Heritage

Edited by Daniela Turcanu-Carutiu

Heritage

Edited by Daniela Turcanu-Carutiu

IntechOpen

Supporting open minds since 2005

Notice
Statements and opinions expressed in the chapters are these of the individual contributors and not necessarily those of the editors or publisher. No responsibility is accepted for the accuracy of information contained in the published chapters. The publisher assumes no responsibility for any damage or injury to persons or property arising out of the use of any materials, instructions, methods or ideas contained in the book.

We are IntechOpen,
the world's leading publisher of Open Access books
Built by scientists, for scientists

5,000+
Open access books available

125,000+
International authors and editors

140M+
Downloads

151
Countries delivered to

Our authors are among the
Top 1%
most cited scientists

12.2%
Contributors from top 500 universities

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

Meet the editor

Prof. (full) Daniela Turcanu-Carutiu, Ph.D. is the Director of Institute of Science, Culture and Spirituality, Ovidius University of Constanta, Romania, including Center of Expertise Art Works by Advanced Instrumental Methods. Her research interest is in the heritage field: in physico-chemical investigation by advanced instrumental methods for authentication, conservation, restoration art works, archaeology components of cultural heritage, materials: pigments-colors and chromatology. She is the author of a reference book on cultural heritage, co-author of numerous chapters and articles published in internationally prestigious journals, citations in ISI Thomson Web of Science. Her research projects include: an integrated approach for reinforcement of historical chalk monuments by means of nanomaterials based treatments, new diagnosis and treatment technologies for the preservation and revitalization of archaeological components of the national cultural heritage.

Contents

Preface

This book presents research efforts in the field of heritage. According to the principle "Open Minds-Open Science", the approach of the researchers helps us to define, establish and affirm heritage in the cultural, social and political dimension of today's world based on what we have achieved and be specific to the realities of the 21st century. It shows us where we come from, where we are now, and in what direction we might be heading. It highlights both the differences between countries and regions and the mutual exchanges.

Culture is a common system of symbols that determines our perceptions, representations and actions. It regulates the relationships of its members between themselves and with the environment in which they live. Culture is a flexible system that makes it possible for individuals to integrate into the system and adapt to other cultural systems. Transculturality transcends the traditional boundaries of cultures in our time. The follower of a culture agrees to embrace both his own values and those belonging to a world different from his own. Cultural heritage is made up of many big and small things. It is preserved through books, artifacts, objects, images, photographs, art and oral tradition. Sometimes we can touch and see what a culture is, other times it is intangible. The cultural heritage consists of testimonies with historical, archeological, documentary, ethnographic, artistic, scientific, technical, literary, cinematographic, numismatic, philatelic, heraldic, bibliophile, cartographic and epigraphic value, representing material testimonies of the evolution of the natural environment and human interaction with it, of the human creative potential and of its contribution to the universal civilization.

From this point of view, this book, *Heritage*, is transdisciplinary and contains the most diverse topics related to culture, art, nature, science, diplomacy and cultural policy. The volume is structured in six sections and several chapters, as follows.

The Cultural Heritage section, chapter Significance in African Heritage brings a wealth of information about the African heritage. The Cultural Heritage Objects of Southern Benin: Plant Dyes and Exudates Used în Their Confection chapter contains results of research and analysis carried out in a multidisciplinary context and provides information on the techniques formerly used by artists and craftsmen as well as on the original materials used. The Promoting Territorial Cultural Systems through Urban Planning chapter presents a topic about promoting territorial cultural systems through urban planning. In this context cultural heritage it is shown as the driving force of development and the planning process must be able to construct shared development scenarios. The Historic Masonry chapter shows that different types of historical masonry that have remained over time are characterized by an adequate mixture of materials with low chemical reactions that are degrading due to environmental conditions. In the Cultural Heritage of a Three Centuries Old Wooden Church chapter the research team consider that archaeo-materials are a good solution due to high degree of compatibility with the original pigments and all materials. The Tropaeum Augusti (France) and Tropaeum Traiani (Romania): A Comparative Study chapter is focused on the long-term sustainability of these heritage monuments, which today represents the guarantee of the legacy of

the Roman times and Latin times in the two European extremities, respectively the West and the East.

The Natural Heritage section, the chapter on What Does the Mass Accumulation of One Hundred Late Pleistocene Fallow Deer Skeletons (*Dama geiselana*) and Red Deer Skeletons (*Cervus elaphus*) from Neumark-Nord Reveal about the Cause of Death? is focused on the study of several disasters in different years, which have led to the mass occurrence of deer. The biochemical results obtained by absorption spectroscopy and RP-HPLC with UV-detection showed that pigments, and probably toxins, characteristic for cyanobacteria are preserved in the sediment.

The Intangible Heritage section presents immaterial treasures. The Thanking in Cameroon French chapter presents a study focused on the analysis of pragmatic and linguistic choices made by Cameroon French speakers when expressing gratitude in three different situations. The Research on Works of Historian Virgil Drăghiceanu Discovered in the Archives of Romania's Historical Monuments Commission chapter is a journey following the career of Virgil Drăghiceanu dedicated to protecting historical monuments. The Research of the Musical Folklore from Maramureș - Chioar Area chapter makes significant contributions through in-depth scientific research tools that gather numerous data on the evolution of Romanian folklore.

The Biotechnology section speaks about science. The chapter on A Survey of Physical Parameters and Natural Radioactivity in the Wooden Church of "Archangels Mihail and Gavril", Draghia demonstrates that one of the most important environmental problems is the global climate change and its impact on the historical monuments in their natural space of conservation. The Technical-Experimental Methods Used in Artwork's Expertise chapter presents a very interesting original topic about how the synergistic methodology used in this case defined as a sum of methods and procedures in the trans- and interdisciplinary field, introduces the notion of "health" in the field of restoration artworks, changing the paradigm in the sense of approaching as a whole. The Biotechnology and Cultural Heritage Conservation chapter presents an extremely interesting unique subject and an example that gave good results showing that the wells are colonized differently by several biological systems.

In the Artificial Intelligence section, the chapter Automation of the Expertise of the Roman Mosaic Arts in Constanta: Analytical and Statistical Models for a Fuzzy Inference-Based System talks about analytical and statistical models for an inference-based system use of analytical models for statistical evaluation of the morphological and chromatic characteristics that represent suitable metrics for making decisions in the field of cultural heritage.

In the Ideological Interaction, Public Governance and Diplomacy in Cultural Space section, the chapter The Ideological Interaction Theory in Critical Discourse Analysis chapter aims at reframing decisions with exploring the cultural as well as ideological perspectives of the communial and idiosyncratic styles. The chapter focuses on the development of the ideological- interaction theory for connecting the discourse with language and personal thought. The chapter Public Governance and Cultural Heritage: Exploring the Links between Culture and Social Indicators with the Principal Component Analysis shows how the approach and governance strategies have an impact on the cultural dimension. The Public Diplomacy in Cross-Border Cooperation chapter deals with complex studies of the Finnish case particularly migrants' inclusion analysis into local cultural and political

environments as well as public diplomacy impact evaluation of an important "soft power" tool where migrants role is rather high. The Public Diplomacy: Functions, Functional Boundaries and Measurement Methods chapter shows that although public diplomacy performs such functions, it is not necessarily effective, especially in 'high politics' such as territorial security. The China's Use of Public Diplomacy in the United States: From World War II to the Twenty-First Century chapter examines China's use of public diplomacy in World War II. By sending personal representatives to the United States to lobby the American public on China's behalf, Chiang Kai-shek was able to negotiate favorable public opinion in the United States that influenced US policy-makers.

I hope that this book will be a useful contribution to the current and future generations of researchers in the field of Heritage.

I would like to give special thanks to all the authors that contributed to this book: Kiriama Herman, Rotondo Francesco, Maldonado Noemi, Sasarman Patricia, Gramescu Ana Maria, Pfeiffer Deml Tekla, Mulo Farenkia Bernard, Udrea Florentina, Uta Vasilica Larisa, Tenter Ancuta, Schroder Verginica, Palla Franco, Ionita Silviu, Munteanu Ionela, Pitukhina Maria, Cao Wei, Burt Sally, and to all members of their research teams.

Daniela Turcanu-Carutiu
Ovidius University of Constanta,
Romania

Section 1

Cultural Heritage

Chapter 1

Significance in African Heritage

Herman Ogoti Kiriama and Edith Nyangara Onkoba

Abstract

Heritage professionals are at all times called upon to make significant judgments about heritage places/objects. There is a supposition therefore that heritage places or objects have intrinsic values that need to be discovered and assigned. This paper, using various examples from Africa, however, argues that values are not intrinsic to heritage but are a construct of heritage professionals/community, and therefore, a heritage place/object can have various values depending on who is making the judgment. It therefore follows that if values vary according to who is assigning them, then the significant/insignificant of a heritage place and object will also vary from one person/ community to another. The paper concludes by arguing that significant/insignificant judgments are hegemonic constructions between contending forces, and therefore, it is difficult to have a universally accepted significant or insignificant judgment.

1. Introduction

Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation [1]. It is now widely acknowledged that heritage is not only manifested through tangible forms such as artefacts, buildings or landscapes but also through intangible forms such as voices, values, traditions and oral history [2, 3]. Cultural heritage and especially its intangible dimensions act as a means of preserving the links between the past and the present and also allows the transmission of its different shades and colours to future generations [4–6]. This notion has led to the conservation etic which argues that for heritage to be available to the future generations, it must be managed [7]. For this management to happen, it is assumed that a community has to have some values or significance for the heritage and this value is determined by an assessment that is governed by a stringent criterion. This premise has led to an entrenchment of practices, mostly Eurocentric, of valuing heritage in the world [8, 9]. Consequently, a number of scholars and institutions, such as Mason [10], Australia ICOMOs [11] and English Heritage [12], just to name a few, have provided various definitions of heritage value typologies. According to Mason [10], heritage values refer to the "positive characteristics or qualities perceived in cultural objects or sites" by a certain community; these values are entrenched by both tangible and intangible elements of the heritage. Mason goes on to propose a typology of heritage as a way of establishing a common ground for expressing heritage values by all concerned and in order to avoid a "black box" scenario where values are "collapsed into an aggregated statement of significance" which makes it difficult to conserve divergent values ([10], 8–10). Mason further argues that the usefulness of his proposed typology is in the fact that it includes various values, therefore making the community know that their values are recognised.

Carter and Bramley [13] see values as the intrinsic and extrinsic qualities of heritage places that are deemed by a person, group or community as important and desirable. Further, they argue that intrinsic values are assessed objectively while extrinsic values are judged by personal, social and cultural standpoints and are, therefore, subjective; in other words, heritage values are seen as being susceptible to nationality, gender, ethnicity, class, religion, poverty, insideness, expertise and age ([14], 213). Therefore, while values are a key factor in heritage formation, however, when there is no social contact, production and dissemination of knowledge as well as spatio-temporal structures in which "such processes can take place, values would simply remain values" [15].

According to the Burra Charter [11, 16, 17], cultural significance is the "aesthetic, historic, scientific or social value for past, present or future generations" ([18], 9–10; [19], 297). These values therefore, need to be carefully understood in order to establish the cultural significance of the heritage place. Further, the Burra Charter, sees cultural significance as a mechanism that assists in assessing the value of places and thus can provide knowledge on the history of the heritage and enable appreciation of that heritage by future generations. The Burra Charter stands out in the fact that it stresses the importance of involving the local community in the determination of the values of the heritage place. Thus, the key concept of a values-based approach is that of stakeholder groups; the approach advocates for the recognition and equal involvement of all types of stakeholder groups and their differing values [20]. As a result, many countries, especially those in Western Europe, North America and Australia, who have embraced the value-based approach to significance, have put much efforts in trying to fully involve communities, especially those perceived as marginalised, in the determination of values of local heritage places. Fredheim and Khalaf [21] however, argue that because of the difficulties involved in interpreting the various values, it is impossible to have a value-based typology that is universally accepted. Johnston [22] argues that the formal adoption of values into criteria and legal frameworks brings in the possibility of imposing a culturally-specific framework that requires values to "fit" into this framework and if they do not fit, they are removed. Unfortunately, however, despite this reservation by Johnson and others, this value-based criterion has been widely accepted globally and it is now being used in determining the significance of a site before inscription, not only on the World Heritage List, but on some countries' local and National Lists as well ([22], 3). Indeed, in Australia, this value-based typology is what the various state governments use in listing sites in their State lists. Not to be left behind, most countries, especially those in Africa and even some western governments, have also used this value-based typology in determining the significance of their heritage places. For instance, in Kenya, the National Museums Act describes a monument "as a structure which is of public interest by reason of the historic, architectural, traditional, artistic or archaeological interest attached to it" (Government Printer 2006) [23].

The Queensland Heritage Act 1992 defines significance as relating to history, rarity, research potential, the exemplification of particular classes of places, aesthetics, and creative, social or cultural association, or association with a significant person [13]. Thus, for both the Kenyan government and the Queensland state government, an object has value only if it is *historic, aesthetics, architectural, traditional or archaeological*; in other words, if an object does not conform to any of these values, it is not significant, it is insignificant; in other words, this valuing automatically privileges some places/objects over others; it is a comparison process that creates categories of values leading to some objects/places being seen as having important values and thus regarded as significant while other objects/places are seen as having less values and thus regarded as insignificant. The fundamental

assumption of the conferring of significance on an object/place is that significance has realism (that significance is "intrinsic" to objects – in other words, that in spite of what we may want, objects do possess significance on their own) [24]. Therefore, a site with a high social significance (e.g. because it is highly visible in the landscape) might be considered to have great significance, although its intrinsic value to understand the past is not very high.

It should however, be noted that values do change; even in those so called "traditional" communities values are not universally accepted by every member of the community; there are always dissenting voices- people who ascribe different values and hence significance- other than that held by other members of a community, to a place or object. Alternatively, over time, values and significance can also change [25]. This then means that the values professionals ascribe to a place/object may not be universally accepted by all members of a community. In other words, a site can have several values assigned to it by professionals, but if those values do not resonate with the local community, it can be deemed to be insignificant to the community. This is the case with Khami World Heritage site in Zimbabwe. Khami, inscribed on the World Heritage List in 1986, is the second largest Zimbabwe Culture (an archaeological culture that marks the development of complex state systems in southern Africa site) after Great Zimbabwe ([26], 1). Khami together with Great Zimbabwe and Mapungubwe in South Africa, are the only three Zimbabwe Culture sites inscribed on the World Heritage List [26]. The site of Khami was nominated and inscribed into the World Heritage List by heritage professionals and without the input from local community. Thus, the local communities do not consider it significant to them and this has led to, in the words of Sinamai "to the disinheriting of the site by the local populace" ([26], 4). The disinheriting does not stem from the fact that local people were not involved in its nomination, but rather from the fact that as a result of historical facts that has resulted in population movements in the region and shifting identities, the local community no longer have any emotional attachment to the site and thus the locals do not see it as representing their narratives. According to Sinamai ([26], iv), "Khami is an inherited place, with a local community that has forgotten it." Though Khami is a magnificent monumental site that inspires and is significant to heritage professionals, it is however, insignificant to the local community. This case shows that values and therefore significance and insignificance, are context dependent and "certain cultural settings seem to privilege the production of one type of heritage more than another" ([26], 4). Further, this example shows the difficulties intrinsic in assessing values and assigning significance of a heritage place because of the multiplicity of values and their innately contested and changing nature [13, 27, 28]. This example also shows the difficulties encountered when trying to define a "local community" of any given heritage place [29].

The problem with many values statements is that in most cases they tend to privilege physical – the architectural and archaeological evidence over the social values and the lives of the affected communities or they carry out what Steve Brown calls "fabric over feelings" heritage narrative [30]. According to Brown, a statement of significance for an object or place should also include the emotions. This is because all places/objects that have been used by individuals will always have narratives that give the individual's perspective of the place and evoke emotions and thus enable readers to have an understanding of the place/object. Further, Brown [30] argues that the "narrative also tells the reader something of time, memory, and place."

As said before, the desire to attach values to heritage places was not only because of the need to involve communities, especially the marginalised ones, in the management of their heritage places, but also to ensure that heritage needed to be seen

as contributing to the sustainability of these communities. Consequently, heritage was ascribed various values that include economic, political, social, religious, educational and others. Whereas the potential contribution of the other values to sustainability could be seen and have thus, been given prominence in heritage discussions, the potential of the social value on the other hand, has not, especially in Africa, been appreciated and has accordingly, not been given much prominence, and yet it is this value, which much more than all the other values, that ensures the sustainability of African communities. The next part of this paper will consider this value.

2. Social value

As individuals or as members of communities, people are all the time engaged with the landscapes where they live or work. According to Byrne et al. ([31], 3) part of this engagement includes "people giving meaning to places through the events in their lives which have taken place" in landscapes. Generations pass knowledge of these events down to each other. Often the events have left no mark on the places or on the landscapes, but people remember what has happened; they keep memories. It is as if people carry around in their heads a map of the landscape which has all these places and their meanings detailed on it. When people walk through particular landscapes, the sight of a place will often trigger the memories and the feelings – good or bad, happy or sad – which go with them. This is the other side of the conversation: it is the landscape talking back. The key thing is that a heritage practitioner, who is a stranger or outsider in these local landscapes, can never discover this world of meaning just by observing a place. They can only know about it by talking to "people giving meaning to places through the events in their lives which have taken place' in landscapes'' ([31], 3). An object/place becomes significant because it is meaningful or it has meaning to a group of individuals or a community. Social value therefore is the distinct meanings that a community, rather than individuals, ascribe to places [32]. In other words, social values are all those values expressed by the community and which fall outside the professional framework [32]. Accordingly, the Australian State of Queensland (2017, 18) has developed the following definition of social significance/social value:

> *The social significance of a place is derived*
> *from a perceived meaning or symbolic,*
> *spiritual or moral value in the place that*
> *is important to a particular community or*
> *cultural group and which generates a strong*
> *sense of attachment*

The Declaration of Oaxaca, prepared by the Mexican Committee of ICOMOS, tries to show how a community's role in the creation, maintenance and giving meaning to places can be respected. According to the Declaration, the people who create heritage, and for whom it is part of their daily lives, are best placed in conserving this heritage through the continuity of traditional practices [33]. There is a danger of destroying this heritage when the role of defining and conserving this heritage is given to the "experts" as this alienates the traditional keepers from their heritage. In other words, the people who live in a certain place or attached to an object, do not only continue maintaining that place/object, but also that the place/object exists because of the continuous interaction that the people have with it and it is from this interaction that the place/object gets its meaning [32]. Therefore,

these are the ideal people to define the significance of the place. The local people are the ideal ones to define significance because as Meinig [34] argues, the same landscape may have different meanings to different people:

> *… even though we gather together and look in the same direction at the same instant, we will not - cannot see -the same landscape. We may certainly agree that we will see many of the same elements -houses, roads, trees, hills -… but such facts take on meaning only through association … any landscape is composed not only of what lies before our eyes but what lies within our heads.*

A good example of this assertion by Meinig – how a landscape can have different meanings to different people is seen in Chinua Achebe's [35] short story, "Dead Man's Path." This is a story of Michael Obi, a young man who has been appointed as head teacher of a mission school, the Ndume Central School, that is situated in what is considered by the missionaries as a "pagan" area. Obi wants his school to be the perfect, beautiful, and successful school in the mission system. With the help of his wife, he transforms the school compound into an English garden, complete with flowers and hedges around the school buildings. Passing through the school however, and without Obi's knowledge, is a little-used path that connects the village shrine with the local cemetery. When he learns of this path, Obi constructs a fence to block villagers from using the path through the school. Obi informs the village priest about the erection of the fence, and the priest protests the fencing of the path telling Obi that "the whole life of the village depends on it. Our dead relatives depart by it and our ancestors visit us by it" ([35], 249). The priest also warns that if Obi obstructs the path, then he will cut "the path of children coming in to be born" ([35], 249; [36]).

The stance between Obi and the priest is an instance where two people, though from the same community, have different understanding of the significance of the landscape. To the priest and the other villagers, the path through the school, though seldom used, is not only to go to the burial place, where people, who soon will be the ancestors of the living are buried, but it is the path that the living and the dead, the present and the future interact with one another and thus ensure the sustainability of the community; the living (present) use it to bury the dead, the dead who are now ancestors(past) use it to visit the living (present) and the children to be born (future) use it to be born. This is the significance of the landscape that Michael Obi did not understand or he refused to understand because of his conversion to Christianity. This example not only shows how different people recognise the social value of a place/object, but also calls for creation of a methodology of valuing heritage that recognises that the social value (significance/insignificance) of heritage is not only about the past but is about the present and future, because the past is found in the present, and that this awareness is significant for a "future meaningful existence" ([37], 3; [38]). This brings to mind the experience I and my team encountered when in 2013 we were excavating inside Mudzi Mwiru, one of the sacred Mijikenda Kayas of the Kenya coast. Mijikenda kayas, listed in the World Heritage List in 2008, are considered by the Mijikenda people as sacred because they are the abode of their ancestors and a source of the Mijikenda identity [39]. As a result of their sacredness, only initiated elders are allowed to enter the kayas [40]. Therefore, before being allowed to carry out excavations inside the kaya, the Kaya elders had to carry out special ceremonies in order to appease the spirits of the ancestors and also

ask their permission for us to carry out the excavations. Without the ceremonies, it is believed, we could have been harmed by the ancestral spirits. In order to ensure that no harm befell us during the excavations, one of the senior elders stayed with us most of the time of the excavation. In between the excavations however, this elder had to go and join the other elders for a ceremony in another Kaya. The next morning as we started the excavations without the elder, we noticed a green mamba snake coming slowly and perching itself on top of a tree near where we were excavating and stayed there till the end of the day and as we prepared to leave the site, it also left. The snake did this for the 3 days that the elder was absent but disappeared the day the elder rejoined us. When we told the elder about the incident, he said that that was the guardian he had sent to stay with us in order to avoid the wrath of the ancestors. The appearance of the snake may appear insignificant, but to the elders of the Mijikenda, it is an affirmation of the sacredness and therefore significance of the kayas to the ancestors and the local community [39]. Peter Schmidt [41] reports the same visitation of an ancestral spirit in the form of a snake when he was excavating one of the royal palaces of the Rugomora Mahe kingdom in Tanzania. The experience makes Schmidt to conclude that "we must be sensitive to and familiar with the roles that ancestors take in guiding, limiting, and insisting on the manner in which behavior and its materialization take shape" ([41], 61).

The examples above show that, in Africa at least, there is need to be cognizance of the important role that ancestors or spirits play in the construction of the significance or (in)significance of heritage places/ objects; that heritage places/objects are not significant or in(significant) "because of their material value, but for the meaning and sometime also for the spiritual life present in them" [42].

Further, these examples are a challenge "not only of the conventional wisdom surrounding what constitutes value, significance and meaning in places of heritage, but also the decision-making processes that determine what is celebrated or over-looked, and therefore also what is preserved or let go" ([43], 114). In order to know, the value and significance of such places, it needs one "to be "tuned in" to the local cycles and rhythms of nature, while also being aware of the processes of management, inhabitation and place-making they embody and reflect" ([44], 5 quoted in [43], 117).

Social value therefore, is the value that the community would attribute to a place. As shown above, different communities and even groups within the same community, will have different values for the same place depending on the experiences that each community/group has had with that place/object. Further, social value exemplifies how the community assesses meaning at the present time and, thus such meaning is likely to be continually redefined, reviewed and restated. This means that social value of a place/object may change from time to time and that future generations may have a different social value for a place/object from that held by the present generation. For instance, it is now widely accepted that Female Genital Mutilation (FGM) is a retrogressive practice and most governments in the world have passed legislation banning it and imposing severe penalties amongst those found practising it; the Kenyan government is one of those governments that have enacted legislation outlawing FGM. Despite the existence of the ban however, some members within the Somali and Abagusii ethnic groups of Kenya, still continue the practice, though in secret. More intriguing is that amongst the Abagusii for instance, it has been found out that the people at the forefront of perpetuating the practice are medical practitioners; they are the ones who are hired by parents of girls who are to be initiated to go and carry out the initiation. The continuation of the practise amongst these groups is because it is deemed to have social value within these communities; FGM, in the opinion of these communities, enables young girls to move from youth to adulthood, and more importantly instils in the

girls proper morals and prepares them to be dependable wives and mothers; to these members, FGM or circumcision as they call it, plays a significant role in identifying the "true" daughters of these communities. The groups believe that anybody who has not undergone the rite is still a child and deserves no respect in the community. These FGM adherents have, to paraphrase Dickerson [24], not only recognised the existence of their communities- the Somali and Abagusii, but have also constructed or aim to construct what can be called a "pure" community – one that wants to protect the "integrity" and "traditions" of their ancestors; these members see themselves as having the ethico-political responsibilities towards their communities and therefore have responsibility of making significance judgments over the rest of the people. This making of significant judgments is an exercise of power and authority; the members still practising FGM see themselves as custodians of age-old traditions and therefore have moral authority of ancestors to continue the practise as this is the only way of preserving their communities. This same argument can be extended to the destruction of Bamiyan Buddhas[1] in Afghanistan by the Taliban, who justified the destruction by the argument that erecting of statues was against the tenets of Islam and it was their duty to preserve the purity of Islam by destroying the statues [45]. These are groups who, driven by nostalgia, want to use the supposed significance of a rite, such as FGM or destruction of heritage places "to restore an earlier state of society" ([46], 2). The importance of this value however, is only for the present generation because as time goes by, the coming generations may abandon such traditions; in other words, social value, as all other values, is transitory [32]. These examples show that "Communities, are diverse, fragmented and complex; some are progressive, some are not" ([47], 3) and therefore there can be no universal significance; what is significant to one set of the community will be insignificant to the other.

The attribution of values to heritage, whether done by experts, an individual who has experience in that heritage or a community, shows that heritage can be used to create and influence a whole range of important relations within a given society such as the establishment of power relations and dominance ([48], 41). Thus, as Smith [49] argues "what makes these things valuable and meaningful - what makes them "heritage", or what makes the collection of rocks in a field "Stonehenge" - are the present-day cultural processes and activities that are undertaken at and around them, and of which they become a part." Consequently, and as we shall shortly see below, a place is significant or (in)significant because somebody has decided to bestow or not to bestow certain values on that place. As the saying goes, beauty is in the eyes of the beholder; so is significance and (in)significance.

3. Significance in African cultural heritage

Africa is rich in cultural heritage, and this ranges from the tangible heritage to the intangible heritage. The various elements of heritage provide communities with the opportunity to establish an active relationship between the present and the past. According to Munjeri [50], the interpretation of the tangible can only be done through the intangible. Thus, as Tosh [51] argues, oral history (intangible heritage) is "an effective instrument for re-creating the past" by virtue of being "the

---

[1] The Buddhas of Bamyan were two 6th-century monumental statues of Gautama Buddha carved into the side of a cliff in the Bamyan valley in the Hazarajat region of central Afghanistan, at an elevation of 2500 metres (8200 ft). They were built between 507 CE (smaller) and 554 CE (larger). They were dynamited and destroyed in March 2001 by the Taliban, on orders from leader Mullah Mohammed Omar, after the Taliban government declared that they were idols.

authentic testimony of human life as it was actually experienced." The custodians of heritage in most African communities were or in some cases still, are the elders, both male and female; in most cases, these elders have been specially chosen by the ancestors to be custodians of the heritage places, objects or memories (tales/myths). These elders will jealously guard both the tangible and intangible heritage (places, objects and memories) so that they can maintain them in the status that they received them; they cannot add or subtract anything. In other words, the significance of African heritage is passed down through the generations by the elders who are considered as the custodians of the indigenous knowledge. These custodians do not separate natural heritage from cultural heritage and therefore the intangible cultural heritage is perfectly interweaved with the tangible as well as with the supernatural.

A combination of factors that include colonialism, introduction of western education and Christianity and Islam, has seen Africa witness a confusion in the assessment of significance of its heritage places. This is largely because both the colonial administration and missionaries perceived African knowledge systems as negative and primitive and therefore, these systems as expressed through cultural heritage practices and places/objects were abhorred; for instance, Christian missionaries identified African religious shrines and other religious places as the abode of the devil [41]. Consequently, when the colonial government believed that a certain heritage place/object merited protection, provision was made, based on a western based value typology, for the protection of only the physical aspects of that heritage [2]. In colonial Zimbabwe (Rhodesia), for example, the site of Great Zimbabwe was, purely based on the value of its physical attributes, preserved; the values, such as spiritual and religious, that the local community attached to the site were ignored. Further, the colonial government used the physical value to bolster its claim that Great Zimbabwe was constructed by non-indigenous people [26]. On the other hand, the independent government of Zimbabwe has used both the western based value typology as well as the indigenous value systems to argue for an advanced ancient African civilization at Great Zimbabwe. Concomitantly, the same government of Zimbabwe has used a western based value typology to nominate the site into the World Heritage List. The same system of western versus indigenous value systems is also seen in South Africa where heritage sites such as the Voortrekker Monument and the Castle in Cape Town were established to uphold the history of the Afrikaner and the white colonial rulers. The experiences of the indigenous people of South Africa, such as the Khoisan, as well as the heritage of ordinary black people, were ignored. To ameliorate the situation, the post-apartheid government has set up the Freedom Park where the memories of the "other" South Africa are commemorated. These examples indicate that to a large extent as Tunbridge and Ashworth [52] have shown, heritage is often one-sided and therefore the significance of any heritage will vary from one community to another; from one period to another and that the same heritage place or object can have multiple significances; an heritage place/object can be insignificant to one group while significant to another. That notwithstanding however, we believe that with proper handling, the various significances can be married together in order to achieve a common value for the heritage place or object. This is because within every heritage place or object there are threads, whether positive or negative, that link the communities which experience that heritage. The weaving of these threads will lead to the understanding of the connections that exist between and within those communities or group of people experiencing that heritage. Understanding how the various groups value this heritage can therefore lead one, to the safeguarding of heritage as a valuable resource for future generations and two, to the achievement of social cohesion within the society.

Africa has a number of heritage places (monuments, distinctive sites, rock art and historic landscapes) which though they have been used by various communities as a means of preserving the collective memories of the communities at various stages of their development, the way of valuing and determining the significance of this heritage, has however, been a source of contradiction and conflict. For instance, for a long time, postcolonial Kenyan governments have not been at easy in recognising the role that the Mau Mau insurgency played in the liberation of Kenya to the extent that the proscription of the Mau Mau movement put in place by the colonial government in 1952, remained in the statute books even after the attainment of independence in 1963 [53] and was only repealed in 2003. In 2006 the new government of Kenya erected in Nairobi, the statue of Dedan Kimathi, the Mau Mau general who was executed by the British in 1957. Kimathi clad in military regalia, holds a rifle on the right hand and a dagger on the other, symbolising the last weapons he held. This was a way of the new democratically elected government, in contrast to the other two previous (despotic) postcolonial governments, acknowledging the significance of the Mau Mau rebellion in the liberation of Kenya; the statue has thus been used to give significance to an event that some of the populace did not acknowledge as being of any significance to their lives [3]. The same is the story in South Africa, where after the end of apartheid in 1994, the new government instituted the Legacy Project, in which it encouraged the founding of post-apartheid heritage institutions such as the Apartheid Museum, District Six Museum and Freedom Park that were given the responsibility of using heritage as an avenue for forging a new national identity for South Africa [54]. These institutions were to create new significances for heritage that will be used in articulating the values of the new dispensation as well as contributing to cultural empowerment of formerly disadvantaged communities ([3], 13; [54], 95). The significances attached to these new heritages by the post-apartheid government and the general populace was however, contested by those who benefited during the apartheid era. The new heritages were insignificant to them though they were seen by the post-apartheid government as being significant in the construction of a new South Africa.

As said before, an outsider heritage practitioner will find it difficult to understand the significance of a heritage place without talking to the local community. This is remarkably so at the site of Osun-Osogbo, a sacred grove in southern Nigeria. The grove is regarded as the home of Osun, the goddess of fertility and is dotted with sanctuaries and shrines, sculptures and art works in honour of Osun and other deities. As in other parts of Africa, the magico- supernatural has been interwoven into the Osun-Osogbo landscape, thus enhancing the significance of the site; the tangible and the intangible have been intertwined together to tell the story of the founding of the site and identity of the Yoruba people. The Osogbo Heritage Council has, without writing anything down, used the shrines and sculptures inside the Osogbo site as a way of telling both the legendary and traditional history of Osogbo [55]. The legendary history is about the goddess Osun or Oso Igbo who is attributed to be the founder of Osogbo while the traditional history is about the coming of Laroye and Timehin in the 17th century and their encounter with the goddess and establishment of a settlement on the banks of the Osun River. Thus, the shrines and sculptures at the site have been used to provide significance and identity to the Yoruba people as they tell the migration history of the people of Osogbo ([55], 49). This significance can however, only be understood by the Yoruba people; no outsider can understand the significant role that each of the sculptures at the site have for the construction of the identity of the Yoruba people.

The Sacred Mijikenda Kaya Forests in the Kenya coast are another good example on how what is significant to one group or individual can be insignificant to another. The Kaya forests are remnants of a once extensive Eastern Africa lowland

forest. The coming into being of these sacred forests is linked to the development of the Mijikenda ethnic group; a grouping that comprises nine communities speaking a mutually intelligible same language save for dialect diversity and, who claim descent from one ancestral area of Shungwaya [56, 57]. In their oral traditions, the Mijikenda claim that when their ancestors arrived in their present area, more than 600 years ago, to protect themselves from marauding neighbours, they set homesteads or *Kayas* in six fortified hilltops. Later the communities started to settle outside the fortified forests but the local elders, through the council of elders, continued to protect the original Kayas as sacred places and burial grounds [58, 59]. The memorial posts or *vigango* that are placed at the head of the graves of departed elders, connect the living with the dead and guarantees that the departed elders continue to protect the living from misfortunes. The governance structure is led by the Council of Elders who are responsible for enforcing the rules and regulations of the kayas as handed down to them by their forbears. This system is well understood by all community members and offenders conform to any punishment meted out to them by the Council of elders. In 2007, the Kenya government applied for the listing of the Kayas in the World Heritage List. Subsequently an evaluation team was sent by the World Heritage Centre to evaluate the site and the nomination. After visiting the site, the team made its recommendations but one that baffled the locals, was the assertion by the team that the Kayas did not seem to have a strong management system. This despite the fact that the team had been introduced to the council of elders who manage the site; despite the fact that the sites could not have been preserved to that particular moment were it not for the activities of the council of elders in enforcing the traditional rules and regulations. The point then is that this evaluation team did not recognise or understand the significance of the management system led by the council of elders. To the evaluation team therefore, the kayas were insignificant because they did not have a clear management system as understood in the western world. The council of elders were not a management system and therefore the kayas did not meet the criteria of significance. To the local community however, the kayas were the most significant heritage place and the council of elders was the most significant aspect for the maintenance of not only the kayas, but the physical and wellbeing of the entire community. This case illustrates how heritage practitioners schooled in the western paradigm, are unable to appreciate the "sacramental nature of the landscape" [60], as held by the local community. As Byrne [61] argues, "to reconcile heritage practice and "the supernatural", we need to better understand the context our practice has in modernity." That is when the significance of the "other" will be our significance.

The (in)significance of heritage places is well documented when it comes to open spaces. Places that have no built physical structure but which people have imbued significance because of the activities that are carried or used to be carried out there. One such example is the Freedom Corner, inside Uhuru Park in Nairobi, Kenya. In 1991, women democracy activists used this place to demand the release of opposition politicians who had been detained by the regime of then President Moi. Subsequently, whenever the opposition wanted something from the government, they would congregate at the site. This part of the park has since then become a significant focal point for critics of every Kenyan government; it is therefore a significant element for the democratisation of the Kenyan nation. In late 2015 however, the British government, as part of its response to a petition in the British courts by the Mau Mau war veterans asking for compensation for atrocities committed against them by the Kenya colonial government, built in a section of Freedom Corner, a Mau Mau remembrance monument [62]. One can argue that the choosing of the Freedom Corner as the home for the Mau Mau monument was an acknowledgement of the significance of the Freedom Corner in the democratisation of the

Kenyan nation and therefore, the Mau Mau rebellion being a precursor of the later struggles, had no other better place to be commemorated other than the Freedom Corner. On the other hand, one can argue that since the Freedom Corner is on the far part of Uhuru Park, where people do not frequently visit, the aim of the British in constructing the Mau Mau monument there was to show the insignificance of the Mau Mau rebellion to the British and what better place to do so than an obscure space of a popular park!!

Indeed, the fact that different individuals, groups of people and communities value a heritage place, site or object differently and according to the exigencies of the time, was seen during the debates for the removal of the statue of Cecil Rhodes from outside both the University of Cape Town in South Africa and Oriel College in Oxford. In South Africa, one of the protesters said that the call for the removal of the statue is a "metaphorical call for the transformation of the University of Cape Town's culture and faculty, which many blacks feel are alienating and still reflect a Eurocentric heritage" [63]. In the same vein, one Oxford student who did not want the statue removed said, "The Rhodes statue stands as a reminder that we have a long way to go in accepting our history……. the statue should stay and remind us that Oxford has much to do to redress its racial imbalances" [64]. These exchanges show that heritage is a dynamic and contested element whose significance or insignificance is constructed separately by different groups of people and this makes it difficult for one group to claim to have powers of determining significance of a heritage site or object.

Just as the authorities, through what Smith [49] calls Authorised Heritage Discourse are able to use heritage to foster their hegemony, the subalterns do also usurp the same heritage to give voice to their story; their construction of significance of a heritage will be different from that of the authorities or superior communities. The example that comes to mind is that of the 19th century runaway slaves (*watoro*) of the Kenya coast. When these slaves ran away from their masters, they were either integrated into the indigenous communities, joined the Christian mission stations or formed their own independent settlements in the coastal hinterland where it was easier for the runaways to avoid recapture by their masters. Some of such independent settlements include the sites of Koromio and Makoroboi in present day Kilifi County (Marshall, 2011).

The slaves in coastal Kenya came from all over Eastern Africa, but in particular from southern Tanzania, Mozambique, some parts of Kenya and the majority coming from Nyasaland (present day Malawi). Determined that their geographical and cultural identities are not lost, the watoro re-introduced several of the dances from their original homeland that had become insignificant during their enslavement. Such dances included *kimungwe, kinyasa, kindimba, kunju,* and *kinyago* [65]. Though these dances enabled the former slaves to remember their origins, these former slaves and their offspring however, influenced these dances to their benefit in such a way that the freeborn indigenous Mijikenda, and who owned the land on which the watoro lived, became for a little time inferior to these ex-slaves. Though kinyago is an entertainment dance, the watoro made it a contested arena to enable them become different from the Mijikenda, as well as the former plantation slaves who had been liberated under the 1907 abolition ordinance. First, though kinyago is a dance that can be used to entertain people, the watoro however, turned it into a contested field in order to enable them be differentiated not only from the Mijikenda neighbours, but from the other ex-slaves, the former plantation slaves who had been liberated under the 1907 abolition ordinance.[2] The watoro, having

---

[2] In 1907, The East Africa Protectorate (Between 1895 and 1920, Kenya was formally known as British East Africa Protectorate; between 1920 and 1963, as Kenya Colony and Protectorate) passed an ordinance outlawing slavery.

run away from their masters, considered themselves superior to the other ex-slaves who refused to run away from their masters but instead had waited for European driven emancipation.

To reinforce their authority over the liberated plantation slaves and the Mijikenda, the watoro turned the kinyago into an oracle that was controlled by a powerful cult known as mzinda and which was governed by strict regulations. Any person who transgressed the oracle was heavily penalised. Such punishment amongst others, was said to include the miraculous death of the offender. The watoro therefore, considered themselves as the authentic custodian of the Nyasa heritage and did several other things to ensure the preservation and sustainability of that heritage. To maintain the secrecy of the kinyago tradition, the performers used coded language and composed kinyago songs in the Nyasa language. Masquerades were also made at secret sites in nearby forests while the kinyago was performed at uwanja, an arena that was guarded by a protective charm (fingo) that guarded against the evil spirits. These steps enabled the watoro to safeguard the understanding of the meanings of the kinyago by the Mijikenda unless the watoro taught them. The outcome was the presentation of the kinyago as a mysterious and honored ceremony that only a fortunate few, in this case the watoro kinyago elders, had the key to its appreciation Therefore, the significance of the kinyago ritual is sealed within the watoro community while to other people, it is an inconsequential ritual. In a cunning way, however, the watoro (subalterns) used the significance of the kinyago to build ties with the Mijikenda community and therefore gain status within the larger community [66, 67].

That significance or insignificance is a construct and depends on the socio-political environment and demands of the time is also demonstrated by the village of Shimoni on the Kenyan south coast where though the usage of a cave as a slave pen is contested by the various village communities, these communities are however, marketing the cave to tourists as a slave cave. The presentation of the cave by the Shimoni communities as a significant element of Kenya's slave heritage is done despite the fact that Kenya's national government has not recognised any slave heritage in the country. Thus, the local community, the subalterns, have recognised the significance in the development of slave narrative in Kenya while the government has not done so. The inhabitants (subalterns) of Shimoni have used their own value typologies that are directly opposite to that of the national paradigm (Authorised Heritage Discourse) to construct the Shimoni cave as a significant element of slave heritage in Kenya; this is directly challenging the hegemonic / dominant national paradigm which considers the cave and indeed slavery as an insignificant element in the national narrative [3].

4. Conclusion

This paper has briefly looked at the way significance/insignificance has been constructed. Using various examples from different parts of Africa, it has been shown that significance is a construct that depends on the dictates of the time that includes the socio-political environment within which a community operates. The paper argues that consequently the use of the significance criteria in selecting sites for listing in the World Heritage List may be misplaced because the question that needs asking is whose criteria is it that is used in determining the significance of the site- is that of the professionals/UNESCO or is that of the local community? As Dickerson [24] asks, "how localised can this 'us' be and yet still allow us to make sense of notions like expertise, knowledge, professionalism, and public institutions? because "to claim any 'us' is to speak for, on behalf of, a community – it is thus an exercise of power. What sorts of ethico-political responsibilities towards

communities does the making of significance judgments involve? As the examples we have provided above have shown, heritage is a hegemonic struggle between contending forces in society over who has the right to decide the destiny of the community – whether it is Obi the school teacher, who wants to get rid of "paganism" within the community – by fencing off the local path or, the local priest who wants to preserve the path that they use to bury their dead and commune with the ancestors and thus ensure the sustainability of the community [66]. Both Obi and the elder are claiming an "us" on whose behalf they are making significant judgments regarding the heritage place.

Funding

Disclosure statement

I have potential conflict of interest

Notes on contributor

Herman Kiriama trained in Archaeology and Heritage Management at the University of Cambridge, UK and Deakin University, Australia. He has held a number of academic and professional posts. Currently he is Associate Professor of Heritage Studies at Kisii University, Kenya. Kiriama has written extensively on archaeology and heritage issues. He is the co-editor of the *Journal of African Cultural Heritage Studies* published by the White Rose Press, UK.

Edith Onkoba is an independent Researcher with a Master's degree in Project Planning and Management with a bias on heritage and sustainable development projects.

Author details

Herman Ogoti Kiriama[1*] and Edith Nyangara Onkoba[2]

1 Heritage Studies, Kisii University, Kisii, Kenya

2 Heritage, Research Consultants, Mombasa, Kenya

*Address all correspondence to: kiriamah@yahoo.com

IntechOpen

References

[1] ICOMOS. International Cultural Tourism Charter: Principles and Guideliness for Managing Tourism at Places of Cultural and Heritage Significance. ICOMOS International Tourism Committee; 2002

[2] Abungu G. Africa's rich intangible Heritage: Managing a Continent's diverse resources. In: Michelle LS, Peter D, Gerard C, editors. Safeguarding Intangible Cultural Heritage. Boydell and Brewer: Boydell Press; 2012. pp. 57-70

[3] Kiriama HO. Shimoni: Contested Heritage. Historic Environment. 2009;**22**(3):38-41

[4] Deacon H. Intangible heritage in conservation management planning: The case of Robben Island. International Journal of Heritage Studies. 2004;**10**(3):309-319

[5] Lenzerini F. Intangible cultural heritage: The living cultures of people. The European Journal of International Law. 2011;**22**(1):101-120

[6] UNESCO. Convention for the Safeguarding of the Intangible Cultural Heritage. Paris: UNESCO; 2003

[7] Smith L. Discussion. In: Bendix RF, Eggert A, Peselmann A, editors. Heritage Regimes and the State: Göttingen Studies in Cultural Property. Vol. 6. University of Gottingen; 2012. pp. 389-395

[8] Lowenthal D. The Heritage Crusade and the Spoils of History. Cambridge: Cambridge University Press; 1998

[9] Gosden C, Marshall Y. The cultural biography of objects. World Archaeology. 1999;**31**(2):169-178

[10] Mason R. Assessing values in conservation planning: Methodological issues and choices. In: de la Torre M, editor. Assessing the Values of Cultural Heritage. Los Angeles: The Getty Conservation Institute; 2002. pp. 5-30

[11] Australia ICOMOS. The Burra Charter. 1999. Available from: www. icomos.org/Australia/

[12] English Heritage. Conservation Principles: Policies and Guidance for Sustainable Management of the Historic Environment. London: English Heritage; 2008

[13] Carter RW, Bramley R. Defining heritage values and significance for improved resource management: An application to Australian tourism. International Journal of Heritage Studies. 2002;**8**(3):175-199. DOI: 10.1080/13527250220000/18895

[14] Howard P. Heritage. In: Management, Interpretation, Identity. Bodmin: MPG Books; 2003

[15] Rudolff B. "'Intangible' and 'tangible' heritage: A topology of culture in contexts of faith" [PhD thesis]. Johannes Gutenberg-University of Mainz; 2006

[16] Australian ICOMOS. The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance. Burwood, Australia: ICOMOS; 2013

[17] Australian ICOMOS. The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter). Australian ICOMOS; 1988

[18] Ahmad AG. Cultural heritage of South-east Asia: Preservation for world recognition. Malaysia Townplan Journal. 2006;**3**:52-62

[19] Walker M. The development of the Australia ICOMOS Burra Charter. APT Bulletin. 2014;**45**(2-3):9-16

[20] Poulios I. Moving beyond a values-based approach to heritage conservation. Conservation and Management of Archaeological Sites. 2010;**12**(2):170-185

[21] Fredheim LH, Khalaf M. The significance of values: Heritage value typologies re-examined. International Journal of Heritage Studies. 2016;**22**(6):466-481. DOI: 10.1080/13527258.2016.1171247

[22] Johnston C. Recognising connection: Social significance and heritage practice. Córima, Revista de InvestigaciónenGestión Cultural. 2017;**2**(2)

[23] Hall CM, McArthur S. The human dimension of heritage management. In: Hall CM, McArthur S, editors. Heritage management in Australia and New Zealand: The human dimension. South Melbourne: Oxford University Press; 1996. pp. 2-21

[24] Dickerson A. Significance for whom? Objectivity and community in heritage practice. Paper presented at the symposium. In: Significance, a Discussion about Values and Valuing in Heritage. University of Canberra; 2015

[25] Appadurai A. Modernity at Large: Cultural Dimensions of Globalization. Minneapolis; 1986

[26] Sinamai A. Memory and Cultural Landscape at the Khami World Heritage Site, Zimbabwe. London, Routledge: An Unherited Past; 2019

[27] De la Torre M. Values and heritage conservation. Heritage and Society. 2013;**6**(2):155-166

[28] Demas M. Planning for conservation and management of archaeological sites: A value based approach. In: Teutonico J, Palumbo G, editors. Management Planning for Archaeological Sites. An International Workshop Organised by the Getty Conservation. Los Angeles: Getty Conservation Institute; 2002. pp. 27-56

[29] Ndlovu N. Management versus preservation: Archaeological heritage management in a transforming South Africa. Conservation and Management of Archaeological Sites (CMAS). 2011;**13**(2-3):123-133

[30] Brown S. Reduced to insignificance: Valuing emotion and empathy. Paper presented at the symposium. In: Significance: A Discussion about Values and Valuing in Heritage. University of Canberra; 2015

[31] Byrne D, Brayshaw H, Ireland T. Social Significance: A Discussion Paper. 2nd ed. Hurstville, New South Wales: National Parks and Wildlife Service; 2003

[32] Johnston C. What is Social Value? Canberra: Australian Government Publishing Service; 1992

[33] Australia ICOMOS. Newsletter; 1990

[34] Meinig DW. The beholding eye: Ten versions of the same scene. In: The Interpretation of Ordinary Landscapes. New York: Oxford University Press; 1979. pp. 33-50

[35] Achebe C. Dead Man's path. In: Gwynn RS, editor. Literature: A Pocket Anthology. New York: Pearson Education, Inc.; 2007

[36] Schmidt PR. Ancestors and archaeology in Africa. Africa Review. 2010;**2**(1):41-64

[37] Andah B. Prologue. in cultural resource management: An African dimension. West African Journal of Archaeology. 1990;**20**:2-8

[38] Allom R. Time, love, age, chaos, memory, death, passion and the spirit of

the place: A response to Joan Domicelj's paper: Conflicting cultural values: A challenging resource. In: Assessing social values: communities and experts: a workshop held by Australia ICOMOS, Sydney. 1996. pp. 21-22

[39] Kiriama HO. Intangible Heritage, identity and archaeology at Kaya MudziMwiru, Kenya. In: Ballarin MP, Kiriama HO, Pennacini C, editors. Sacred Natural Sites and Cultural Heritage in East Africa. Kampala: Fountain Publishers; 2013. pp. 100-120

[40] Githitho A. The sacred Mijikenda forests of coastal Kenya and biodiversity conservation. In: Lee C, Schaaf T, editors. International Workshop on the Importance of Sacred Natural Sites for Biodiversity Conservation. Paris: UNESCO; 2003. pp. 27-35

[41] Schmidt PR. Rediscovering community archaeology in Africa and reframing its practice. Journal of community archaeology and heritage. 2014;**1**(1):37-55

[42] Pennacini C. Mubende hill. Preserving and transforming heritage in a Ugandan sacred site. In: Ballarin MP, Kiriama HO, Pennacini C, editors. Sacred Natural Sites and Cultural Heritage in East Africa. Kampala: Fountain Publishers; 2013

[43] Atha M. Ephemeral landscapes. In: Howard P, Thompson I, Waterton E, Atha M, editors. The Routledge Companion to Landscape Studies. London: Routledge; 2019. pp. 113-126

[44] Gammage WL. The Biggest Estate on Earth: How Aborigines Made Australia. Sydney: Allen and Unwin; 2011

[45] Petzet M. Safeguarding the Buddhas of Bamiyan. In: Machat C, Petzet M, Ziesemer J, editors. Heritage at Risk: ICOMOS World Report 2008-2010 on Monuments and Sites in Danger. Berlin: hendrikBäßlerverlag; 2010

[46] Zeit Online. Trump is Emancipating Unbridled Hatred. 2016. Available from: http://www.zeit.de/kultur/2016-10/judith-butler-donald-trump-populism-interview/seite-2

[47] González-Ruibal A, González PA, Criado-Boado F. Against reactionary populism: Towards a new public archaeology. Antiquity. 2018;**92**(362):507-515 & 525-27. DOI: 10.15184/aqy.2017.227

[48] Graham B, Ashworth GJ, Tunbridge JE. A Geography of Heritage: Power, Culture and Economy. London: Arnold; 2000

[49] Smith L. Uses of Heritage. London: Routledge; 2006

[50] Munjeri D. Tangible and intangible heritage: From difference to convergence. Museum International. 2004;**56**(1-2):12-20

[51] Tosh J. The Pursuit of History: Aims, Methods and New Directions in the Study of Modern History. 6th ed. London: Longman; 2015

[52] Tunbridge JE, Ashworth GJ. Dissonant Heritage: The Management of the Past as a Resource in Conflict. Chichester: John Wiley; 1996

[53] Kanogo T. [1987]. Squatters and the Roots of Mau Mau, 1905-63. Nairobi: East African Educational Publishers; 1993

[54] Marschall S. Commodifying Heritage: Post-apartheid monuments and cultural tourism in South Africa. In: Hall MC, Tucker H, editors. Tourism and Postcolonialism: Contested Discourses, Identities and Representations. London: Routledge; 2004. pp. 95-112

[55] Probst P. Keeping the goddess alive: Performing culture and remembering the past in Osogbo, Nigeria. Social Analysis. 2004;**48**(1):33-54

[56] Spear T. The Kaya Complex: A History of the Mijikenda Peoples of the Kenya Coast to 1900. Nairobi: Kenya Literature Bureau; 1978

[57] Willis J. The northern kayas of the Mijikenda: A gazetteer and a historical reassessments. Azania. 1996;**31**

[58] Nyamweru C. Natural cultural sites of Kenya: Changing contexts, changing meanings. Journal of Eastern African Studies. 2012;**6**(2):270-302

[59] Githito A. The sacred Mijikenda Kaya Forests of coastal Kenya: Traditional conservation and management practices. In: Joffroy T, editor. Traditional Conservation Practices in Africa. Rome: ICCROM Conservation Studies; 2005. pp. 62-68

[60] Byrne D. Counterheritage: Critical Perspectives on Heritage Conservation in Asia. London: Routledge; 2014

[61] Byrne D. "Significance and the supernatural" paper presented at the symposium. In: Significance, a discussion about values and valuing in heritage, University of Canberra, 15th May 2015; 2015

[62] Elkins C. Alchemy of evidence: Mau Mau, the British empire, and the high court of justice. The Journal of Imperial and Commonwealth History. 2011;**39**(5):731-748. DOI: 10.1080/03086534.2011.629084

[63] Parkinson J. Why is Cecil Rhodes such a controversial figure? BBC News Magazine. 2015

[64] Latif D. Racism at Oxford goes deeper than the statue of Cecil Rhodes. So what's the point of ditching it? The Guardian Newspaper. 2016

[65] Tinga KK. "Secrets of slaves: The rise and decline of Vinyago Masquerades in the Kenya Coast (1907 to the present)" [M. A. Mini-Thesis]. South Africa: University of the Western Cape; 2012

[66] Kiriama HO. The landscapes of slavery in Kenya. Journal of African Diaspora Archaeology and Heritage. 2018;**7**(2):192-206. DOI: 10.1080/21619441.2019.1589711

[67] West S. A history of heritage. In: West S, editor. Understanding Heritage in Practice. Manchester: Manchester University Press; 2010

Cultural Heritage Objects of Southern Benin: Plant Dyes and Exudates Used in Their Confection

Louis Fagbohoun and Cathy Vieillescazes

Abstract

Colors are practically ubiquitous in the artistic and craft objects of the South Benin region, affiliated to the Yoruba cultural area. Apart from the usual ochres and kaolin, the paint layers of the sculptures are little known, especially in terms of their binders but also plant dyes exploited. Colors from plants, usually used in textile dyeing or wickerwork, were among others also used in painting. The mid-term of research and analysis carried out in a multidisciplinary context provided information on the techniques formerly used by artists and craftsmen as well as on the original materials used. This information is inherent in a possible restoration of old museum objects.

Keywords: heritage objects, painting, characterization, conservation-restoration, Benin

1. Introduction

The experience of developed societies and those emerging today confirms the primacy of culture over development [1]. Cultural mastery unleashes the creative energies of development through art, mainly African art which integrates the three elements of the universe: nature, human and the divine. This art does not target the isolated individual, but the integrated person, deeply united with the group and the community. In fact, inventing sustainable development involves building a new cultural vision based on scientific research. Indeed, the dyes used in the making of heritage works represent a cultural element of the first order [2]. In all parts of the world, natural dyes have been used since time immemorial until the end of the nineteenth century, when they were dethroned by the discovery and economic development of synthetic dyes.

The organic compounds responsible for color in ancient materials were obtained from plants, insects, crustaceans and lichens [3]. In addition, the mineral substances used came from red or yellow colored earth, ... Their identification in the recipes formerly used in the confection of ethnic objects is important, not only as an indicative technical element, but it also promotes the knowledge of intentions artists, mixing or preparation systems, the quality of the pigments used, their origin and their supply points [2]. Therefore, it provides important information for the application of appropriate treatment in modern conservation-restoration interventions. In addition, beyond the recognition of simple artistic technicality, it contributes to the revelation of their cultural and cult reference.

The recurring problem with ethnographic collections is linked to the lack of documentation or its imprecision, particularly for objects collected in the past [4]. The example of the objects presented in this work is indicative of these shortcomings. However, it has been clarified, according to certain inscriptions and/or characteristics of representation, that these are objects collected around 1900 and coming from the Yoruba-Nago region currently located on the territory of the Republic of Benin. These objects belong to the collections of two museums located in the city of Lyon-France; it is about the African museum and the museum of Confluences. These objects are particularly important because beyond the esthetics, they were all intended for a specific use in their locality of origin. Indeed, the Guèlèdè masks, the Ibéji statuettes, the Shango or hunter costumes …, worn during specific rituals, or other propitiatory ceremonies increase the spiritual vision of the wearer. This shows, in fact, that ethnic objects remain characterized by the genius of assembling or mixing materials, and moreover by the genius of the expression of matter and of the verb.

In recent decades, ethnic objects have gained value by circulating between galleries, auction houses and foreign museums; it is important to safeguard and enhance the objects of Beninese cultural heritage in this flourishing art market.

To this end, an ethnobotanical survey was therefore carried out upstream, with the aim of selecting as well as characterizing the coloring principles of the dye plants most used in South Benin in the making of artistic and craft objects [5, 6], followed by an analytical chemical study by Liquid Chromatography (HPLC-UV-visible), by infrared spectroscopy and *via* microchemical tests of dye materials taken from ancient ethnic objects, in order to identify their matrix origin [7]. Overall, this paper is a social and scientific contribution to the knowledge of natural dyes and materials historically used in the artistic field in Benin in order to improve and revive, ultimately, knowledge of traditional skills as well than for better conservation-restoration of heritage objects.

2. Historical overview on ethnic objects

We cannot separate the historical context of the chemical characterization of the materials formerly used by African artisans and artists in the making of cultural heritage objects, in particular with regard to the identification and the geographical origin of the objects that have been deported, sold or exchanged. Indeed, works of art from the African continent were formerly relegated to second place, calling them gross or magical. In 1898, the Great Encyclopedia affirmed that "Among the Negroes who seem, however, like all the races of central and southern Africa, very backward in matters of Art, we find idols representing men and reproducing with a grotesque fidelity the characters of the Negro race" [8]. This attitude of Eurocentric academics, which consisted in classing peoples according to their level of artistic technicality, can be explained for a reason which is twofold: the lack of written documents capable of allowing a study is the first; the second finds its foundation in slavery and colonization.

A few decades later, voices were raised against this mechanical determinism; this is the case of R. Andree cited by Laude (1988) [9]. The latter mentions in his book that in 1885 Andree wrote that: "Peoples situated at a lower degree of culture may have reached a relatively high degree in the field of art, […] it does not appear not always as the highest state in the evolution of a people". It follows a material influx from Europe on the question of Negro art which generates more curiosity. Indeed, the Europeans will be interested in the products of the civilization of the negroes which they bought in mass and accumulated them in their museums. At the same time, some missionaries (SMA: Society of African Missions) collected these objects, most of which were described as fetishes and which they deported to Europe. This

is the case in Benin of the Reverend Father Francis Aupiais. Indeed, a few years after the creation of the S.M.A (1856), the priest Auguste Planque asked the missionaries living in Dahomey to send: "*a collection of things from your new homeland. We want to have in our museum weapons, tools, household utensils, all your gods. In a word, every-day objects that are outside our customs.*" [10]. In addition, the works were gathered to facilitate their study, their knowledge by everyone who could have business in Africa. It was the beginning of a very obvious predilection for descriptions and observations made of Negro art. As a result, today, the vast majority of objects of African heritage are found in European and North American museums. It is rightly so, that the materials characterized and/or presented in this paper, were taken from ethnic objects coming mainly from the museum of the service of the African missions (SMA) known under the name of the African museum of Lyon and whose did not have information as to the materials mainly, the dyes used in their manufacture.

3. Methodological approach and principle of the physico-chemical analysis plan for materials taken from museum objects

The success of a heritage approach requires a preliminary or even permanent interaction with the holders of endogenous knowledge and skills. To this end, an ethnobotanical study was carried out on the materials historically used in the making of cultural heritage objects in the region of southern Benin [6]. The target of this survey was mainly aimed at artisans and artists as well as resource persons invested in local cultural awareness. This is a survey based on a semi-structured interview, followed by demonstration sessions on the use of natural materials used by the craftsman, as well as their harvesting for analytical purposes. The analysis plan used is based on a succession of physicochemical analysis techniques which consist in promoting, at each stage, the choice of the appropriate method for the rest of the analysis. This procedure made it possible to reduce the number of experiments to be carried out on the samples taken while increasing the quality of the results obtained. Indeed, very small quantities of dye material the size of a pinhead, are taken from the sampled objects. Then, using a binocular magnifier, the pigments are sorted in order to have the best homogeneous material which is analyzed using an infrared Fourier transform spectrometer (IR-TF) [7]. The interpretation of the results obtained, and their comparison to direct witnesses or to the IR-TF database, conditions the choice of the following analysis. Thus, the coloring matter undergoes either microchemical tests to complete or confirm the results derived from the IR for the inorganic compounds, or an HPLC analysis with a view to identifying the organic dyes. The schematic summary of the sample analysis plan is presented in **Figure 1**.

The IR-TF analysis consists in preparing translucent KBr pellets from the materials taken from the objects, which are subjected to the beam of a spectrometer (Nicolet AVATAR Thermo-360 FT-IR, DTGS KBr detector/OMNIC treatment version 6.0/ acquisition of 64 scans). Colored textiles are directly subjected to the infrared beam in ATR mode. IR-TF spectra were collected in the mid infrared (400–4000 cm^{-1}).

Microchemical analysis consists in highlighting the constituent ions of mineral pigments. It is carried out by the wet route in a drop of solution under a binocular magnifier. The detection of iron(II) was carried out by reaction with thiocyanate (KSCN, 160 g L^{-1}) in an acid medium according to the conventional protocol [11]. That of iron(III) was confirmed by reaction with potassium ferricyanide ($K_3[Fe(CN)_6]$, 100 g L^{-1}) in an acid medium [12]. The presence of the sulfide ions S^{2-} was visualized in an acid medium by reaction with the addition of the reagent iodine-sodium azide and that of the Al^{3+} ions by the addition of the acetic buffer and
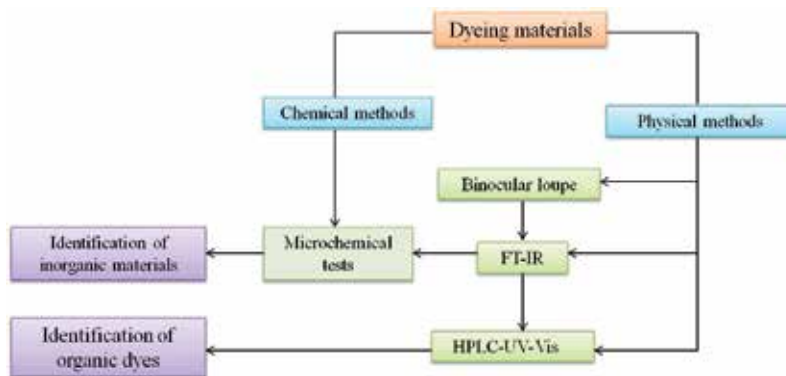
Figure 1.
Schematic principle of the physico-chemical analysis plan for materials taken from museum objects.

of aluminon III according to the protocol of Odegaard et al. [13]. The recognition of the binders was carried out by means of the experiment on the heating plate [12].

Regarding the identification of organic dyes by HPLC, the samples were prepared according to the nature of the pigment, favoring a non-denaturing decomplexation method of Bourhis et al. [14]. In fact, the dye material taken from the objects was treated with an acetic buffer solution (pH = 4.3) and then subjected to ultrasound (SOLEX 180 prototype). However, the colored textiles are extracted directly with the mixture of methanol-dimethylformamide solvent (MeOH-DMF, 1:1; v/v). The extract obtained is filtered, evaporated to dryness and then taken up in methanol before being injected into the system. The prototype used includes a Waters 600 quaternary gradient pump, equipped with an autosampler and a Waters 2996 photodiode array detector (PDA). The stationary phase used is a C18-e column (Symmetry Shield RP-18, Waters 5 µm; 4.6 × 250 mm) and the mobile phase consists of a binary mixture of solvents, acetonitrile-water acidified with TFA (0.01%) in gradient mode. The compounds were detected between 190 and 800 nm and the data were processed under control of Empower 2 software.

Overall, the references used for the characterization of materials taken from ethnic objects, consist of coloring principles purified or isolated from the most used dye plants in the region of South Benin, and about 50 commercial standards of phenolic, flavonoid structures, quinones, etc. In addition, the laboratory database contributed in particular to the IR-TF analysis of the samples.

4. Ethnobotany survey, a springboard for promoting ethnic objects

The ethnobotanical survey carried out with resource people, in particular craftsmen and artists, made it possible to draw up a list of natural materials, mainly the dye plants most used in arts and crafts, especially in basketwork, pottery, sculpture, weaving, …, in southern Benin. Around, 26 plant species belonging to 14 botanical families (**Table 1**) provide various colors usable by these artisans.

These plants were the subject of a report published in 2014 in the journal *Ethnopharmacologia* [6]. The methods of preparing the dyes listed are decoction, grinding, kneading, pressing, crushing, pounding and maceration with the possible addition of mordant. This study revealed that almost 97% of the listed species are also valued for medical care by the respondents, since they are used to treat common ailments such as anemia, malaria, diarrhea and hemorrhoids. In addition, the local Yoruba-Nago names reported for these plants mostly refer

Family	Name (genus and species)	local appellation yoruba/nago	Products
Anacardiaceae	*Anacardium occidentale* L.	Kandju/Cajou	Yellow dye
	Mangifera indica L.	Mangoro	Yellow dye
Bixaceae	*Bixa orellana* L.	Osun elede	Red pasty material
	Cochlospermum planchonii Hook. f. ex Planch.	Gbehoutou/Ferou	Yellow dye
Cannabaceae	*Trema orientalis* (L.) Blume	Afoforo	Red brown dye
Capparaceae	*Crateva religiosa* G. Forst.	Eyigouhonron/Erun	Yellow dye
Combretaceae	*Anogeissus leiocarpus* (DC.) Guill. & Perr.	Anyi	Yellow dye / brown dye
Euphorbiaceae	*Jatropha curcas* L.	Akpôro	Brown yellow dye
	Tectona grandis L. f.	Ikpatomu	Red dye
Lamiaceae	*Vitex doniana* Sweet	Ori	Dye red brown or black
	Baphia nitida Lodd.	Irosun/owiwi	Red dye
	Indigofera tinctoria L.	Shenshe/chenche	Variable blue dye
Leguminosae	*Parkia biglobosa* (Jacq.) G. Don	Igba	Brown dye / reddish brown dye
	Philenoptera cyanescens (Schum. & Thonn.) Roberty	Elu	Variable blue dye
	Pterocarpus erinaceus Poir.	Apepe/ Osun dudu	Brown red dye
	Pterocarpus osun Craib	Igi osun	Red dye paste
	Senna occidentalis (L.) Link	Adjangoulou	Black dough / red-brown juice
Lythraceae	*Lawsonia inermis* L.	Lali	Red brown dye paste / red brown dye
Malvaceae	*Gossypium barbadense* L.	Owu	Red dye
Meliaceae	*Azadirachta indica* A. Juss.	Dogonyaro	Orange yellow dye glue
	Khaya senegalensis (Desv.) A. Juss.	Guwo	Orange red dye
Moraceae	*Ficus thonningii* Blume.	Odan	coating
Phyllanthaceae	*Bridelia ferruginea* Benth.	Igi ira	Brown dye / dark khaki / black dye bath
	Hymenocardia acida Tul.	Igi osu/ orukpa	Red brown dye
	Flueggea virosa (Roxb. ex Willd.) Royle	Iranjé	Black dye
Poaceae	*Imperata cylindrica* (L.) Raeusch.	Ekan	Yellow dye (variable)

Table 1.
Directory of dye plants used by artisans and artists in the region of southern Benin.

to dye use or the medicinal properties of the plant. This is the case of *Pterocarpus osun* whose vernacular name "osun" refers to the miracles attributed to the soft red substance prepared from this plant. Indeed, this substance is used in the form of an ointment by women right after delivery to announce not only the birth of the baby because of its color but especially for its antifungal properties. It is the same for "Orukpa", local name Yoruba, of the plant *Hymenocardia acida* which literally designates "release of red smoke which kills", because of the toxicity of its wood under the effect of heat. Regarding the indigo dye, it should be mentioned that Benin is distinguished by the low diversity of these blue plants, but also by their quality as well as that of the tank technique used. *Philenoptera cyanescens* (liana indigo) is the most used species accompanied by *Indigofera tinctoria* (indigotier). In addition, in the Yoruba culture (Nigeria and Benin), the application of certain dyes requires special provisions, in particular a good state of purification of the artist so that the dye stays on the support. Sexual intercourse the day before or before dyeing is detrimental to its tenacity. Indigo dye is associated with the worship of a deity named **Iya Mapo** who protects the female world and its activities, such as pottery, oil pressing or soap making. However, it should be noted that this practice is nearing extinction.

5. The objects and dyes used

5.1 Masks of Guèlèdè

They characterize the Guèlèdè and its dance. They are sculpted by artists in convents called "Ashè" from the trunks of light cylindrical trees exclusively identified; the best known being the cheese maker *Ceiba pentandra*. Most of the Guèlèdè crest masks consist of two parts: A lower part characterized by a calm face in a conventional simple and static form, with almond-shaped eyes and short scarifications on the cheeks and/or the forehead which represent identity scars held in high esteem in the Yoruba-Nago ethnic group. The upper part, on the other hand, very lively, very complex, is linked to the artist's creativity and to a specific event. It conveys articulated scenes illustrating both socio-educational messages linked to this event and religious messages, then expresses, in addition to ritual magic, a very popular "media magic" aimed at restoring the social cohesion put endangered by the harmful behavior of certain individuals or certain entities. Consequently, there is a manifest ingenuity, at the origin of the making of these crest masks, of sculpture to the application of polychromic materials, followed by their process of sacralization through dance or the power of the verb, which, moreover give them life. This is what makes this art, the best known of the Yoruba-Nago cultural artifacts and was inscribed in 2008 by UNESCO on the representative list of the intangible cultural heritage of humanity.

Indeed, when the sculpture is painted, the pictorial layer consists of a colored layer derived from mineral, vegetable or animal materials, and a binder (oil, egg, wax, latex, resin, etc.). It can be dyed; in this case, it is a colored liquid which the wood absorbs. This liquid comes from a dye solution and can have additives (alum, lime, various salts, etc.) or it is a coloring principle extracted directly from the plant and applied to wood. The example of some of the masks presented (**Table 2**) is indicative of the dyes as well as the techniques, among others, used in their manufacture.

The stratigraphic study of the structure of the samples visualized with a binocular magnifier, shows that the mask referred to as **2013.7.1**, has a very thin layer of dye stuck to the wood. It is a stain directly applied to wood. On the other hand,

Table 2.
Some masks from Beninese cultural heritage.

the structure of the samples from the masks **Ref. 401.940.023** and **Ref. 60.004.102** reveals respectively a more or less thick mass of red pigment supported by a layer of yellow crystals, and of yellow pigment surmounting a layer of blue pigment very characteristic of a blue washing powder. This observation indeed reflects a variety of techniques for dyeing ethnic objects. In addition, the identification of dyes by HPLC-UV-visible of these different layers of pigments on the basis of the uniformity of their retention time (tR) and their UV-Vis spectrum to that of the purified or isolated compounds from dye plants studied with reference, made it possible to characterize three compounds: 2-hydroxy-1,4-naphthoquinone (tR = 15.1 min) as well as two flavone aglycones; luteolin (tR = 19.7 min) and apigenin (tR = 22.5 min) at the mask **Ref. 2013.7.1** (**Figure 2**).

Indeed, the compounds identified are characteristic of the *Lawsonia inermis* (henna) species [15], in particular 2-hydroxy-1,4-naphthoquinone (lawsone) which is the specific coloring principle of this species [16]. Thus, the use of this species in the coloring of the mask **Ref. 2013.7.1** is revealed by its coloring marker; the lawsone. Therefore, even in the absence of flavones (luteolin and apigenin), which could not be detected in the red sample from the mask **Ref. 401.940.023**, the identification of the only lawsone in this object, indicates the contribution of henna in the preparation of its red pigment. In addition to lawsone, epicatechin is identified in this sample. This reveals in addition to henna, the use of a tannin plant in the preparation of this dye recipe. Indeed, epicatechin is the major dye characterized in the bark of *Khaya senegalensis* mainly used in dyeing by Beninese craftsmen not only as a bite for its richness in tannin but also for the natural red tint which they exhume by pyrolysis [6].

Furthermore, the IR-TF analysis of the yellow pigments from the lower layer of dyes of the mask **Ref. 401.940.023** and the upper layer of dyes from the mask **Ref. 60.004.102** supplied characteristic tapes in the fingerprint region (<1600 cm^{-1}). In fact, the absorption bands around 600 cm^{-1}, characteristic of iron oxide imprints of the yellow ocher type (Fe_2O_3, nH_2O) have been observed. These bands are attributed to two types of vibrations. These are the vibrations appearing respectively at 540 cm^{-1} and 470 cm^{-1} for the mask **Ref. 401.940.023** and at 630 cm^{-1} and 600 cm^{-1} for the mask **Ref. 60.004.102**. They are characteristic of a deformation beyond the plane, of the O—H group and of a valence vibration of the Fe—O bond. In addition, a band of high intensity appearing in double form between 3698 and 3621 cm^{-1} could be attributed to a valence vibration of the OH group, while the OH associated with the hydrated form of this iron oxide appears in the form of a wide strip at 3435 cm^{-1} for the mask **Ref. 401.940.023** (**Figure 3**).
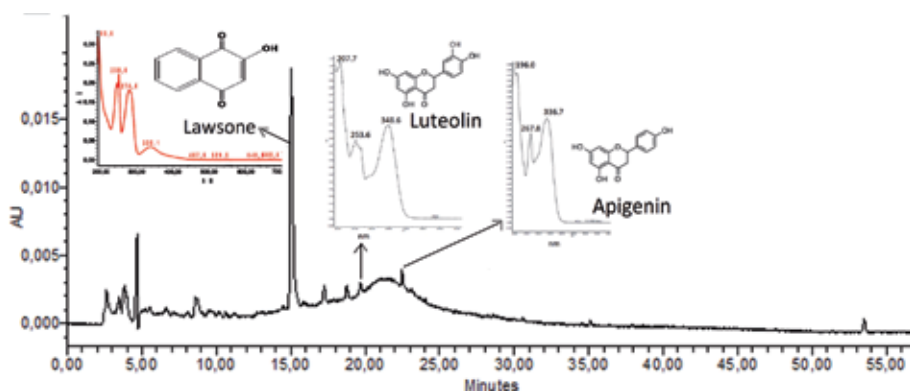
Figure 2.
*Chromatogram at 350 nm and UV–visible spectra of the compounds identified in mask **Ref. 2013.7.1***
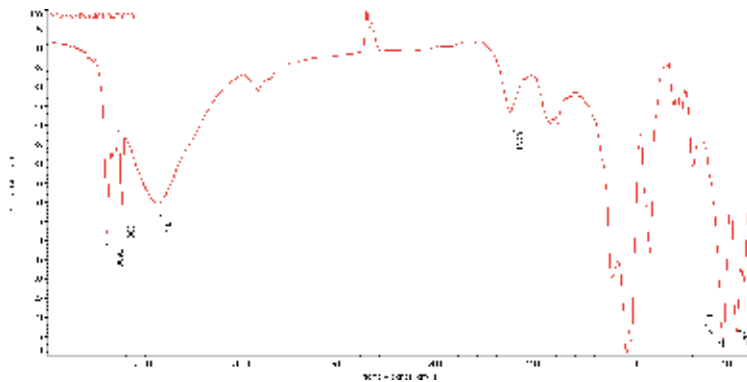
Figure 3.
*IR-TF spectrum of yellow mask pigment **Ref. 401.940.023.***

On the other hand, at the level of the mask **Ref. 60.004.102**, this last band appears in the form of a very large and intense doublet above 3400 cm^{-1}. In addition to the absorption band at 1622 cm^{-1} characteristic of an elongation vibration of the OH bond, there is another elongation vibration of stronger intensity, corresponding to the SO bond of the sulfates which appears in the form of doublet around 1115 cm^{-1}. This assumes that the yellow pigment of the mask **Ref. 60.004.102** consists of a mixture of iron oxide and hydrated sulfate ($CaSO_4$, $2H_2O$), the main constituent of gypsum. This result was confirmed by a control (yellow ocher + $CaSO_4$) available in the laboratory (**Figure 4**).

Microchemical tests revealed the presence of ferric and ferrous ions, constituents of iron oxide in the samples of masks **Ref. 401.940.023** and **Ref. 60.004.102**. It is the same for the ions S^{2-}, component of the mixture of calcium sulfate and yellow earth of the pigment **Ref. 60.004.102**, whose FT-IR spectrum has been characterized. In addition to the sulfide ions, the detection of Al^{3+} ions in the blue pigment of the mask **Ref. 60.004.102**, is associated with washing blue (Na8-10Al6Si6O24S2–4) of the lower layer of this sample.

5.2 "Ibéji" twin statuettes

The Ibéji twin statuette represents the soul of the deceased twin transferred to a wooden figurine. Indeed, in the religious tradition of the Yoruba-Nago, it is considered that the twins have one soul, united and inseparable. For this reason, if a twin dies, the life of the survivor is threatened since his soul is no longer in balance.
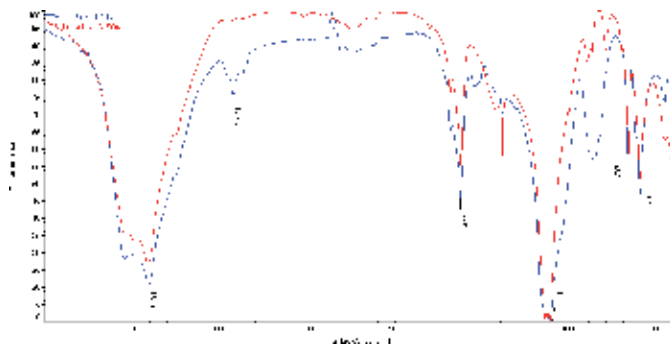
Figure 4.
*FT-IR spectra of the control (mixture of yellow ocher + $CaSO_4$) and of the yellow pigment of the mask **Ref. 60.004.102.***

The anger of the deceased twin can put his entire family at serious risk (illness, bad luck, etc.). In order to avoid these harmful risks for the family, it is necessary to find a way to reunite the souls of the twins. Thus, after consultation with the "Ifa" oracle, ritual arrangements are made and through a cult ceremony, the soul of the deceased is transferred to the wooden figurine. Therefore, this statuette becomes the guardian of the soul of the deceased and must be able to benefit from the same treatment and care as the survivor. Theoretically, it is therefore not necessary to sculpt these wooden statuettes if the two twins die, because the union of their souls is no longer compromised or compromising. But in the Yoruba belief, the dead twins are endowed with supernatural powers, more powerful than those of the ancestors, so even if the two babies die, a couple of Ibéji are sculpted, in order to bring to the twins offerings or their offer sacrifices so that they protect the mother and the whole family. The Ibéji does not represent a child, as one would expect, but an adult more often, with the face and the naked body of an adult (**Figure 5**). It is the sculptor who decides on the artistic form he will give to the statuette. The only element which links it to the request is the sex of the twin or twins who must be sculpted.

Although the statuette represents a living soul, the blue dyes frequently found on the head of Ibéji's sculptures, are traditionally translated by the divine breath that decorates the hairstyle of those who have gone into eternity. Stratigraphic analysis of the pigment taken from the head of the twin **Ref. 501.931.002** reveals a simple application of blue dye adsorbed by the wood. The study of the chemical composition of this pigment in IR-TF presented a spectral profile typical of cyan blue equivalent to Prussian blue $Fe_4[Fe(CN)_6]_3$. It is characterized by a systematic stretching vibration of the C≡N triple bond at 2095 cm^{-1} which appears in a very intense band. There are also weak absorption bands characteristic of the vibrations of elongation of Fe—N bond at 600 cm^{-1} and of Fe—C and C—Fe—C or Fe—CN bonds at 500 cm^{-1}. The characteristic bands of water, which appear at 3436 and 1634 cm^{-1} respectively corresponding to vibrations of elongation and deformation of the O—H group (**Figure 6**).

Characterization by HPLC-UV–Visible of the blue sample from twins **Ref. 501.931.002**, also made it possible to identify an organic dye, indigotin (tR = 7.33 min), a coloring principle of plants to indigo (**Figure 7**).

However, this sample does not contain indirubin. It should be mentioned that two species of indigo plants, *I. tinctoria* and *P. cyanescens*, are used in dyeing in Benin [6]. The origin of the indigo plant was determined by studying the ratio of the relative content of indigoids (indirubin/indigotin) in the plant's original matrix [5]. Indeed, the absence of indirubin (structural isomer of indigotin) and degradation

Figure 5.
*Ibéji twins African museum; **Ref. 501.931.002**.*
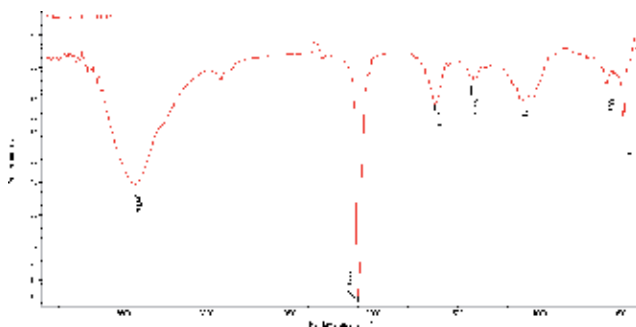
Figure 6.
*IR-TF imprint of the blue pigment of Ibeji statuette **Ref. 501.931.002.***

markers (isatin and anthranilic acid) of the two indigoids, show the high indigotin content of the species initially used in the preparation of this blue dye. A preliminary study of indigo plants indicates that *P. cyanescens* has a higher content of indigotin than *I. tinctoria*. The indigo plant associated with this sample therefore appears to be indigo liana and, this result corroborates the preliminary ethnobotanical study [6], showing that the frequency of use of *P. cyanescens* due to its richness in indigotin, is two times that of *I. tinctoria*. Indeed, the high content of indirubin in *Indigofera tinctoria* is to the detriment of the yield of indigotin sought by dyers.

In summary, it emerges from the chemical characterization of the thin layer of blue dye taken from the twin head Ref. 501.931.002, that this sample consists of either a mixture of synthetic pigment of Prussian blue and natural dye solution indigo, or a natural shade of indigo that was subsequently given a brush of cyan blue synthetic pigment. Indeed, it has been reported that, sometime after the synthesis of synthetic blue pigments, at the end of the nineteenth century, 150 salesmen crisscrossed the planet to sell these different blues; notably in Tunisia, Morocco, Gabon, Togo, Côte d'Ivoire, Benin and Nigeria [4]. The same is true of aniline blue marketed in 1897 as far as Africa, which has gradually replaced natural indigo in the textile field, while on painted wooden objects, laundry blues are frequently encountered.

5.3 Fetishes

Fetishes designate any object, which, following certain ritual acts, is invested with personal powers or impersonal forces. It can be activated by sacrificial gifts and used for a magical act intended to harm, attack or repel the supernatural attacks
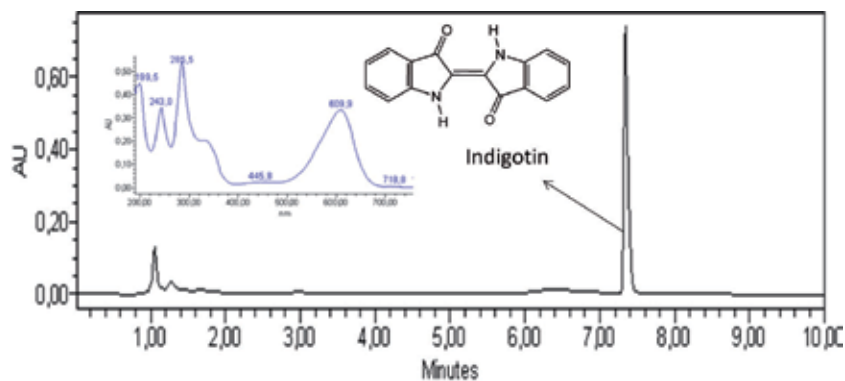
Figure 7.
*Chromatogram at 285 nm of Ibéji blue dye **Ref. 501.931.002.***

of human enemies or to have children and moreover any other wealth [17]. Most fetishes form an assembly of substances to which particular forces are attributed. They are often certain sculptures, stones, horns, claws, teeth, bones, hair, animal skins, coloring substances, etc. but also shreds of tissue, filth, menses and other such impure as effective materials. It plays a role of receptacle and functions by communication with invisible spirits. The fetish sculpture presented is an example. It is marked by white and blue hues in places, especially the blue hues on the head and the white hues of koalin on the eyes and the neck (**Figure 8**).

Kaolin, used in the tradition, translates the communication with the ancestors. It is taken from depressions which are assimilated to the refuge of the ancestors' males. Around the eyes, it keeps ghosts away. Indeed, kaolin is a clay which serves as an adsorbent and can maintain the pigments between them and on the support. It does not contain iron or other chromogenic metals, hence its whiteness. It is therefore transparent in refractive binders such as oil, it is then considered as a filler. The ancients mixed kaolin with their dyes, which, due to its physical characteristics, can therefore partially fix the color by absorption.

In addition, the application of dyes to specific places on the object, in particular the blue tint affixed to the dorsal column of this fetish, denotes coded know-how which reveals that the role of these dyes goes beyond the mere decorative function. Indeed, it should be noted from Bleton et al. [18], that these materials give life to the object and participate in its identity.

The stratigraphic analysis of pigment removal carried out on the fetish back **Ref. 60.003.627**, revealed that it consists of an upper layer of blue dye overlying a layer of red dye. The identification of the dye composition of this HPLC-UV-Visible sample revealed that it contains indigotin (tR = 25.7 min) and lawsone (2-hydroxy-1,4-naphthoquinone; tR = 15.1 min) (**Figure 9**). This last dye comes from the red lower layer of the analyzed sample and shows the use of henna (*L. inermis*) and indigo liana (*P. cyanescens*) in the preparation of the dye recipe which was used to cover the dorsal hollow of this fetish **Ref. 60.003.627**.

5.4 Cult and customary textiles

Textiles occupy a prestigious place in the Yoruba-Nago culture, not only for esthetic reasons, but also for cultural and ritual reasons. For the latter, they

Figure 8.
Fetish confluence museum; Ref. 60.003.627.
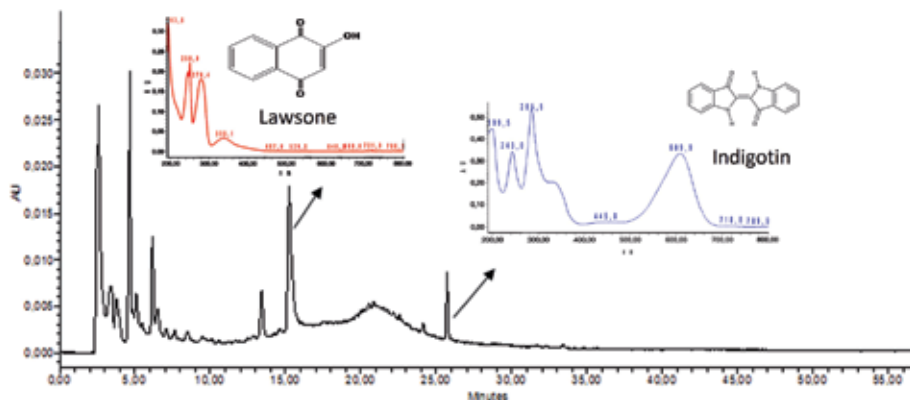
Figure 9.
*Chromatogram at 350 nm of fetish dyes **Ref. 60.003.627** and the UV–visible spectra of the identified compounds*

constitute the support of various materials, in particular dyes, coatings, cowries, animal bones, mirror, amulet or any other substance, the whole of which forms an armor which amplifies not only the spiritual vision of the wearer but also and above all ensures his protection against any external or spiritual attack. These textiles, qualified as "prepared", appear in the form of colorful and marvelous costumes used for the Egungun cult or the Guèlèdè cult, while the hunter costumes have a very particular appearance and appear in the form of a vest (**Figure 10**). It is the same for the ritual accouterments of Shango.

IR-TF analysis in ATR mode of a blue textile part of a hunter's jacket **Ref. 2013.0.152**, has absorption bands characteristic of natural cellulosic material with an intense band at around 1109 cm^{-1} due to CO and a wide band at 3339 cm^{-1} linked to the OH group and, a low band at 2920 cm^{-1} due to CH. This result is similar to that from the analysis of a cotton control used as a reference and moreover corroborates the major place occupied by cotton fibers in the field of weaving in black Africa (**Figure 11**).

Figure 10.
*Hunter costume jacket African museum; **Ref. 2013.0.152**.*
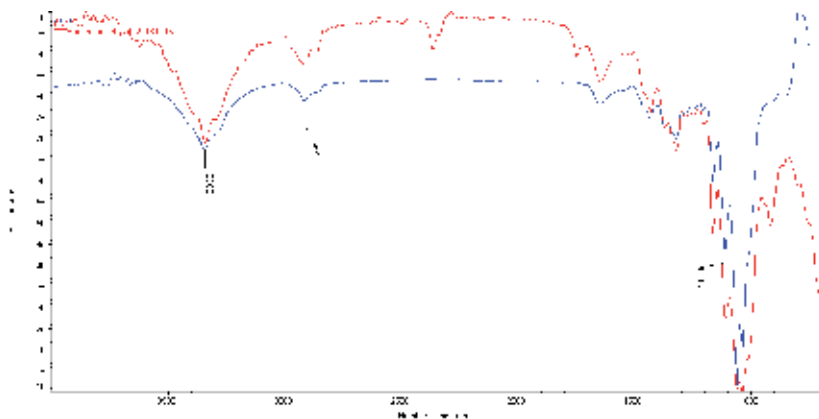
Figure 11.
FT-IR spectra of blue textile hunter costume jacket Ref. 2013.0.152 and cotton.
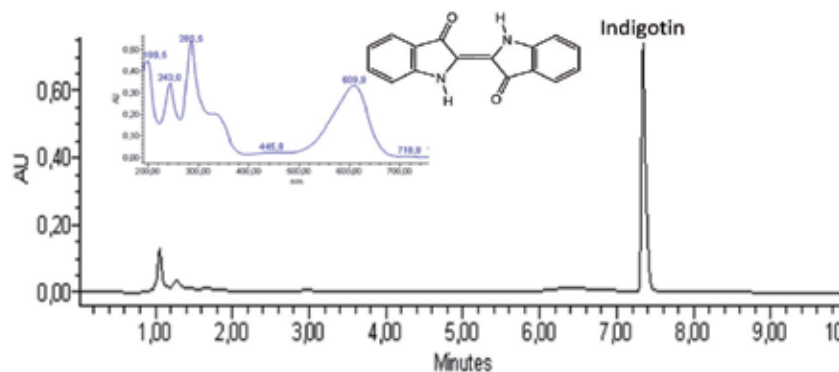
Figure 12.
Chromatogram at 285 nm of blue textile hunter costume jacket Ref. 2013.0.152.

IR-TF analysis of this sample only allowed to determine the nature of the cotton support used to make this vest **Ref. 2013.0.152**. However, its analysis by HPLC-UV-Visible revealed that it mainly contains indigotin (**Figure 12**).

The identification of the only indigotin in this sample reminds us of the use of indigo liana *P. cyanescens* in the dyeing of this textile. Indeed, *P. cyanescens* is the most popular indigo plant in the Yoruba-Nago cultural area, for dyeing blue or black blue cotton, bark (formerly), raffia and other plant fibers, as well as leather, hair and woodcarvings. Yoruba women use this plant, locally called "èlu", as a source of indigo in the manufacture of "adire" fabric; decorative technique similar to batik (dyeing method by which we cover the parts of the fabric that we do not want to dye with detachable wax), which has the effect of creating pale blue patterns on a dark blue background [19]. Traditionally, woven fabrics known as "country fabric" or "Asho ibilè" and dyed with indigo liana were reserved for dignitaries for ceremonial attire, dowries, burial clothes, court fines and gifts to distinguished visitors [5].

6. Other vegetable exudates used

Apart from the natural organic dyes characterized in almost all of the heritage objects studied, field surveys have made it possible to identify other exudates of plant origin, in particular binders: oils, resins, latex, gums, etc., which are

also highly valued by craftsmen and sculptors for their different technical than cult properties. Indeed, from a technical point of view, *Alstonia boonei* Wild (Apocynaceae) exudes a toxic latex used to coat the surface of sculptures because of its fungicidal and insecticidal properties, while the latex of *Hevea brasiliensis* (Euphorbiaceae) and that of *Ficus congensis* (Moraceae) are used to seal the carved objects. The same is true of the mucilaginous fruits of *Afraegle paniculata* (Schum. and Thonn.) Engl. (Rutaceae) which serve as glues used in pottery. As for the latex of the Iroko, *Chlorophora excelsa* (Moraceae), it is used specifically for its spiritual dimensions in the sculptures. The iroko is considered a sacred tree, frequently protected near homes and in cultivated fields. In Benin, it is used squarely as a fetish.

The chemical analysis of binders of vegetable origin was much less approached than that of dyes, because it was necessary for these first works to select artifacts which can be compared, having similar functions and/or having a similar analytical technology. However, a binder sample taken from the yellow strip on a Guélédé crest mask **Ref. 60.004.102**, and subjected to microchemical staining tests on a thin section and of the heating plate, made it possible to observe a behavior typical of a natural emulsion. Its IR-TF spectrum displayed a very good correlation coefficient with that of the whole egg. It is interesting at this point to recall that during ethnobotanical field surveys, it was reported that an egg binder was used by the ancients [20]. Its use strictly requires a state of purification since the day before.

7. Conclusion

Analytical techniques IR-TF and HPLC-UV-Visible and microchemical tests applied to the study of dyes and pigments extracted from samples taken from ethnic objects including masks (Guèlèdé), statues of Ibéji, fetish and textiles from museum collections, provided, among other things, information on the matrix origin of materials than on the techniques used in their making. The dyes identified on the objects presented as an example are mostly of plant origin. They reveal the results of the entire corpus of objects studied and testify to the knowledge and use of local natural resources in the making of ethnic objects. However, natural mineral pigments such as kaolin, and soils rich in iron oxides, as well as two synthetic blue pigments have been identified on certain objects. Apart from the dyes, the binders reported in the manufacture of heritage objects come largely from the plant world, nevertheless binders to the whole egg or part of the egg were also reported during field surveys and highlighted. Regarding the way of African painting, it was observed that the color can be directly applied to the wood and then be covered with a resin or a tree sap (or conversely, the resin of first applied to the wood underlay). It can also be applied in two layers of different dyes. In addition, the application of dyes to specific places on the object, in particular the shade affixed to the heads, the dorsal column, or the face, denotes coded know-how which reveals that their use goes beyond the mere decorative function.

8. Recognition

This work is the result of scientific collaboration between a North-South university institution and museum conservator-restorer. Indeed, a research program has been set up and continues to explore the field of coloring plants and organic exudates used by sculptors and craftsmen in West Africa. It brings together Louis Fagbohoun of the Higher Normal School of Natitingou of the National University of Sciences, Technologies, Engineering and Mathematics of

Benin, Cathy Vieillescazes, and Carole Mathe of Avignon University as well as Camille Romeggio independent conservator-restorer. The objective, goes beyond the conservation of the heritage material, through scientific analyzes, it is about exploring a culture very respectful and learned of its natural environment and enhancing its endogenous knowledge.

Author details

Louis Fagbohoun[1*] and Cathy Vieillescazes[2]

1 Laboratory of Chemistry-Research Team Applied to Artistic and Cultuo-Bioactive Substances, Higher Normal School of Natitingou, National University of Sciences, Technology, Engineering and Mathematics, Benin

2 IRPNC Team, UMR IMBE CNRS 7263/IRD 237, Avignon University, Avignon, France

*Address all correspondence to: fadis07@yahoo.fr

IntechOpen

References

[1] Kouéna ML. La place et le rôle des œuvres d'art dans le développement africain: cas du Congo-Brazzaville 11è Assemblée Générale du CODESRIA. 2005. pp. 1-12

[2] de Balbín Behrmann R, Alcolea González JJ. Les colorants de l'art paléolithique dans les grottes et en plein air. L'anthropologie. 2009;**113**:559-601

[3] Peggie DA, Hulme AN, McNab H, Quye A. Towards the identification of characteristic minor components from textiles dyed with weld (*Reseda luteola* L.) and those dyed with Mexican cochineal (*Dactylopiuscoccus* costa). Microchimica Acta. 2008;**162**(3-4):371-380

[4] Romeggio C. Sièges rituels yoruba. Questions de conservation-restauration, entre contexte africain et recontextualisations occidentales. In: Mémoire de Master en conservation-restauration d'œuvres peintes. 2007

[5] Fagbohoun L. Etude chimique de colorants naturels et matériaux résineux traditionnels du Bénin dans le domaine artisanal [Thèse de doctorat]. HAL Id: tel-01168469. 2014. Available from: https://tel.archives-ouvertes.fr/tel-01168469

[6] Fagbohoun L, Gbaguidi AF, Ayedoun MA, Mathe C, Moudachirou M, Vieillescazes C. Etudes ethnobotanique et phytochimique des plantes tinctoriales sources de colorants naturels et matériaux résineux traditionnels du Bénin dans le domaine artisanal (Ifangni/Bénin). Ethnopharmacologia. 2014;**52**:56-66

[7] Fagbohoun L, Mathe C, Gbaguidi FA, Ayedoun MA, Moudachirou M, Vieillescazes C. Chemical characterization and origin of dyes used in the manufacture of Beninese cultural heritage objects.

Color Research and Application. 2019;**44**(2):234-242

[8] Feau E, Joubert H. L'art Africain. In: La Grande Encyclopédie. Paris: Editions Scala; 1996. p. 8

[9] Laude J. Les arts de l'Afrique noire. Paris: Sté Nle des Editions du Chêne; 1988. p. 381

[10] Romeggio C. Liste et fiches techniques des matériaux naturels utilisés dans l'artisanat à Porto-Novo et aux alentours. In: Rapport de stage. Ecole du Patrimoine Africain de Porto-Novo; 2006. p. 145

[11] Charlot G. Analyse qualitative rapide des cations et des anions. 4è ed. Dunod; 1980

[12] Philippon J. Microanalyse chimique des pigments et des liants par voie humide. Paris: Annale Lab., Institut Français de Restauration des Œuvres D'art; 1986. pp. 35-59

[13] Odegaard N, Carroll S, Zimmt SW. Material Characterization Tests for Objects of Art and Archaeology. 2nd ed. Archetype Publications; 2005

[14] Bourhis K, Blanc S, Mathe C, Dupin J-C, Vieillescazes C. Spectroscopic and chromatographic analysis of yellow flavonoidiclakes: Quercetin chromophore. Applied Clay Sciences. 2011;**53**:598-607

[15] Afzal M, Al-Oriquat G, Al-Hassan JM, Muhammad N. Flavone glycosides from *Lawsonia inermis*. Heterocycles. 1980;**14**:1973-1976

[16] Dixit SN, Srivastava HS, Tripathi RD. Lawsone, the antifungal antibiotic from the leaves of *Lawsonia inermis* and some aspects of its mode of action. Indian Phytopathological Society. 1980;**31**:131-133

[17] Dianteill E. Le Pouvoir des objets. Culture matérielle et religion en Afrique et en Haïti. Archives de Sciences Sociales des Religions. 2000;**110**:29-40. DOI: 10.4000/assr.20201. Available from: http://journals.openedition.org/assr/20201

[18] Bleton J, Rivallain J, Sansoulet J. Caractérisation et fonctions d'enduits placés sur les masques Ejumba de Basse Casamance, sud du Sénégal. Journal d'Agriculture Tropicale et de Botanique Appliquée. 1995;**2**:25-35

[19] Cardon D, Jansen PCM. *Philenoptera cyanescens* (Schumach. & Thonn.) Roberty [Internet]. In: Jansen PCM, Cardon D, editors. Fiche de PROTA4U. Wageningen, Pays: PROTA (Plant Resources of Tropical Africa/Ressources végétales de l'Afrique tropicale); 2005

[20] Fagbohoun L, Vieillescazes C, Mathe C, Romeggio C. Couleurs et plantes colorantes dans l'art yoruba Enquête de terrain. CeROArt. 2019;**11**:1-22. DOI: 10.4000/ceroart.6622

Chapter 3

Promoting Territorial Cultural Systems through Urban Planning

Francesco Rotondo

Abstract

Europe is a land of ancient urbanization where nature and culture of places are inextricably intertwined, defining real territorial cultural systems. After the era of a hurried expansion of the cities linked to the industrial revolution, in the height of the digital era, urban planning finds the key to understanding space in cultural heritage. In a European territory that appears increasingly distinct between metropolitan and inner areas, both cultural heritages play an essential role in defining the paradigms of self-sustainable development that urban planning declares to promote. This is the basic assumption that the paper proposes starting from the analysis of the relationship between historic centers and natural landscapes, in search of a different use of the land, reversible, respectful of the environment but still capable of being the physical support for anthropogenic transformations and the productions of economy and life. Starting from a rereading of the relationship between cultural heritage and territorial systems, the paper elaborates a different vision of the historic centers as epicenters of possible economic networks and ecosystem services, based on the analysis of Italian and Eastern Europe experiences.

1. Introduction: landscape and cultural heritage as territorial driver

As highlighted by Choay [1], it is the memory that guides the identification of the heritage. Historical centers and natural landscapes represent the key elements of that process of rediscovering the cultural, social, and economic identity of our territories, which through this interpretation can become the base of a new self-sustainable development model, consistent with the peculiarities of relationships between populations, activities, and places.

This is not a nostalgic reference to a bucolic past, to a rural world that no longer exists and which we hope to recreate, but on the contrary the verification of possible innovative futures in which the historic centers and the landscapes in which they are located represent the identity and recognized locations of new development models, of different ways of building the contemporary.

There is no discussion of lower land consumption, but of a different use of the land, reversible, respectful of the environment but still capable of being the physical support for anthropic transformations and the production of

cultural economies, capable of making them productive and livable again and also inland areas far from large cities and the main mass mobility system.

The relationship between the transformation of urban settlements and the cultural and landscape matrix needs to be guided by urban planning.

Before entering into the ways in which urban planning and cultural heritage must be linked, it is necessary to share the concepts of heritage and landscape that form the basis of this renewed relationship.

The term heritage is currently used to express multiple concepts of contemporary society, with a plurality of meanings that are all the more different the more distant are the disciplinary areas within which it is used.

The etymology of the term "heritage" derives from the Latin word patrimonium, which in turn is the union of the terms pater (father) and munus (duty); it literally means "duty of the father," and more extensively, it can be translated as "things belonging to the father," that is, goods which as belonging to the fathers are full of value and meaning.

This still leads us to believe, with a broader meaning understood in an intergenerational key, that heritage is the set of assets that we inherited from our fathers so that they can be entrusted to future generations. Such a definition inevitably shifts the attention to the role that heritage must fulfill, a role that oscillates continuously between that of a passive deposit of historical memory and cultural identity and the opposite, a powerful stimulus for the creativity of the present and construction of the future.

The best known international instrument aimed at promoting cultural and natural, "material" or "tangible," heritage is the 1972 UNESCO Convention,[1] ratified by almost all the states of the world. In this convention cultural heritage[2] and the natural one,[3] however, they are considered in relation to their exceptional nature. Already at the end of the 1970s, the need was felt from many sides to add to this international convention a similar protection device for those "intangible" riches that make up the, so to speak, "intangible" heritage of humanity. After a long journey of studies and proposals, the new 2003 Convention was therefore reached,[4] which thus completes that of 1972. There is no doubt that the protection of the only material component of monuments, environments, and landscapes can be meaningless without the preservation of the cultures and social expressions that have contributed to giving them life— they ensured the maintenance, and they took care of the decoration. Wanting to summarize the conceptual evolution gained within this important international body, it can be considered that with the 2003 Convention, in addition to having given particular importance to local communities in defining what is to be understood as heritage and the role that they must have in the strategies of protection and enhancement, the deep interdependence between intangible and material assets is affirmed; that is, the need for an integrated approach for the protection and enhancement of tangible and intangible assets for the benefit of established communities is affirmed [2].

---

[1] The Convention concerning the "protection of the cultural and natural heritage worldwide" was signed on November 16, 1972.

[2] Made up of monuments, settlement agglomerations, and sites formed by man such as archeological sites.

[3] Consisting of natural monuments including physical and biological formations, geological and physiographic formations, and natural sites.

[4] The Convention for the "Protection of Intangible Cultural Heritage" was approved by the General Conference of UNESCO on October 17, 2003.

Similar importance is given to local communities in defining the concept of landscape, as indicated in the European Convention of Florence in 2000.

In fact, Article 1 of the Convention defines the landscape as follows: it "means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."

The European Convention signed in Florence in 2000 has changed the way we observe and recognize the landscape. The landscape is no longer just a thing of particular beauty or uniqueness, as some rules of the early twentieth century described it, but it has been fully recognized as a deep and inseparable intertwining between anthropic and natural heritage, material and immaterial, interpreted and built through the experience of the communities that live and use those places.

2. Cultural heritage and territorial systems' relationships

On a cultural level, the reflections start from the scientific debate gained within the literature on the subject.

As already cited, highly innovative is the conception of the heritage in the thinking of Choay [1]. His idea of heritage as "allegory of the memory" is based on the origin itself of the word "monument," already mentioned in the previous paragraph, which means "warn" and "remember." The monument challenges memory, calls it into question as a true selection criterion of the elements attributable to the cultural heritage of a settled community. The monument can therefore be considered a cultural universe linked to the characteristics of the context in which it is present and to the community capable of recognizing and understanding its value.

In fact, the environment can be considered as the result of a stratification process, the physical signs of which are the result of the complex relationship of the interaction between man and nature. In each period, the environmental structure has expressed that dense network of relationships through which a company has located itself in a particular physical context. Therefore, the environment can only be understood through the development of its history over time [3].

The attention must therefore be directed to grasp the recurring meanings of the profound relationship between population, activities and places, the unifying meanings of the landscape-environment, its deep structure, the quality of the differences of its structural meanings [4]. In this context, the natural and cultural heritage becomes the result of the stratification of the life habits of the generations that have followed one another in those places. It becomes the physical narrative of the transformations not only of the territories but also of the communities that inhabited them [3].

But the concept of heritage finds its most fertile application in the territory in the thought of Magnaghi [5, 6], going beyond the same UNESCO distinction between cultural and natural heritage, tangible and intangible, to reach an original and potentially fruitful theory of local territorial development, within which it is possible to easily include and develop the concept of local territorial cultural system.

According to the UNESCO [7], cultural heritage comprises at least three categories:

Tangible cultural heritage:
  Movable cultural goods (paintings, sculptures, coins, manuscripts).

Immovable cultural heritage (monuments, archeological sites, etc.)
Underwater cultural heritage (shipwrecks, underwater ruins, and cities).

Immaterial (or intangible) cultural heritage:
Oral traditions, performing arts, rituals.

Natural heritage:
Natural sites with cultural aspects, such as cultural landscapes and physical, biological, or geological formations.

Starting from the same basic ideas and sharing the definition of cultural heritage, the UNESCO [7] focused on the introduction and diffusion of the concept of cultural diversity.

Culture manifests itself in different ways in places and throughout the ages. This plurality is the main wealth of contemporary societies that distinguishes its identity from the previous ones. Cultural plurality, characterized by innovation and creativity, is as essential for man as biodiversity for nature.

If you share this approach, cultural heritage can be recognized as a relevant element of common capital on which to build the future of the next generations with a view to sustainable development [8].

Therefore, the key concept of this work lies in the recognition of this inseparable relationship between the cultural heritage of the historical centers and the landscape in which they are inserted.

Precisely the wide range of meanings that cultural heritage can assume according to the definition developed by the UNESCO (material, immaterial and natural cultural heritage) represents the foundation of a sustainable development that local communities can promote. In fact, in order to defend and promote cultural diversity, the range of cultural assets and landscapes in which they are included represent values so rooted and connected to each other capable of providing original interpretative tools of possible activities, economies, and forms of development.

In essence, the cultural heritage of a region must be interpreted as a lasting palimpsest of the different ways of interpreting the changing economic and social conditions, a prerequisite for identity change.

The cultural heritage, within the limits dictated exclusively by the need to maintain the particular characteristics, must be able to modify the function and role following the needs of society and the contemporary economy.

According to Magnaghi, in the *territorialist approach*, it is precisely the specific qualities of the place to find, through the energies of the local society, the specific style of self-sustainable development. It is evident that the interpretation, description, and representation of these qualities become the central theme of the space representations.

Magnaghi [3] therefore identifies an effective tool in what he defines as the "atlas of heritage." In the territorialist sense, territorial heritage is a system of synergistic relationships between the peculiar qualities of the physical environment, the built environment, and the anthropic one. It is therefore necessary to represent and interpret in an integrated way the three aspects of the heritage itself.

The territorial heritage, thus defined and shared with the community, becomes for Magnaghi [3, 9] fertile ground for action, a living system on which to act to enhance the local environmental and cultural peculiarities, intended as parts of the wider local territorial cultural system. Urban planning organizes and

programs the development of these cultural territorial systems in which space can be classified and interpreted.

3. Historic centers, possible poles of economic networks, and ecosystem services

Historic centers are often bastions which are remnants of age, habits, and traditions now lost in other parts of the territory. But in an era in which communication becomes more and more immaterial, in which virtual accessibility becomes more important, centers with original cultural heritages can become the cornerstone of innovative forms of production based on a new synergy between anthropic activities, nature, and landscape.

The cultural heritage placed at the center of the development policies of a territory can contribute to attract not only tourists but also investors capable of promoting the local economy by introducing new activities, also possibly controlled and exercised at a distance from the polarities of the world economy through the use of information and communication technologies [10].

In line with the operational guidelines for the implementation of the World Heritage Convention [11], cultural landscapes are cultural goods which represent the "combined works of nature and man" as identified in Article I of the Convention.

Landscapes represent the evolution over time of society and its relationship with the territory, with its strengths and weaknesses.

There are a great variety of landscapes which are representative of the different regions of the world, of the combined work of nature and humanity, and express a long and intimate sharing relationship between peoples and their natural environment. Some sites reflect specific land use techniques that guarantee and support biological diversity. Others, through traditions and religious rites, embody an exceptional spiritual relationship between people and nature.

To preserve the memory of the relationships between men and the environment, safeguarding traditional cultures, a true deposit of the memory of those who preceded us (sacred places, botanical gardens, crops, ways of using the territory, etc.), these sites, recognized as landscapes cultural, have been inscribed on the World Heritage List. They constitute our common identity as member of the human race.

In 2010, the culture of integrated conservation recognized internationally the need to maintain with the historical city also the historical cultural landscape in which it finds its origin. The recognition of the historic city in the contemporary urban landscape was sanctioned by the UNESCO [12].

Today the historic urban landscape (HUL) is of fundamental importance in all urban planning and integrated conservation projects.

Historic cities and the rural villages each within its own territorial and landscape context are an integral part of the world heritage, with the communities and their intangible assets, in a continuous process of evolution and change.

In an urban context, the safeguarding and enhancement of heritage concern the set of built and open spaces that can be included in metropolitan areas or the set of small urban settlements and their rural spaces, including the intangible values that characterize them (**Figure 1**).

In this context, the operation consists in referring the cities with their morphological, functional, and structural characteristics to a larger whole, consisting of its territory, the surrounding environment, and the landscape.

Figure 1.
Isolated rural house in the hamlet of San Casciano in the municipality of Sarnano in the province of Macerata in the Marche region in central Italy, within the Monti Sibillini National Park (average altitude 540 m, inhabitants 3142. Photo by the author).

Figure 2.
Agricultural soil in a rural context in the Sibillini Mountains in the province of Macerata in the Marche region in central Italy. The articulated composition of hilly and flat rural landscapes, marked by dry walls and insulated garments pastures of sheep, represents an increasingly less widespread landscape of high biodiversity (photo by the author).
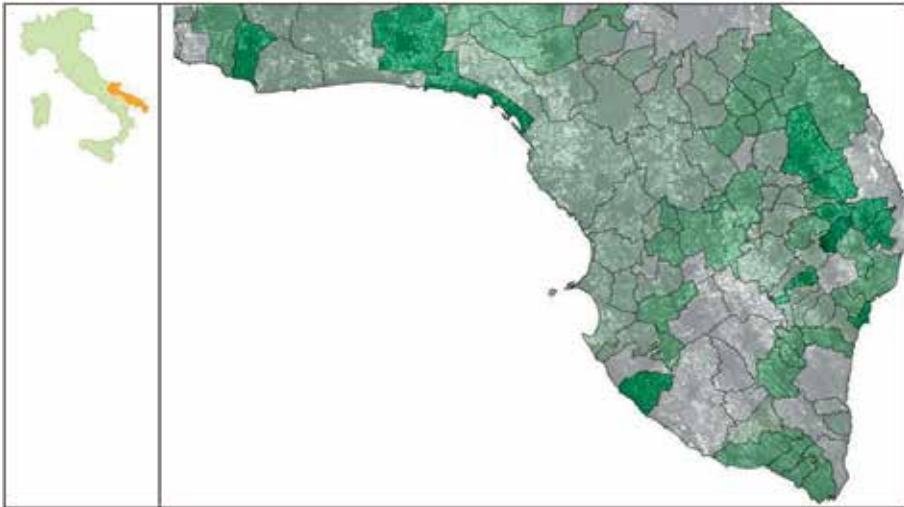
Figure 3.
Example of networks of historic centers in lower Salento, in the Apulia Region in the South of Italy, subject of the development policies of the strategy for internal areas coordinated by the Italian Agency for Territorial Cohesion (http://www.agenziacoesione.gov.it/it/arint/). It can be seen how the urban centers of the municipal territories highlighted in the figure (the different shades of green describe from the darkest to the lightest the greatest degree of belonging to the whole of the internal areas according to the parameters defined by the ministry and reviewed in a specific research by the author) constitute a settlement network capable of supporting and innervating the internal areas of which they are part of ecosystem services if society will be able to support a new self-development, based on the use of information technologies, virtual accessibility, enhancement cultural, and natural resources. Graphic elaboration by the author in developing the following research's work: "The role of the cultural territorial systems of the minor historical centers and the landscapes in which they are inserted for the valorization, protection, and management of cultural heritage and intangible heritage." Research funded by a NUVAL-Formez research grant, 2014.

Each community, through the recognition of its collective memory and the knowledge of its past, has the task of identifying the way to preserve its heritage. Each element of this heritage is the bearer of specific values, with the relative possibilities for change [13] (**Figure 2**).

With respect to all the considerations made so far, further reflection on the importance of the soil resource must be spent, also in terms of cultural as well as environmental resources. Awareness of the value of the soil resource seems to grow, in literature, together with the recognition of the ecosystem services it is able to offer [14].

With the soil status monitoring methods usually available from local authorities, it is complicated and in practice difficult to achieve, to express and quantify the impact of soil losses and degradation at local scale also in terms of erosion of rural landscapes, loss of ecosystem services, and vulnerability to climate change, and finally, to provide decision-makers at local level with specific information for the definition and implementation of measures with the aim of limiting, mitigating or compensating for soil sealing.

Therefore, it is equally complex to provide an in-depth picture of the loss of ecosystem services related to land use due to anthropogenic factors.

In fact, as illustrated in many scientific articles (e.g., [15]), a soil of good quality is able to correctly perform its ecological, economic, and social functions, guaranteeing the supply of peculiar ecosystem services or the benefits that man obtains, directly or indirectly, from the ecosystems [16] and necessary for their sustenance [17, 18], which are divided according to the most recent classification of the Common International Classification of Ecosystem Services (CICES):

- Procurement services (food and biomass products, raw materials, etc.)

- Regulation and maintenance services (climate regulation, carbon capture and storage, erosion and nutrient control, water quality regulation, protection and mitigation of extreme hydrological phenomena, genetic reserve, biodiversity conservation, etc.)

- Cultural services (recreational and cultural services, ethical and spiritual functions, landscape, natural heritage, etc.)

In general, a soil can be considered in good health if it has an adequate content of organic substance, a good structure, and a high diversification of the micro- and macroorganisms that populate it [19]. It is evident that a waterproofed soil can provide cultural services at most but not the other two [18].

With these premises, it is easier to understand why historic centers are potential epicenters of new economic networks and ecosystem services. In fact they are certainly able to offer multiple cultural services, but at the same time, their reuse saves soil and therefore guarantees at least the services of regulation and maintenance of ecosystems (**Figure 3**).

4. First forms of sustainable landscape development: some experiences in Eastern Europe

The values and strategies described so far have found a first application in a European project, born within the proposals relating to the thematic program 2007–2013 promoted by the European Union "Investing in Europe: Investing in People" and within the Eastern Partnership Culture program. The title of the project summarizes the focal points on which the partners have concentrated their insights and the consequent activities, Valorization and Improving of Management of Small Historic Centers in the Eastern Partnership region, hence the acronym VIVA_EASTPART.

The project aims to establish study and operational methodologies that allow local partners from the Eastern European countries involved (Romania, Moldova, Armenia) to build new development paths through an integrated approach to cultural heritage, with particular reference to the centers and small historians, in order to produce territorial added value.[5]

The study and action strategy was aimed at defining an innovative form of sustainable development, which would best enhance the individual components that structure each "cultural territorial system" [20], the product of the interaction between culture and territory, between local identity and global heritage, and between conservation and transformation.

In fact, we speak of "systems," since the territories examined are characterized by the overlap of elements of historical and geographical evolution, precise and linear elements, merged with the surrounding landscape that holds them together

---

[5] Scientific coordination was entrusted to academic figures from the Polytechnic University of Bari and the University of Rome La Sapienza, with the aim of supporting and guiding the actions of local partners, through the definition of a budget on past actions and policies (good and bad practices), the drafting of a methodology for the construction of the Integrated Cultural Territorial Plans and Local Action Plans, the drafting of a toolkit containing the operating instructions, and the support of local partners in the drafting of the pilot projects on the three selected areas (Sibiu County in Romania, Dilijan, Tavush region in Armenia, and Cahul County in Moldova).

in a perfectly distinguishable unicum. The systemic character is particularly evident in one of the pilot cases, Tavush region in Armenia, in which the system of monasteries embedded in the rock of the Armenian barren mountains is now an integral part of a harmonious anthropic natural landscape, in which religion, tradition, culture, and history mingle to create a tangible and intangible systemic heritage (**Figure 4**).

The term "territorial" is also used, since the focus of the entire project was the internal rural areas dotted with small villages and historic centers, territories often still with unexpressed potential, not yet usurped by mass tourism and building speculation, and for this reason, still full of meanings elsewhere forgotten or suffocated. Strategies and planning must necessarily act here from a territorial point of view, to create sustainable development that brings out the values of these lands, so that the local works for the global and vice versa (**Figure 5**).

Finally, the term "cultural" is used, referring to that cultural framework [21] composed of tangible and intangible assets, which affect a variety of aspects: from architecture to art, from history to music, from nature to crafts, and so on. It is a matter of identifying those local cultural landscapes [22] in which the population recognizes itself, beyond any geographical dimension and any administrative boundary. The atlas of landscapes that takes shape in this way perfectly follows the spirit of the European Landscape Convention of 2000 and lays the foundations for sustainable and flexible planning that goes beyond the territorial and sectoral hierarchies, which derives from the values in which the inhabitants recognize and manage to integrate the various components into shared strategic scenarios. The path to achieve these objectives and to draw up the so-called "integrated cultural plan" is described and detailed in the Methodology Dossier, produced by scientific partners and implemented and tested by local partners in pilot projects.

Figure 4.
The Haghartsin Monastery in the municipal territory of Dilijan in the Tavush region of Armenia, characterized by the widespread presence of places of worship of considerable historical value and agricultural dwellings which, integrated into the surrounding mountain landscape, make up a system of rural settlements and widespread cultural heritage that characterizes the entire region (source: author's photo).

Figure 5.
Rural houses in the municipal area of Dilijan in the Tavush region of Armenia which, in the strategies of the integrated cultural plan developed during the VIVA project, represent a connection of a physical but also immaterial territorial character between the villages and small towns that dot the region (source: author's photo).

At the operational level, the preparation of a "toolkit" was also extremely useful, a lean and easy-to-use manual that local partners could follow and consult at each stage of their activities.

Furthermore, the involvement of the populations was transversal within the project, from the cognitive-reconnaissance phase to the planning phase, to draw on the one hand important elements of the diffuse knowledge necessary to create a map of values inherent in the territories and on the other to create an awareness of a place such as to develop awareness of the development potential of the territories themselves in the inhabitants, an essential condition for initiating effective processes of sustainable local development [5]. Drawing important lessons, in fact, from good and bad practices of the past, we tried to involve the local populations by directing all activities towards forms of active and inclusive participation, with the aim of exploiting and interpreting those codes and languages of the best transmission that are almost always behavioral and that as such escape codification through rules and documents but which represent an invaluable pool of knowledge and potential action.

5. Conclusions and perspectives for territorial cultural systems

Italy and much of Europe enjoy an extraordinary polycentrism and a large and diverse network of small- and medium-sized historic centers. It is therefore necessary to be able to enhance this original settlement structure. It is essential to highlight the enormous territorial capital made up of the networks of historic centers and the territorial systems in which they are included [23], which has its strengths in natural and cultural resources, in agricultural and tourist production systems, and in the social energy of the local population and potential residents. In this context, the unused territorial capital represents an important latent resource to be reactivated. It is a measure of the development potential that can be implemented.

Strengthening the demographic structure of these territorial systems and the quality of life, in terms of access to essential services, is an indispensable condition for the success of any development strategy one wishes to implement in these territories. Strengthening can be achieved through population growth or an increase in working-age population classes or at least a halt to decline. Overcoming the inertial demographic dynamics is a fundamental aspect for the success of local development policies [24].

Strategies must therefore aim at improving the quality of life of residents, well-being, and social inclusion, increasing the demand for work and the use of territorial capital. No less important are the strategies aimed at the protection of the territory, the enhancement of natural and historical cultural resources, the promotion of sustainable tourism, the activation of agro-food systems, and the reevaluation of know-how and craftsmanship linked to traditions locals. Obviously, natural and cultural capital [23] is not the only outcome of history: it can be increased with appropriate modernization practices and policies through architecture, the reuse of disused urban containers, and the enhancement and integration in integrated itineraries and/or itineraries (e.g., food and wine or cultural). Natural and cultural capital then requires a necessary integration with the world of entrepreneurship to be translated into economic opportunity.

There are numerous policies, programs, and actions capable of supporting a self-sustainable local development of this territorial capital, but to pursue them, it is necessary to change the cultural approach and governance models of this process and a medium long-term time horizon [23].

These purposes and these strategies are at the basis of the activities started to encourage the development process of numerous territorial realities in Italy, such as, for example, among many, the pilot project called "Live Villages," or that of the most beautiful villages in Italy which have now taken on the characteristics of a large area territorial project (**Figure 6**).

By shifting even more attention to the territorial cultural systems, the goal becomes to plan individual territorial realities in the broader context in which they fall: the territorial cultural systems can in fact allow a unitary and systemic vision of development activities based on the enhancement of resource locals.

With these design purposes, however, the development prospects of the territorial cultural systems are outlined within the latest generation landscape plans, in line with what is defined in the European Landscape Convention. Cultural heritage is therefore interpreted as an integrated system related to the territory, in its historical structure defined by long-lasting territorialization processes, and by the identity characteristics of the territorial figures that compose it.

Planning is therefore understood here as an action-oriented project activity, an activity inclusive of the plurality of ideas and instances expressed by the settled communities, a different way of approaching, that is, looking for solutions aimed at promoting local development. This highlights the need to understand what the fundamental requirements of the planning process must be in order to be able to involve inhabitants and stakeholders, to manage the relationship between public and private entities, to use and administer significant quantities of georeferenced data and information, to promote the quality of the urban and territorial landscape, and to pursue a real quality of life for the users of the plan, in economically weak territorial areas, with a resident population dispersed over large territorial areas and often characterized by infrastructural deficiencies.

In taking cultural heritage as the driving force of development, the planning process must be able to construct shared development scenarios, in terms of complexity rather than according to simplified visions, in order to fully grasp the peculiarities and diversities of the places: peculiarities and diversity are the foundation

Figure 6.
Typical glimpse of historic urban landscape in the municipality of Sarnano in the Sibillini Mountains in the province of Macerata in the Marche region in central Italy. The municipality has been admitted to the club of the most beautiful villages in Italy, born on the impulse of the Tourism Council of the National Association of Italian Municipalities (photo by the author).

of development. It is therefore a matter of supporting and consolidating, on the one hand, the internal "short relationships" between local subjects, that is, the set of shared knowledge, cooperative skills, and habits that produce geographically diverse territories and cultural characters, and to promote, on the other, the "long relationships" between the local and the super flat [25]. It is in these latter relationships that the process of self-determination of the local society can take place [5]: "local" and "global" must have a dimension of constant dialectic.

This means, therefore, that the planning process must assume the identity characteristics of cultural heritage as central factors in development policies to produce new territorial qualities, such as to attribute high levels of competitiveness to local resources on a global scale.

Planning and subsequently designing cultural heritage as a resource for the territory is fundamental to allow its reuse and reintegration into the life cycle of its communities. In order to be protected and enhanced, the cultural heritage that preserves the history and identity of places, it must be part of a project capable of making it contemporary.

Figure 7.
Hilly landscape on the edge of the municipality of Sarnano at the foot of the Sibillini Mountains in the Marche region. The small stone artifacts are integrated into the mountains interrupted only by isolated trees that delimit the possible panoramic shots.

The time is also ripe to work on a territorial project capable of combining protection and conservation with actions of "re-signification and modification" of the places; a project capable of clearly outlining future scenarios that address issues related to the protection of cultural heritage and landscape but also the inclusion of services, in their close interdependence; and the promotion of cultural occasions and events related to the specificity of the individual territorial polarities, as well as to settlement development, mobility, and accessibility. It is a matter of promoting a project that refers to a grid of qualitative parameters and not only, and no longer—as usual—simply quantitative. The search for an overall quality of the project lies in the ability to interpret the constitutive logics of the territory, to recognize its training laws and to propose itself as part of a physical and social spatial whole (**Figure 7**).

This is reinforced today by the same reference legislation, consequent to the European Landscape Convention, increasingly oriented towards expanding the range of action of the project activity to ensure specific territorial quality objectives for each territory. In the development scenarios, the project invests all landscapes, even those whose quality is only latent if not absent, and considers their potential not only in relation to forms and signs inherited from history but also to the value of change, when it is coherent with those signs and with those forms. Signs and forms therefore become driving factors of regeneration processes and renewed identities.

Author details

Francesco Rotondo
Università Politecnica delle Marche, Ancona, Italy

*Address all correspondence to: f.rotondo@univpm.it

IntechOpen

References

[1] Choay F. L'allégorie du patrimoine. Paris: Éditions du seuil; 1992. pp. 277

[2] Van Oers R, Haraguchi S. Managing Historic Cities [Gérer les villes historiques]. Paris: UNESCO World Heritage Centre; 2010

[3] Azzena G. History for places. In: Maciocco G, Sanna G, Serreli S, editors. The Urban Potential of External Territories. Franco Angeli: Milano; 2011. pp. 196-227

[4] Sanna G. Territory, representation, project. In: Maciocco G, Sanna G, Serreli S, editors. The Urban Potential of External Territories. Franco Angeli: Milano; 2011. pp. 142-195

[5] Magnaghi A. Projet local. Sprimont (Belgique): Pierre Mardaga; 2003. pp. 128

[6] Magnaghi A. A charter for democracy and local self-sustainable development. In: The Urban Village. London: Zed Books Ltd; 2005

[7] UNESCO. What is meant by "cultural heritage"? 2015. Available from: http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/ [Accessed: 02 January 2020]

[8] UNESCO. Universal Declaration on Cultural Diversity. 2001. available from: http://portal.unesco.org/en/ev.php-URL_ID=13179&URL_DO=DO_TOPIC&URL_SECTION=201.html [Accessed: 02 January 2020]

[9] Magnaghi A. Scenari strategici. Visioni identitarie per il progetto di territorio. Firenze: Alinea; 2007

[10] Craterre-ENSAG. Cultural Heritage & Local Development. A Guide for African Local Governments. Grenoble: Imprimerie Bastianelli; 2006

[11] UNESCO. Operational Guidelines for the Implementation of the of the World Heritage Convention. 2013. Available from: https://whc.unesco.org/archive/opguide13-en.pdf [Accessed: 01 February 2018]

[12] UNESCO. Recommendation on the Historic Urban Landscape. 2011. Available from: https://whc.unesco.org/en/hul/ [Accessed: 02 January 2020]

[13] ICOMOS. Les Principes de la Valette pour la sauvegarde et la gestion des villes et des ensembles urbains historiques. 2011. Available from: http://www.icomos.org/fr/chartes-et-normes [Accessed: 02 January 2020]

[14] Pittock J, Cork S, Maynard S. The state of the application of ecosystems services in Australia. Ecosystem Services. 2012;**1**:111-120. DOI: 10.1016/j.ecoser.2012.07.010

[15] Di Leginio M, Fumanti F, Strollo A, Munafò M. Funzioni del suolo, servizi ecosistemici e minacce. In: ISPRA. Consumo di suolo, dinamiche territoriali e servizi ecosistemici. ISPRA. Rapporti 248. 2016. pp. 1-3. DOI: 10.1201/b16500-23

[16] Costanza R, d'Arge R, Groot R, de Farber S, Grasso M, Hannon B, et al. The value of the world's ecosystem services and natural capital. Nature. 1997;**387**:253-260. DOI: 10.1038/387253a0

[17] Blum WEH. Functions of soil for society and the environment. Reviews in Environmental Science and Bio/Technology. 2005;**4**:75-79. DOI: 10.1007/s11157-005-2236-x

[18] UNEP. Millenium Ecosystem Assessment. Ecosystems and Human

Well-Being. A Framework For Assessment. Washington, DC, USA: Island Press; 2003. pp. 245. Available from: http://pdf.wri.org/ecosystems_human_wellbeing.pdf [Accessed: 02 January 2020]

[19] Brevik EC, Burgess LC. Soils and Human Health. Boca Raton, FL, USA: CRC Press; 2013. pp. 408. DOI: 10.1201/b13683

[20] Selicato F, Piscitelli C. Territorial cultural systems: Possible definitions. In: Selicato F, Rotondo F, Marin V, Lopez Galdeano J, editors. Cultural Territorial Systems. Landscape and Cultural Heritage as a Key to Sustainable and Local Development in Eastern Europe. Basel, Switzerland: Springer International Publishing; 2016. pp. 75-84. DOI: 10.1007/978-3-319-20753-7

[21] Carta M. L'armatura culturale del territorio. Il patrimonio culturale come matrice di identità e strumento di sviluppo. Milano: Franco Angeli; 1999. pp. 408

[22] Colarossi P. Building local cultural landscapes. In: Selicato F, Rotondo F, Marin V, Lopez Galdeano J, editors. Cultural Territorial Systems. Landscape and Cultural Heritage as a Key to Sustainable and Local Development in Eastern Europe. Basel, Switzerland: Springer International Publishing; 2016. pp. 133-180. DOI: 10.1007/978-3-319-20753-7

[23] Camagni R. Regional competitiveness: Towards a concept of territorial capital. In: Capello R, Camagni R, Chizzolini B, Fratesi U, editors. Modelling Regional Scenarios for the Enlarged Europe. Advances in Spatial Science. Berlin, Heidelberg: Springer; 2008. pp. 33-47. DOI: 10.1007/978-3-540-74737-6

[24] Montrone S, Perchinunno P, Rotondo F, Selicato F. Internal areas strategies: From statistical methods to planning policies. In: Gervasi et al., editors. Computational Science and Its Applications—ICCSA 2015, vol. III. Basel: Springer International Publishing; 2015. pp. 658-672. DOI: 10.1007/978-3-319-21413-9

[25] Dematteis G, Governa F. Territorialità, sviluppo locale, sostenibilità: modello SLoT. Milano: Franco Angeli; 2005. pp. 240

Chapter 4

Historic Masonry

Noemi Graciela Maldonado, Pablo Martín,
Gerardo González del Solar and María Domizio

Abstract

Masonry is a composite material characterised by its good behaviour under dead loads and in a nonaggressive environment. However, this noble material does not satisfactorily resist seismic loads. The different types of historical masonry that have remained over time are characterised by an adequate mixture of materials with low chemical reactions that are degrading due to environmental conditions. There are numerous historical masonry construction techniques in the world, reflecting local conditions of materials and workmanship. The key to its permanence and maintenance over time despite the effects of earthquakes is the construction technology and quality of materials used. As a result of earthquake damage observation and experimental research, various technical solutions for rehabilitation and retrofit of masonry are now available. Finite element modelling has become a very useful tool to identify the damage problem in historical masonry but requires a significant contribution of parameters obtained from destructive and nondestructive tests.

Keywords: heritage, ceramic units, mortars, compatibility, modelling, strengthening

1. Introduction

Masonry is a material composed of natural or manually manufactured units joined with fresh mortar, which constitute an important inventory of existing buildings in the world from the Egyptian civilization to the present day. The most widely studied and investigated construction techniques correspond to the masonry of the Greek and Roman constructions that have remained to this day. In Africa and Asia, the oldest masonry was made of stone or earth. In America, ceramics were used as masonry in the late nineteenth century that are now part of the local cultural heritage.

The preservation of heritage buildings requires knowledge to guide technical and economic maintenance strategies [1]. Building materials degrade over time when in contact with the environment, and this is a natural and inevitable process. From the perspective of use, the main unknown behaviour is the rate of deterioration, necessary data to raise the estimated construction service life in relation to safety and/or functionality [2].

The use of masonry has significant advantages in cost, installation speed, aesthetics, durability, sound insulation, thermal insulation, fire resistance and accidental damage, energy consumption, maintenance and repair, availability

of materials and local workmanship and potential recyclability. Regarding the disadvantages, we have detected the need for greater resistant area compared to reinforced concrete, the need of better foundations, problems in the insulation, the size of the openings, in the arrangement of the joints, considerations of safety and health, durability problems by presence of water and salts and currently lack of skilled labour.

The architectural function of the masonry is the envelope of the building to protect its inhabitants and their belongings from environmental agents, for example, the effect of rain. They can be constituted as walls of barriers or drainage.

Structural masonry can be classified as bearing or nonbearing. The bearing masonry resists the own weight and wind loads or earthquake and gravitational loads generated by the floors or ceilings supported on it [3].

The presence of moisture, whose origin may be the wet soil, rainfall or faulty drainage services, causes damage to old masonry. Although moisture can be measured by different techniques, the results are not repeatable. In other cases, new interventions with new materials have increased moisture problems [2].

The application of the finite element method using nonlinear constitutive models is a tool to verify the observed damages and stress states of historic masonry. But nevertheless, laboratory and field tests are necessary in order to characterise masonry materials and provide reliable data on the design parameters needed for building modelling although the number of samples to be extracted should be minimal.

1.1 Methodological evaluation of historical construction

The methodology used in the study of cases evaluates at the beginning whether the historical works have heritage values or not (**Figure 1**), defining the responsibilities before specifying the procedure [2]. All the activities involved in this task involve the interaction of different disciplines and an important responsibility of the maintenance management of the heritage.

Figure 2 presents the different steps of the procedures followed for the rehabilitation of historic buildings, applying safety criteria stated in the regulations and conservation criteria of the International Council on Monuments and Sites (ICOMOS) charts [4]. In this evaluation, the impact of the durability of the materials and the environmental sustainability with the built environment must be incorporated in addition to the safety in the structure.
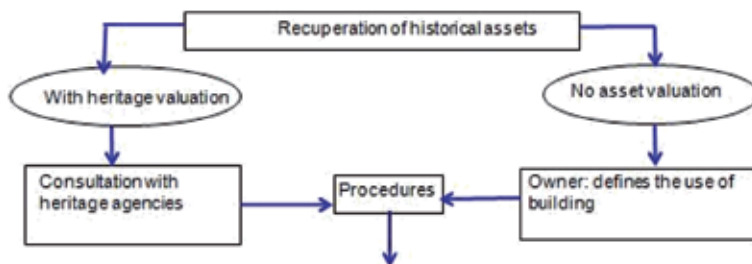
Figure 1.
Basic criteria for recovery of historical works.
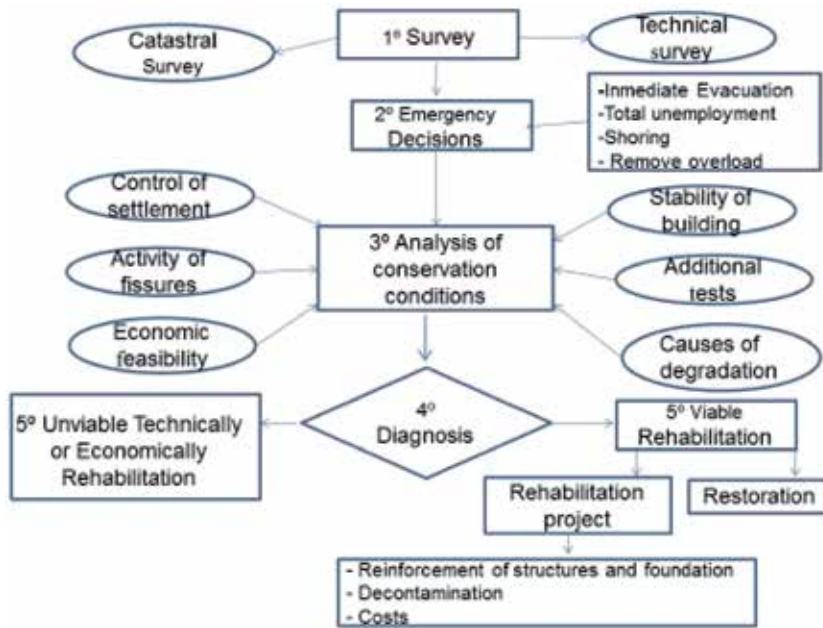
Figure 2.
Procedures of study of heritage construction.

2. Masonry materials

2.1 Historic masonry units

2.1.1 Natural stone

Stone has been used from earliest times. Stone as a material is geographically widespread. Its use in structures is often confined to local materials from a nearby quarry. Load bearing stonework was used up to about the late nineteenth century, but many earlier structures were built of rubble or brick faced with stone ashlar. Since about the year 1900, stone has been mostly used as facade to cheaper masonry or as cladding for other materials.

Stone masonry construction may be of ashlar, squared/coursed rubble, random rubble, etc. Composite rubble/ashlar walls have often been used. It cannot be assumed that a pier or wall with ashlar facing is of solid construction through its entire section; often the core will be of very weak material [5].

2.1.2 Bricks and blocks

Bricks are the oldest man-made building material. Examples of sun-dried clay bricks (adobe) date back to 8000 BC, and fire bricks were used by 2500 BC. Clay bricks were traditionally made locally. Urban buildings of the late nineteenth century and early twentieth century were made of masonry of fired ceramic bricks [5]. In the transition to the use of steel, concrete constructions appear, which employ hybrid metal profiles for supporting floor slabs or as bridges and columns within the masonry to withstand earthquakes known as sidero-brick [6]. Since 1930 the use of reinforced concrete in the world is

widespread, leaving the brick masonry walls for minors or cladding in reinforced concrete structures or termination of facades.

Although features may be more reliable as a dating aid, brickwork may sometimes be approximately dated by the brick size. However, there are regional variations which may be greater than those relating to age [5]. Bricks can be fired clay, calcium-silicate or concrete.

Figure 3 shows different placement patterns of solid bricks: stretcher bond, header bond, English bond and Flemish bond, which have different applications in construction (walls, landscaping, pavements).

These patterns allow to identify the time of construction but not the elements of metallic union that were placed from the middle of the nineteenth century in the form of flat strips every four or six courses. Its presence is detected by the slight but regular cracking in these joints due to the increase in volume due to iron corrosion.

The walls with inner cavities are later than 1850 for thicknesses close to 0.40 m and preponderance from 1930 to thicknesses of 0.45 m. These walls generally have a common brick course, an air layer of 0.05 m and a course of decorative purposes or tightness control.

The first uses of concrete blocks are at the beginning of the twentieth century with an important growth due to the demand of houses before World War II. Since World War II, the use of concrete blockwork increased dramatically because of the promotion of cavity walls and the need for improved thermal insulation, which was achieved by the use of lightweight concrete blocks for the inner skin.

Block sizes vary from 390 × 190 × 60 mm to 590 × 215 × 250 mm. The blocks may be solid, cellular or hollow. Densities vary in the range 475 kg/m^3 (autoclaved aerated) to 2000 kg/m^3 (normal aggregate).

2.2 Historical binders

The mortars present in the historic masonry of buildings are typically composed by simple or hydraulic limes. There are two kinds of binders, aerial or hydraulic, depending on the mechanism of hardening [7].

They can be subdivided into simple mortars, hydraulic mortars and composite mortars. The binder can be cement, lime or mix of both. In the past, same mortars contained ash to give a dark colour.
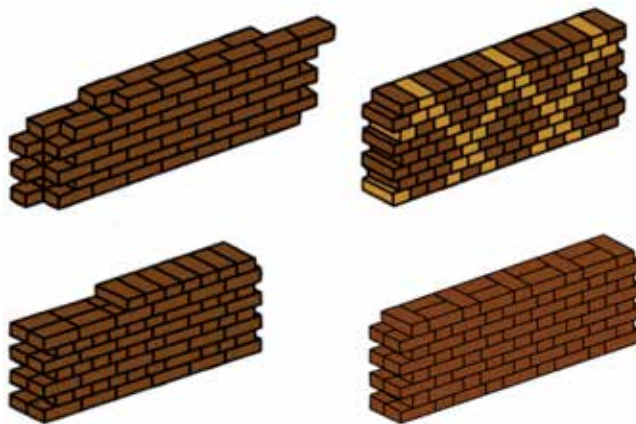
Figure 3.
Common solid brickwork bonds: stretcher (up, left), header (up, right), English (down, left) and Flemish (down, right) bonds [5].

The function of the mortar is to hold together the masonry units and compensate its dimensional tolerances. Also the purpose of mortar is to transfer the gravitational force uniformly through the brickwork, the tying effect being achieved by friction and the staggered pattern of the bricks.

Pure lime mortars, containing no clay or silt, are hardened by carbonation of calcium hydroxide. This can take many years, depending on the porosity of the stone or brick and on the thickness of the wall.

In the case of mortars made from hydraulic lime, where the limestone is ground and fired with some clay or silt, the lime reacts with water for initial strength gain, supplemented subsequently by carbonation of any free lime.

Pure lime mortars (lime-sand) are relatively weak and flexible. Pure cement mortars (cement-sand) may be stronger and stiffer than the stone or brick. If the mortar is too strong, any cracks in the masonry from whatever cause may therefore go through the stones or bricks rather than follow the joints.

Cement-lime mortars (cement-lime-sand) have intermediate strengths; the greater the proportion of cement, the stronger the mortar. Small additions of cement to lime mortars increase the strength marginally but reduce the permeability significantly. This can result in frost damage in porous stone or brick.

Mortar joints are eroded by rain running down faces of walls. This effect is aggravated by chemical breakdown of the binder, because of the acidity of the rainwater. The resistance to this weathering increases with the total proportion of binder to sand. Sulphates, from whatever source, can cause the expansion and disintegration of mortar. Some bricks contain sulphates which may be leached out into the mortar.

The strength of the mortar influences the strength of the masonry in compression, tension and flexure but not to a great degree.

Lime-sand mortars were traditionally used. They were able to accommodate movement, both from the bricks themselves and from the structure as a whole. It was considered a good practice that the mortar should never be stronger than the brick. This must be taken into account when specifying the repair mortar.

Strong cement-rich mortars tend to shrink, which can lead to poor bonding and water ingress into the wall.

The compressive strength of mortar in existing joints cannot be measured directly. The ratios of cement/lime/sand can be established by chemical analysis of mortar samples taken from the joints.

3. Historical masonry construction techniques

The basic method of construction has barely changed in several thousand years: the units are placed one above the other in such a way that they form an intertwined assembly in at least two horizontal directions. Sometimes order is achieved in the third dimension. Most of the time, an intermediate layer of mortar is used to save small to large inaccuracies between units and make the walls waterproof, airtight and soundproof.

There are four main techniques for achieving stable masonry [8]:

1. Irregularly shaped and sized but generally laminar pieces are selected and placed by hand in an interlocking mass (e.g. dry stone walls, see **Figure 4**).

2. Medium to large blocks are made or cut very precisely to one or a small range of interlocking sizes and assembled to a basic grid pattern either without mortar or with very thin joints (e.g. ashlars or thin-joint).
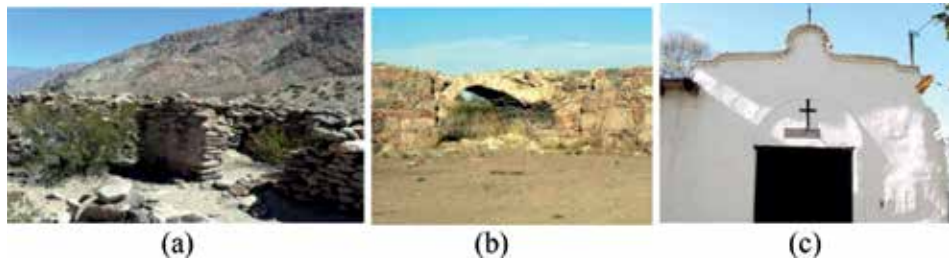
Figure 4.
Photographs of Mendoza, Argentina: (a) prehispanic stone walls (Uspallata), (b) stone bridge (Luján de Cuyo), (c) Jesús Nazareno church (Guaymallén).

Figure 5.
Photographs of historical masonry heritage of Mendoza, Argentina: (a) provincial Museum of Fine Arts (Luján de Cuyo), (b) Caro wine vault (Godoy Cruz), (c) Arizu winery (Godoy Cruz).

3. Small-to-medium units are made to normal precision in few sizes and assembled to a basic grid pattern, and the inaccuracies are taken up by use of a packing material such as mortar (e.g. normal brickwork, see **Figure 5**).

4. Irregularly shaped and sized pieces are both packed apart and bonded together with adherent mortar (e.g. random rubble walls).

4. Seismic behaviour of historic masonry

The behaviour of historical masonry to permanent vertical loads has been satisfactory. A different approach to heritage building occurs when there is a seismic-risk region. The way in which a structure is damaged during an earthquake is strongly influenced by its proximity to the area of fault rupture.

Under the great demands on acceleration and displacement of the seismic events studied, only the conjunction updated with new design procedure regulations, a regular good structural design, static redundancy and proper implementation will allow structures to survive strong earthquakes [2].

By definition, "repair" refers to the post-earthquake repair of damage, caused by seismic ground motion that does not increase the seismic resistance of a structure beyond its pre-earthquake state.

"Strengthening", "seismic strengthening", or "seismic upgrading", however, comprises technical interventions in the structural system of a building that improve its seismic resistance by increasing strength and ductility. According to the proposed terminology, strengthening a building before an earthquake is called "rehabilitation", whereas strengthening after the earthquake is called "retrofit" [9].

The law procedure and how to decide the appropriate methods are different in each country. However, the practice between safety and historical preservation is almost the same in all countries that have some preservation regulations,

but the problems are exacerbated when the effect of seismic actions is added. The California Historical Construction Code [10] has joined the vision regarding heritage aspects and safety. It includes the subject of use and occupation; protection against fire; escape routes and accessibility; structural requirements, materials and old methods of construction; requirements of mechanical and electrical installations; and drains, whenever the building merits the identification of heritage value.

In the United States, the bearing walls of unreinforced masonry (URM) correspond to before 1933 with two courses of bricks joined at their upper end. When the interior was filled with rubble, it was stiffened elastically and modified the behaviour of the frames where the masonry is inserted.

The behaviour of horizontal diaphragms in historic masonry is often deficient because they are not sufficiently connected to transfer the horizontal seismic forces to the resistant side walls. They are usually made of wood, supported by beams anchored in wall inserts, which are affected by deformations outside the plane of the loaded wall, which can lead to the overturning of the wall and the collapse of the building [3].

The Long Beach earthquake (California, 1933) showed the bad behaviour of this masonry, causing the prohibition to use it in school buildings. The UBC of 1943 established that the masonry had to meet the same criteria of design of the reinforced concrete of that time, appearing the armed masonry.

The Santiago (Chile) and City of México (1985); Izmit, Turkey, and Quindío, Colombia (1999); Pisco, Perú (2007); L'Aquila, Italy (2009); Lorca, Spain (2011); Kathmandú, Nepal (2015); and Manabí, Ecuador (2016) earthquakes have shown that nonengineering masonry buildings have suffered significant damage, especially the masonry constructions in adobe and in stone [3, 11, 12].

4.1 Masonry laboratory tests

The tests of historic masonry specimens obtained from existing structures are scarce. However, there are several investigations carried out in small-scale replicas of URM or in different scales carried out in the United States, Italy and Yugoslavia in the last 25 years [3, 9].

There are in situ testing techniques to measure the compressive strength of the masonry, which produce some damage and require special equipment. The experimental static tests can be applied: flat-jack test and pull out. Ultrasonic, geo-radar, acoustic emission, static monitoring, thermography, X-ray diffraction can be used as non-destructive tests; which sometimes are not justified for masonry routine evaluations that have less thickness than the historic masonry.

The dynamic tests can be ambient vibration testing, even to register a long-term dynamic monitoring.

5. Historic masonry durability

From the point of view of durability, the walls as an open system are in contact with other contiguous structures that take part in the dynamics of the overall behaviour. Even when any infiltration can be successfully eliminated, contact with the ground or with adjacent walls provides moisture sources by capillarity. Virtually all walls contain soluble salts, either dispersed within porous materials or locally concentrated. They can be present as efflorescence that form different aggregates of crystals with various shapes and located on the surface, such as sub-springs that form crystalline aggregates below the surface, and as solutes in aqueous solutions on and inside the walls.

Figure 6.
Evolution of the mortar compatibility process during rehabilitation of school building [2].

The main known salts produced in the walls are carbonates, sulphates, chlorides, nitrates, oxalates and sodium, potassium, calcium, magnesium and ammonia. The different salt species, precipitated from multicomponent systems, vary considerably depending on the materials present, but the type of salt found can, therefore, very often give indications of their origin.

Both the plasters and the paint layer of the walls are typically open structures with high porosity (their pores can easily be intercommunicated). This means that there is a large surface exposed to the degradation agents and there is easy permeability to fluids in contact with it both liquids (solutions of salts diluted in the wall) and gases (atmospheric pollutants and water vapour) [13].

5.1 Material's compatibility

In masonry it is required that the chemical compatibility between the mortar of replacement and the old mortar, the physical compatibility in relation to the process of solubility of salts and water of transport and the structural compatibility where the resistance of the new mortar must be similar to that of the masonry historical in order to avoid damages by the use of mortars with Portland cement.

As far as mortars are complex systems, different approaches can be used for their characterisation. Nowadays, the reconstruction of the original composition is quite complex and requires the application of various and complementary techniques. In addition, the technological culture of making lime mortars has been lost, although from the economic point of view they would be of lower cost [7]. The need for mortar compatibility has led to the design of specific products to avoid damage by chemical reactions as shown in **Figure 6** [2].

6. Masonry modelling

The directed behaviour of the geomaterials (shear as a function of compressive strength) requires computational models that allow capturing the different failure modes and, without losing precision, represent them in a simple way. In accordance with this, there are several modelling techniques; the micro-models consist of the modelling of the masonry units and the mortar as continuous elements, while the

masonry-mortar interface is represented by means of discontinuous elements. As the macro-models, these are phenomenological models in which masonry units, mortar and interface are represented as a composite by means of a continuous element. The technique to be used is based on the level of accuracy and simplicity desired [14].

Phenomenological models allow focusing on the overall response of the structure at a lower computational cost. For this to happen, it is necessary to establish a constitutive model whose response is representative of the behaviour of the composites. The constitutive model of Drucker-Prager [15, 16] allows to represent the behaviour of the masonry as an elasto-plastic material with a strong dependence on the acting pressure. The low number of variables to define makes this model attractive. In turn, the characterisation of these variables can be carried out in a simple way through a diagonal compression test in laboratory or application of flat-jack in situ.

To obtain the modelling parameters of the masonry, laboratory tests are carried out in a 1:1 scale on specimens of different thickness [15]. With the experimental results achieved, a finite element model is formulated using the Abaqus software [16] whose parameters allow to obtain a behaviour similar to that observed during the tests.
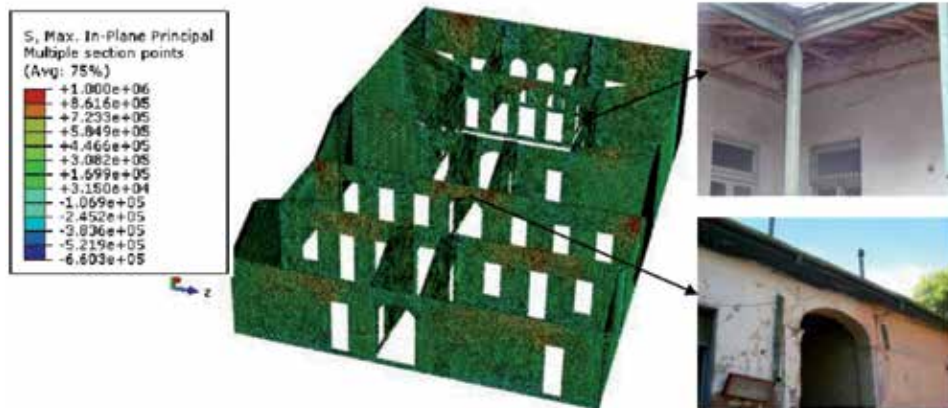
Figure 7.
Comparison of stress state modelling and building damage status [17].
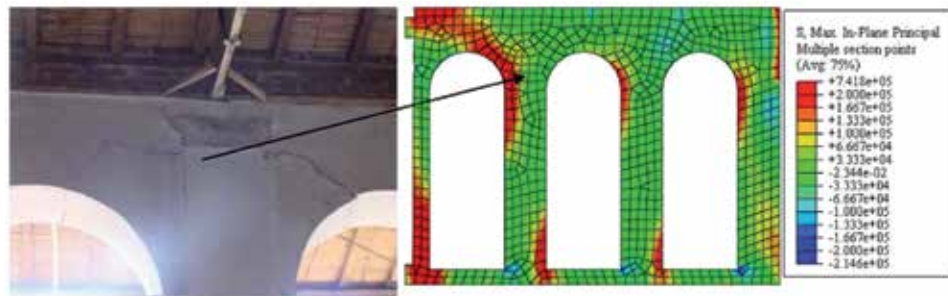
Figure 8.
Comparison between stress state modelling and building damage status [17].

Based on the model generated and calibrated, the building geometry and the state of applicants loads are simulated, the results of which are compared with the real damage evidenced in the structures analysed. The analysis of the results from
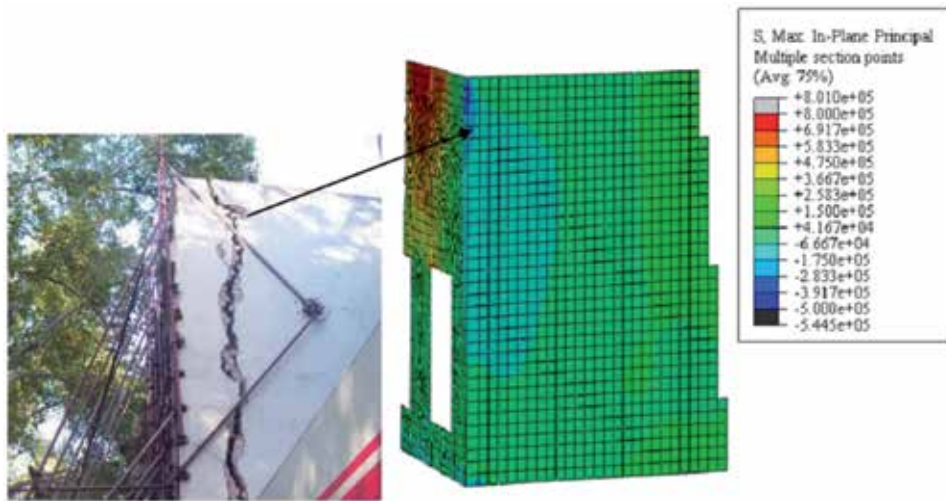
Figure 9.
Simulation of facade damage due to inefficient foundation [17].
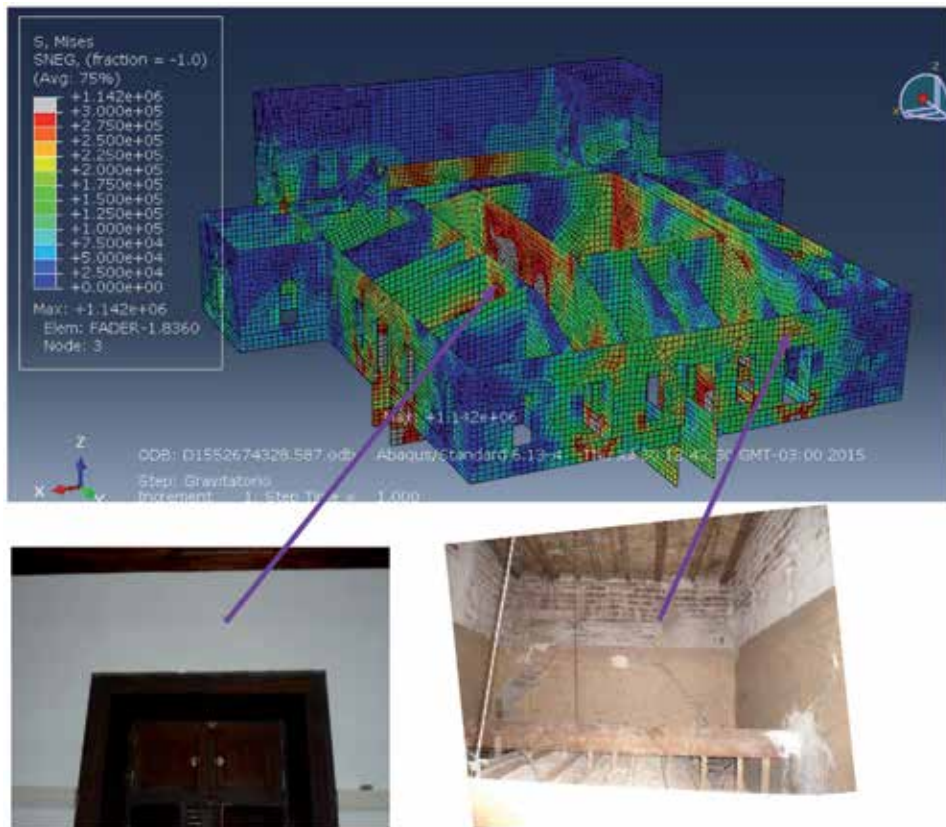
Figure 10.
Damage due settlements of different sectors [18].

the structural simulation allows a better understanding of the causes of the deterioration as well as the cracking patterns. These results have allowed us to make a proposal for its repair and subsequent rehabilitation.

Figure 7 shows the general structural model and the state of stresses of the masonry of an educational building [17]. It shows the concentration of stress associated with the wall encounters and points of application of loads, points that must be reinforced locally, while the rest of the masonry is subjected to a normal tension level below the stress maximum. In **Figure 8** we can see the result of the modelling for the damage in archs, and **Figure 9** shows the detachment of the main facade.

In the case of the museum in **Figure 10**, the stress concentration in the walls of the central nave is observed as a result of the differential settlement between this sector and the lateral ones [18].

7. Study cases

Table 1 shows the cadastral characteristics of historic masonry buildings studied in Mendoza, Argentina, from 1999 to 2015 [2].

Table 2 shows the data obtained in the evaluation of the condition of the historic masonry buildings prior to the value enhancement [2].

Table 3 shows the soil criteria and masonry modelling for different buildings studied. It is taken as a criterion modelling by finite elements for walls using the type plate element of four or eight nodes. Drucker-Prager model has been used for the simulation of material failure [15]. The foundation is modelled by elastic springs, or the soil is modelled directly, considering its rigidity (elastic), since in this type of structure soil stiffness plays a fundamental role. For the roof structure, which is generally flexible, main resistance elements such as trusses or girders (ridges, etc.) are modelled, distributing loads to these elements. The seismic action is determined by applying the methods established by the regulations as proportional forces to the mass of each node of the finite element mesh [17].

Evaluated	Saint Francis Ruins, Capital	Mitre School, Capital	Giol Chalet, Maipú	Fader House, Luján de Cuyo
Date of building	XVIII century	Late nineteenth century–1906	1910	1892 house 1905–6 paints
Date of study	1999	1999 and 2010	2012	2013
Charge heritage	National Direction Architecture Municipality of Capital	Direction of Heritage Government of Mendoza	Municipality of Maipú National Direction Architecture	Direction of Heritage National Direction Architecture
Intended use	Outdoor museum	Educational museum	Vintage museum	Fine arts museum
Archaeological and historical background	Historical and archaeological studies	Few historical and archaeological studies	Few historical studies. No archaeological studies	Few historical studies. No archaeological studies

Table 1.
Data on the buildings studied.

Evaluated	Saint Francis Ruins, Capital	Mitre School, Capital	Giol Chalet, Maipú	Fader House, Luján de Cuyo
Valid contributions from different epochs	1941: Put in value Maintenance Ruins Park and archaeological exploration	Maintenance (paint, flooring) 1955: Replacement of floating floors 1964: Reinforcing bases	Different uses over time (bank deposit, file, housing)	Summer house 1949: Put in value as a museum Subsequent updates of aesthetic value
Masonry type	Masonry handmade ceramic solid mortars with different types of bonding Variable thicknesses	Handmade ceramic solid 0.55 m (head and rope) Good constructive technique	Handmade ceramic solid 0.30 m (head) with metal profiles on walls	Handmade ceramic solid 0.55 m (head and rope) Slab of masonry and metal beams Good constructive technique
Main problems detected, damages and durability	1861: Destruction by earthquake Deterioration by weathering (capillarity) Cracking in critical areas Imposition of vegetation	Cracking cut eardrums 1985 earthquake Separation facade 2006 earthquake Lack of perimeter chains Settlement arches for lack of foundation bearing capacity Water drainage and sewers problems Efflorescence and soluble salts	Expansion mortar corrosion of wires and profiles on walls Reinforcement corrosion losses in storm drains Contributions of soil moisture plumbing losses Presence of soluble salts	Cracking of supporting structures, mixtures of materials, lack of soil bearing capacity Contributions of soil moisture Problems in storm drains Masonry deterioration by weathering, efflorescence and presence of salts Problems with gardens
Regional seismic risk	High (alluvial soil)	High (alluvial soil)	High (alluvial soil)	High (alluvial soil)
Causes of structural damage	Mendoza earthquake of 1861 and later	Mendoza earthquake of 1917 and later	Lack of maintenance	Several earthquakes Interventions Lack of maintenance

Table 2.
Characteristics of previous interventions, masonry and existing pathologies.

Evaluated	Saint Francis Ruins, Capital	Mitre School, Capital	Giol Chalet, Maipú	Fader House, Luján de Cuyo
Modelling soil	Triangle 15 nodes Mohr-Coulomb elastic theory Plaxis Bv	Triangle 15 nodes Mohr-Coulomb elastic theory Plaxis Bv	Elastic theory	Elastic theory Interaction with Abaqus
Modelling structure	Elastic Midlin theory Plaxis Bv	Eight nodes isoparametric nonlinear Abaqus SAP2000 linear retrofit	Linear masonry plates SAP2000 linear retrofit	Nonlinear model Drucker-Prager masonry Abaqus SAP2000 linear retrofit
Estimate safety	It supports earthquake IV MM	>80% of the original	>80% of the original	>80% of the original
Type of proposed intervention	Reversible (temporary propping) until the final consolidation project	Reversible (outer metal reinforcement chained) Irreversible in foundation	Irreversible (removal of corroded profiles) Without intervention foundation	Reversible (outer metal reinforcement chained) Irreversible in foundation
Present status	Executed	Executed	Proposed	Executed

Table 3.
Modelling and type of intervention.

8. Repair, rehabilitation and retrofit of historic masonry

A large number of historical structures do not meet safety requirements because today's requirements are more demanding than those at the time of construction and because many years have passed by since their construction and structural safety has deteriorated due to use and time. To bring these historic buildings to a level of safety standards today, it is necessary to adapt its structure. However, historical value may be lost due to intervention; therefore, new approaches are needed to achieve sufficient safety.

The San Fernando, California, earthquake of 1971 demonstrated that the adaptation of the parapets to avoid their fall was effective. The 1994 Northridge, California, earthquake showed little damage to historic reinforced masonry with respect to URM that suffered damage and collapse [3].

The structural rehabilitation of historical buildings could be done by hiding those new structural elements or exposing them. Sometimes, the exhibition of new structural elements is preferred because alterations of this type may be reversible; in the future they can be changed without losing the historical character of the building [17].

The decision to hide or expose structural elements is complex, and there is to be a consensus with the preservation professionals who are participants of the project. In high seismic-risk area, it is difficult to strictly follow the principles of the different restoration charts (Venice, Athens, etc.), and the task is a challenge of structural engineering [17, 18].

The strengthening techniques depend on the building response to the earthquake. Different response leads to different strengthening methods. Three main groups could be:

- Interventions to obtain better global response of the building (in case of building box type behaviour and a prevailing in-plane response, **Figure 11**)

- Interventions for the local mechanisms (in case of a prevailing out-of-plane response, **Figure 12**)

- Interventions on blocky structures (where the kinematic mechanisms must be prevented: obelisks, towers and also arches and vaults, **Figure 13**) [19]

In the PERPETUATE project [18], both traditional and innovative intervention techniques have been evaluated. Some of the methods that are widely used in URM structures are insertion of horizontal tie rods; insertion of anchors between structural elements; adding new walls, buttresses and foundations; changing of weak mortar in joints of existing masonry (repointing); repair of cracks; jacketing of walls with reinforced concrete; grout injections of stone masonry walls; injections of cement or epoxy-based grout into cracks; and insertion of reinforced concrete "ring" beams or moment frames and reinforced concrete slabs. Each of these mentioned methods has its own advantages and disadvantages.

Figure 11.
Reinforcement of foundations and reversible metallic structures in columns and lattice, Mitre school, 2012.
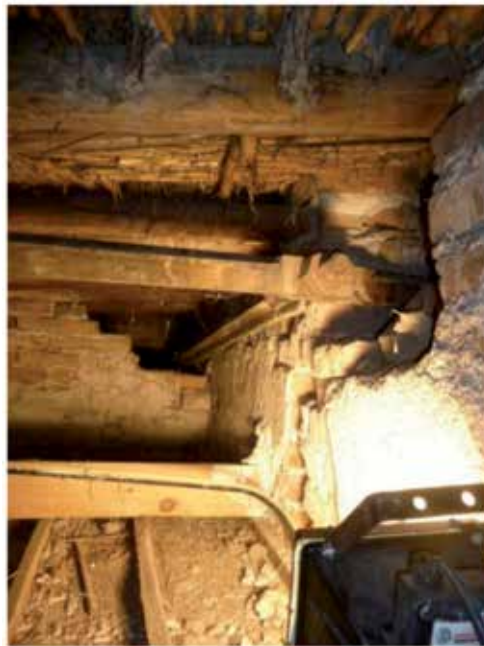
Figure 12.
Bidirectional tensors for bracing of historic masonry walls, Fader House, 2013.

Some innovative methods are strengthening brick masonry with attaching FRP fabric to the surface, restoration of stone masonry with compatible cement grouting, insertion of transversal connection in stone masonry walls, installing seismic isolation for single assets scale and installation of energy dissipation devices [18].

The choice of rehabilitation technique depends on the condition of the masonry, the availability of local workmanship and the safety requirements [4, 9, 11].

Figure 13.
Support structure of masonry blocks, Saint Francis Ruins, 2011.
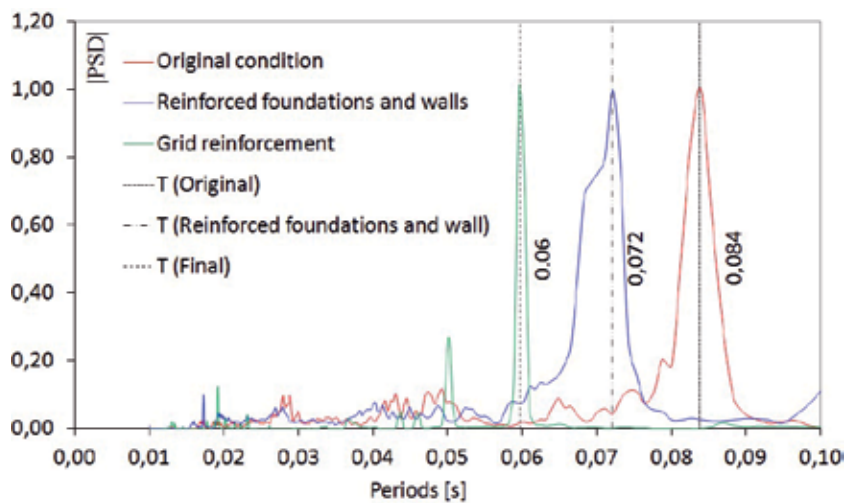
Figure 14.
Evaluation of the change of the dynamic properties of the masonry building in the different stages of the rehabilitation [20].

The effectiveness of a rehabilitation can be evaluated by system identification techniques. They measure the dynamic properties of the structure through environmental vibration before, during and after the structural reinforcement. The vibrations of low amplitude come from different sources, among them, the vehicular traffic, the micro-tremors, the wind, etc.

In the case of masonry, the parameter used to measure the efficiency of the structural reinforcement is the period of the walls measured at the top of them. Before starting the reinforcement work, the environmental vibration in the structure is measured in order to know the periods of the same with the existing level of damage. Once the foundations are consolidated and the walls reinforced, new measurements are taken, and in this way we can know the degree of recovery that the structure has had up to that stage as indicated in **Figure 14** [20].

9. Conclusions

The study of rehabilitation of masonry involves a team of specialists from historians, architects, structural engineers, geotechnical and chemical technicians, etc. That is, it cannot be considered only as a structural problem.

The seismicity of the site and the abandonment of the old buildings have caused the collapse of most of the old buildings, leading to the loss of cultural values that have been part of the local history. Therefore, the rehabilitation of old buildings should be considered a state policy, in order to preserve the few buildings that remain for the future.

It is emphasised that in the region with near-source earthquake, historic buildings that have been standing are made up of ceramic solid bricks; only very few of adobe and stone have managed to survive due to the high demand for ductility of earthquakes near-fault.

Modelling by MEF applying nonlinear constitutive models provides an effective tool for the simulation and verification of historic masonry heritage buildings, so it is necessary to research the formulation of efficient constituent models for thick masonry.

The monitoring through environmental vibration measurement has been a useful tool to evaluate the level of recovery of construction, allowing in the future to evaluate the state of conservation of the same. Model calibration is possible from frequency identification.

Acknowledgements

Author details

Noemi Graciela Maldonado*, Pablo Martín, Gerardo González del Solar
and María Domizio
National Technological University, Mendoza, Argentina

*Address all correspondence to: ngm@frm.utn.edu.ar

IntechOpen

References

[1] Maldonado N, Michelini R. Técnicas aplicadas para la restauración de construcciones antiguas de mampostería en zona de elevado riesgo sísmico. In: Proceedings of V Congreso Iberoamericano de Patología de las Construcciones y VII Congreso de Control de Calidad (CONPAT99); 18-21 October 1999; Montevideo. Uruguay: ALCONPAT; 1999. pp. 1581-1586

[2] Maldonado N, Martín P, Maldonado I, Domizio M, González del Solar G, Calderón F. Behaviour and durability of ceramic heritage masonry in near source fault zone. In: Proceedings 16th World Conference on Earthquake (16WCEE); 9-13 January 2017; Santiago de Chile: ACHISINA: 2017. Paper 3371. Available from: http://www.wcee.nicee.org/wcee/article/16WCEE/WCEE2017-3371.pdf

[3] Klingner R. Masonry Structural Design. 1st ed. New York: McGraw-Hill; 2010. 589 p. ISBN: 007163830X 9780071638302

[4] ICOMOS Charter 2003. Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage. International Council on Monuments and Sites. 2003. Available from: https://www.icomos.org/victoriafalls2003/iscarsah_guidelines.doc [Accessed: 24 March 2019]

[5] The Institution of Structural Engineers, editor. Appraisal of Existing Structures. 3rd ed. London: ISE; 2010. 197 p. ISBN: 9781906335045

[6] Girini L. Arquitectura, Industria y Progreso. Las bodegas vitivinícolas de Mendoza en el Centenario [thesis]. Mendoza: University of Mendoza, Argentina; 2004

[7] Válek J, Hughes J, Groot C, editors. Historic Mortars. Characterisation, Assessment and Repair. 1st ed.

RILEM: Springer; 2012. 444 p. DOI: 10.1007/9789400746350

[8] Domone P, Illston J, editors. Construction Materials. Their Nature and Behaviour. 4th ed. London, New York: Spon Press; 2010. 584 p. ISBN: 9781315272436 - CAT# KE40194

[9] Tomaževič M. Earthquake-Resistant Design of Masonry Buildings. 1st ed. London: Imperial College Press; 2006. 282 p. ISBN: 1860940668 9781860940668

[10] International Code Council, editor. California Historical Building Code. California Code of Regulations, Title 24, Part 8. 1st ed. Washington D.C.: ICC; 2016. 38 p. ISBN: 978-1-60983-655-9

[11] Furukawa A, Kiyono J, Parajuli R, Parajuli H, Toki K. Evaluation of damage to a historic masonry building in Nepal through comparison of dynamic characteristics before and after the 2015 Gorkha earthquake. Frontiers in Built Environment. v3. 2017. 62. DOI: 10.3389/fbuil.2017.00062. Available from: https://www.frontiersin.org/article/10.3389/fbuil.2017.00062 [Accessed: 20 March 2019]

[12] Lanning F, Haro A, Liu M, Monzón A, Monzón-Despang H, Schultz A, Tola A. EERI Earthquake Reconnaissance Team Report: M7.8 Muisne, Ecuador Earthquake on April 16, 2016. 92 p. ISBN: 978-1-932884-69-2. Available from: http://www.eeri.org [Accessed: 20 October 2018]

[13] Domizio M, Maldonado N, Arena A, Fernández LL. Importance of environmental monitoring, after the rehabilitation of heritage masonry buildings in seismic zone: Case study. In: Aguilar R, Torrealva D, Moreira S, Pando M, Ramos L, editors. Structural Analysis of Historical Constructions

an Interdisciplinary Approach RILEM Bookseries 18. Heldeberg: Springer; 2019. pp. 2395-2403. DOI: 10.1007/978-3-319-99441-3_257

[14] Lourenço P. Computational strategies for masonry structures [thesis]. The Netherlands: Delft University of Technology; 1996

[15] González del Solar G, Martín P, Calderón F, Maldonado N, Maldonado I. Importancia de la modelación numérica en la puesta en valor de estructuras patrimoniales de mampostería en zona sísmica. Revista ALCONPAT. 2014;**4**:215-231. DOI: 10.21041/ra.v4i3.71. eISSN: 2007-6835

[16] Hibbitt H, Karlsson B, Sorensen P. Abaqus Theory Manual. Version 5.8. Providence, RI, USA: Dassault Systèmes Simulia Corp; 2011

[17] Maldonado N, Martín P, Maldonado I. Seismic mitigation of a historic masonry building. The Open Construction and Building Technology Journal. 2011;**5**(Suppl. I-M3):61-70. DOI: 10.2174/1874836801105010061

[18] Maldonado N, Martín P, Maldonado I, Calderón F, González del Solar G, Domizio M. Estudios para la puesta en valor de edificio patrimonial con pinturas murales en zona sísmica: un caso de estudio. In: Proceedings of the XIII Congresso Latino-Americano de Patologia da Construção, XV Congresso de Controlo de Qualidade na Construção, Construção 2015: Congresso Luso-Africano da Construção (CONPAT 2015); 8-10 September 2015; Lisboa. Portugal: Instituto Superior Técnico, 2015. Sesión 3.4. paper 7205

[19] Gostič S, Uranjek M, Simonič M, Štampfl A. DELIVERABLE D34 results of experimental tests on strengthening techniques and guidelines for the design. PERformance-based aPproach to Earthquake proTection

of cUlturAl heriTage in European and mediterranean countries. 2012. Available from: www.PERPETUATE.eu/d34/ [Accessed: 20 February 2016]

[20] Domizio C, Calderón F, Maldonado N. Los riesgos de terremotos en construcciones escolares patrimoniales en zona de elevada sismicidad (Gran Mendoza). In: Viand J, Briones F, editors. Riesgos al sur. Diversidad de riesgos de desastres en Argentina. 1st ed. Buenos Aires: Imago Mundi; 2015. pp. 177-196. ISBN: 9789507932021.ch 12

Chapter 5

Cultural Heritage of a Three Centuries Old Wooden Church

Patricia Săsăran, Ancuța Ţenter and Lorelay-Diana Jianu

Abstract

The responsibility, decisiveness and aim of the villagers from Drăghia, Maramureș county, Romania, in preserving their three-century old wooden church is a model worth following by other communities, considering the density of such monuments in this region. The church is the testimony of the values and faith of the community there. Unfortunately, weather and history's imprint lead to a visible degradation of the place of worship in its structure, architecture and paintings. The community got involved and took steps to obtain funds in order to save the church. Thus, in 2006 the church was restored and saved. However, the interior paintings are in a state of severe degradation, and they also need urgent restoration and conservation. The efforts of this simple community and its fervent struggle to preserve this heritage are astonishing. The fact that they considered the church as the most valuable legacy they can leave their descendants is to be appreciated.

Keywords: cultural heritage, sustainability, cultural patrimony, cultural identity, church, community

1. Introduction

The wooden church dominated the first era of religious buildings on the entire territory of Romania. Symbol of human life, it is the main place where life unfolds on spiritual, individual but also collective coordinates. The founding of a church was and remained an exemplary action, which is kept in the conscience of each community [1]. In the following we will present a case study based on the wooden church from Drăghia village and how this place of worship was kept until today, thanks to the villagers who saw in it a heritage and felt responsible for its salvation.

2. Presentation

2.1 Historical presentation of wooden church

Drăghia is a village in the Land of Lăpuș, in Maramureș county. The first mention of the village dates back to 1393 with the Hungarian name of Dragusfalva [2]. It was mentioned in the document that on the 13th of October 1392, in Gilău, members of the Bánffy family of Losonc split between them certain holdings, among which Dragusfalva [3].

The historian Kádár József mentions that between 1541 and 1546, the territory of Drăghia belonged to the lord of the Ciceu citadel, Petru Rareş of Moldova. He claims that the name of the village Drăghia comes from the name of voivode Drag. The recorded names of the village over the years varied as follows: in 1553, Dragia; 1586, Dragie; 1608, Dragialy; 1629, Draghie; 1733, Brugia; 1750, Dregie; 1787, Dregye; 1850, Dragya and Dregyie; 1857, Dragyia; and 1890, Dragosfalva [4].

The village is remarked by the presence of a wooden church (**Figure 1**) built in 1706, as testified to this day by the Latin inscription found left of the entrance: *Anno 1706 D. 14 obrys.* It is under the patronage of the Holy Archangels Michael and Gabriel, and today, it is part of the Lăpuş Deanery, belonging to the Orthodox Episcopate of Maramureş and Sătmar. It is made of oak wood, harvested from the oak forest found higher up from the church, and was paid for using donations from the villagers.

The master builder was Both Griga, as attested by the inscription found above the entrance: *Ботх Грига Мѧщиръ*. To this day one can see the following inscription on the holy doors: *Ячасть помань а8 пьтйть Тома Опришъ ший соаца са Мариє ший* […], which tells us that the church was painted in 1797 by Petre and was paid for by Toma Opriş and his wife, Maria; their sons Filip and Ştefan; and his sister Teodora Anisia.

Figure 1.
Holy Archangels Church, Drăghia.

The painter was church singer Petre Diacul from Preluca, who also painted the churches from Răzoare and Rușor. The painting is in folk-art style with baroque features, much like most other wooden churches in the area [5]. Another year found on the doors is 1773, probably the year that the altar was built. In the middle of the nave's dome, there is a painting of the Holy Trinity, the Father being depicted as "the Ancient of days" holding a globe in his hand inscribed with the year 1857. The church might have been partially repainted at that time. Thus, the collective memory is maintained through the various inscriptions and dates marked on the wood, which place us to a certain time and offer us information that speaks about founders, masters, contributions to the building and decoration of the church, and repairs or changes [1].

2.2 Monument characteristics

The church is 12.40 m long, 4.45 m wide, 7.50 m high at the ridge and 15.50 m high at the tower's spire. The base and the walls are all made of oak beams placed on a dry-laid stone foundation [6].

The entrance to the church is 161 cm high and 85 cm wide, forcing most people to bow in reverence while entering. The door was painted on the outside with the Archangel Michael, but unfortunately it has faded to the point where you can just make out a shade of the Archangel.

The building plan (**Figure 2**) [7] is found throughout the area, the church being divided into a narthex, nave and altar. The narthex has a polygonal shape, covered with a straight ceiling, above which the bell tower is situated. The ceiling is painted with cherubs, and the walls are painted with images of the Myrrhbearers and of wise and foolish virgins from the Gospel of Mathew. The narthex was where the women would attend the mass [8].

The nave is rectangular, with a dome, and is separated from the narthex by a wall with an opening and a door. The door is painted with two saints and, in the lower part, the tree of life in a pot. The door frame is engraved with symbols such as
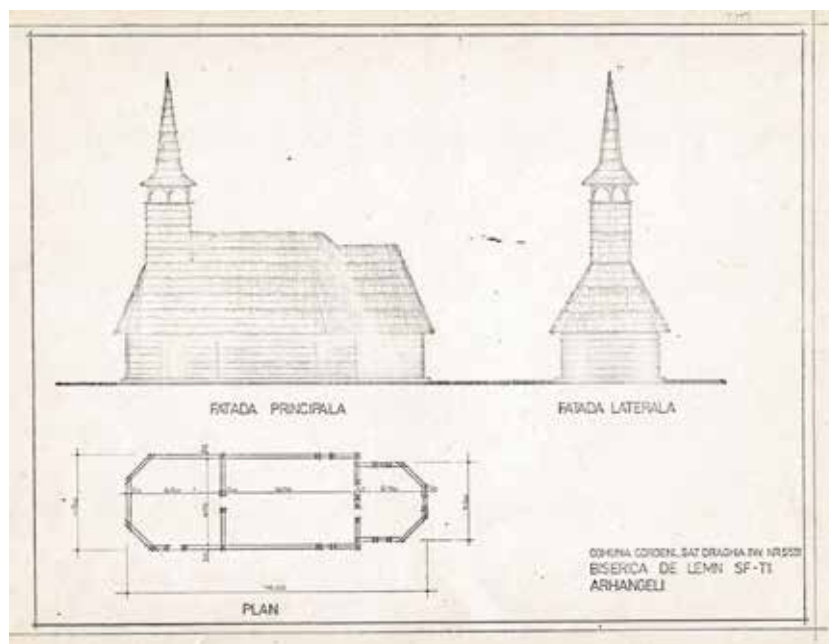
Figure 2.
The building plan of the Holy Archangels Church, Drăghia.

the six-petaled rosette, honeycomb and wolf's teeth. The opening is fitted with small turned columns of various forms that were painted white [9]. Between the nave and the altar is the iconostasis. The altar is in a domed polygonal apse.

After the church was built, the land immediately next to it became a graveyard. In front of the church, there are three stone slabs, two large and one smaller, that were used as tables during the agape feast.

The painting is tempera on canvas and wood and covers the entirety of the church interior. In order to make a continuous painting medium, the painters applied bands of hemp canvas stuck with animal glue to the gaps between the beams and planks. In the altar there is a part of the wall that is entirely covered with canvas, not just the gaps.

The painting in the nave is badly damaged, many scenes being unrecognisable, with only some spots of colour left. Among the visible images, there are Jacob's ladder (**Figure 3**), the Holy Trinity, Elijah riding to the heavens in his fire chariot

Figure 3.
Painting of angels climbing Jacob's ladder.

and the four Evangelists. The paintings on the iconostasis, being sheltered, are entirely recognisable. The Twelve Apostles are depicted with Jesus as a High Priest in their middle, and at the top of the iconostasis, there is a wooden cross painted with Jesus crucified. Above the iconostasis there is a semicircular opening on the frame, of which there are painted portraits of the six prophets from the Old Testament, while on the other side of the cross, the sun and the moon are painted (**Figure 4**).

In the altar we have the Virgin Mary with the Protecting Veil painted on the dome; above the round window, we have the three Archangels, while on their left and right, we have the scenes of Cain and Abel's offerings. The walls are painted with portraits of 12 great hierarchs, with Melchisedech in front of the altar stone.

2.3 Historical monument

An interest for the past was recorded in the collective memory even from ancient times. There is a certain respect in the popular conscience for old buildings, whether they are from time immemorial or built by recent ancestors. The first writings about the antiquities scattered throughout the three Romanian lands were recorded in the writings of Ion Neculce, Miron Costin and Constantin Cantacuzino-Stolnicul. The history of the seventeenth and eighteenth centuries recorded the first attitudes towards what would later be called historical monuments [10]. The idea of conserving and valuing old buildings of historical value was present in our country even from the Middle Ages. In the beginning of the nineteenth century, the documents confirm the existence of a romantic spirit in the Romanian society as well, through its interest for ruins evocative of past glory. In intellectual circles, the idea of protective legislation for the material remains of previous cultures was discussed often. Thus, in 1874 the Boerescu Regulation is passed, which stipulated the founding of "the Commission for Public Monuments". A new law for the conservation of national monuments is passed in 1881, called "The Law for the Conservation and Restoration of Public Monuments", but also "The Law for the Discovery of Ancient Monuments and Objects". In 1913, "The Law for the Conservation and Restoration of Historical Monuments" followed, and the legislative act HCM nr. 661/22.04.1955 deals with "the keeping and usage of cultural monuments", consecrating the passing

Figure 4.
Detached canvas strips.

of the most historical monuments in the property of the state and the selective financial support of only those monuments that are state property [11].

This was the beginning of the interest in saving historical monuments, the wooden church in Drăghia being officially declared one in 1967.

As is the case with most villages, a new church made of bricks was built, the one in Drăghia dating to 1939, and the old wooden church was left nonfunctional.

2.4 Facts

The old church on the hill undergoes, thus, years of relative isolation, particularly during the Second World War. Slowly, the wooden shingles give in here and there, rain seeps in, and a good portion of the interior painting is destroyed forever, while at the same time, the clay soil on which the church is built slowly moves downhill and threatens its existence entirely. During the war there were very few men in the village, many died on the front, and those that were left or returned were either ill or old. After the war, the Communist regime took power and promoted its atheist ideology while at the same time persecuting the various religions found in the country. The regime was against maintaining a place of worship—thus "In those hard times, the Romanian Orthodox Church and other religious creeds were subject to many pressures, intimidations, hindrances, restrictions, and persecutions that lead to many victims and much suffering, both physical and moral" [12]. The village's economic power and workforce were thus weakened. In this context, the wooden church was not repaired for quite a while.

However the parish archives show that the church's administration committee met on the 22nd of August 1942 and had as first curator Sima Constantin "who after finding that all members are present, opens the meeting bringing to the fore the state in which the old church is, and that it wouldn't be Christian for a place of worship, from where for hundreds of years prayers have ascended to our Creator, to be destroyed". The faithful and the committee decide that "the old church should be moved from this dangerous site without being damaged, namely to the place called Holly Garden, found at about 800 m from the edge of the village, and to be installed and covered, and serve as monastery, in order to address further prayers to the Almighty from that place that the faithful from Drăghia called sacred for a long time, having proof of this from the oldest faithful still alive". The document was signed by Sima Ioan, Rad Constantin, Cosma Ioan and Radu Ioan. Being a state of war and under Hungarian administration, this plan could not be carried out, so the church remained on its initial spot.

In 1957 a native priest Petru Radu returns to his place of birth in order to preach, Drăghia being a subsidiary of the Dealu Mare parish back then. The priest gets involved quickly in the salvation of the old church. He planted plum and black locust trees in order to stabilise the soil, and repaired, together with his parishioners, small portions of the roof. In 1960 wider repairs are made to the roof, but the greatest achievement is that from 1967, when the church is included on the Historical Monuments List, under the code LMI: MM-II-m-A-04569, its inclusion being approved by The Directorate of Historical Monuments from the Department of Worship, no. 14301-1514 from the 5th of September 1967. In 1970 all of the church's wooden shingles are replaced with the help of the County Museum. For the moment, the church's existence is no longer threatened. On Wednesday, the 16th of May 1979, "the lightning rod is installed on the church. The lightning rod was obtained thus: Cosma Ioan from Deal, no. 61, from Dealu Mare, the brother of the wife of the sexton from Drăghia, donated a silver coin which I've melted and placed on the tip of a lightning rod that belonged to a foreman from Târgu Lăpuș; the iron rope and the grounding were received from I.R.E.M., and the nails were made by

the blacksmith Boboș Petre. When it was installed, a scaffold was built up to the bells, and from there a ladder was placed reaching the top of the tower. Crișan Gavril, 43 years old, climbed the ladder and installed it. He was a miner at the Paroșeni mine, near Lupeni, but he was on leave those days. A number of men from the village worked at the scaffold, among which Bârtaș Ioan" [13].

Religious life revives as well, as Fr. Petru holds Holy Mass once a month at this altar and celebrates Vespers on the first day of Easter. The patron saints are celebrated on the 8th of November each year, and the parishioners are attending in large numbers on the hill where the village's Christian life truly began.

In 2006, the church turned 300 years old, but it was found to be in a badly damaged state. The terrain just north of the church slid perilously towards the northern face of the church, partly burying it to a height of up to 25–60 cm. This led to the severe degradation of the church's wooden base, and the deterioration of the wooden shingles led to the deterioration of the upper roof framework and of the purlins under the effect of rainwater.

Given this state, the Maramureș county Cultural Directory of Culture declared the church in collapse. A large-scale and urgent intervention was greatly needed. After signalling the state of the church to the Ministry of Worship and Culture, 100,000 RON were transferred from the Government's reserve fund to the fund of the Ministry of Culture. Then the folder was needed to be finalised in order for the money to be sent to the church's account. The Manisa București company, through architect Niels Auner, wrote the project no. 652/2006 *Reabilitare/Consolidare Biserica Sfinții Arhangheli Mihail și Gavriil-Drăghia*. The company Rustic Ltd., Baia Mare, skilled in restoration work, executed the work with a team led by Vasile Dușinschi and administered by Cornel Cușner.

The restoration and consolidation work required numerous interventions. Since the church interior was painted, a protective tent was needed to protect it during the works. The entire roof framework was removed, since it was badly damaged, leaving only the frame of the tower. Then, the entire church was lifted (**Figure 5**), using a jack and wedges, to a height that permitted the foundation work to be carried out.

Figure 5.
The lifting of the church.

Once lifted, the existing stone foundation was dismantled, and a new foundation made of reinforced concrete was poured on the entire base of the church, as well as two crossbeams that would sustain the dividing walls between the three rooms. The stone foundation was rebuilt over the concrete one, keeping the old architecture. The wooden base was replaced with oak beams that were treated to protect them from rot and fire. Some of the beams were dismantled and either restored or replaced. The building was placed on the new base and the new foundation, and then the new roof framework was built. A scaffold was built in order for the workers and materials to easily reach the roof. The old wooden shingle covering was badly damaged by the weather and had many holes made by green woodpeckers, so it had to be replaced, and the birds' access to the tower was hindered using fine-mesh netting. The cross from the tip of the tower was restored as well and placed back in its place. The finishing work was also performed, on the floors and wood-work. The work ended with the installation of the lightning rod.

A wooden gate decorated in Maramureș style was placed at the entrance to the churchyard, and a stone path with steps leading to the church was laid. The churchyard was fenced with a double wooden fence, and exterior lights were placed around the church and on the path.

The work began on the 2nd of November 2006, when the weather was no longer favourable and access to the church was difficult. On the 8th of November, the day of its patron saints, an icon of the Holy Archangels painted by Prof. Costea Constantin from Oradea was sanctified in the churchyard. The Archangels came to the help of the workers, as the weather turned fair almost until Christmas Eve, when the work was completed. During the excavation for the foundation, a stone cross was found, possibly used as a foundation stone. More funds were acquired the following years, reaching a total sum of almost 300,000 RON, thus covering the entire costs of the work.

In 2011, a team of specialists from Bucharest led by the Prof. Dr. Handrea Dorin, with the help of Marin Coteţiu, drafted the project for the restoration and conser-vation of the interior painting of the church. The estimated cost for the work was 350,000 RON. In the summer of 2012, a donation of 9000 RON was received and was used for the restoration of the holy doors and for some urgent restoration work in the narthex.

The works done constituted a veritable crown of honour placed on the old trunk of the church as it celebrated its 300th anniversary. The funds were attained thanks to one of the locals, Lucia Radu Stângă (decision no. 597 from the 10th of May 2006, concerning supplementing the budget of the Ministry of Worship and Culture from the reserve fund available to the government in 2006, for the reparation of The Holy Archangels Michael and Gabriel Church from the village of Drăghia, Coroieni commune, Maramureș county), and the parishioners helped out with the meals and lodgings of the restoration team. Some gave money donations as well, and others donated the wooden shingles used to cover the church.

It was a great achievement for the villagers, their forefathers' church being granted a new lease of life for a few more centuries. In this same period, the television station Axa TV, from Baia Mare, made two short films about the church, called "The ship on the hill" and "New vestment" by Smaranda Stângă.

Steps are being taken regarding the conservation and restoration of the paint-ings. The project was drafted and sent to the Ministry of Culture, but the funds still have not been approved.

During the restoration and rehabilitation works from 2006, some planks from the dome of the nave were replaced, as the project supervisor considered them too degraded to be returned to their place. It is possible that there were still some faint paint marks on them which could have helped figure out what was painted on them. In the past, some of the planks from the narthex's ceiling were removed and lost. As a

consequence of rainwater seeping in, the wood and the painting on it were badly damaged. Another cause of damage were the temperature fluctuations between night and day, which led to volumetric changes of the wooden structure that resulted in the chipping and fissure of the paint layer, leading to a complete loss of painting in some large areas. This phenomenon is particularly intense on the southern side of the church, which receives more sunlight during the day than the other sides.

In the current context of climate change and the impact on historical monuments in their conservation area, currently the church is in the attention of specialists from Ovidius University of Constanta, ICECHIM Bucharest and Babeș-Bolyai University of Cluj-Napoca for new holistic investigations through analysis by advanced methods for correct diagnosis. A study was performed to analyse the physical parameters of temperature, humidity, pressure and natural radioactivity by measuring the radon concentration inside the church.

The research team considers that archaeomaterials are a good solution through high degree of compatibility with the original pigments and all materials.

Following the degradation of the binder and the volumetric changes suffered by the wooden support under moisture gain and loss, the paint layer lost its adhesion to the wood, leading to chipping. Significant losses of paint layer are ascertained, even all the way to the wooden support, caused by dusting or involuntary rubbing and hitting on the surface. For example, the areas that were protected by the pews of the cantors hold more paint than those next to them. Still, these areas and the iconostasis have more damage caused by the metal nails driven in the wood.

The partial detachment of the canvas strips (**Figure 4**), stuck to cover the gaps between the planks, led to the exfoliation and loss of the paint layer found on them. Numerous bands detached completely of the support and led to the permanent loss of the paint layer. Furthermore, there are hints of a moderate xylophagous attack that affected the support and led to small losses of paint layers. In some places one can see flight holes caused by xylophagous insects.

Following the ascertainment of the major damages concerning the painting, the specialists proposed the following treatment:

1. Removal of non-adherent deposits

2. Removal of the nails from the support

3. Restoration of the cohesion and adhesion of the paint layer to the support

4. Filling in with new wood

5. Cleaning the back end of the canvas strips

6. Consolidation of the painting on the canvas

7. Application of the canvas strips to the support

8. Removal of the restoration canvas and glue surplus from the surface

9. Insurance of the fish glue and micronised chalk from the edge of the paint layer

10. Gradual removal of the adherent and non-adherent deposits off the surface of the paint

11. Selective grouting

12. Chromatic integration

13. Extermination and prevention of the xylophagous attack

14. Written, photographic and drawn documentation during the restoration work [6]

2.5 Cultural heritage results

Following the efforts of restoration and preservation of the church, today, the church is open for visitors, both tourists and faithful. Only in the summer of 2019, a group of 50 pilgrims, along with some locals, attended the Holy Mass at the church on the hill. This was a joyous event because since the 2006 restauration works, no mass was held in the church. In the last few years, the church was visited by about 100 visitors per year, many of whom from abroad. Most of the time, they are impressed by the church's story but also by its surroundings.

A special effort was also made for this case research by studying a large number of documents from archives, interviews with locals, specific laboratory analyses and photographs. Currently, there is an ongoing research with preliminary results attesting the advanced degree of deterioration of the building materials and pigments.

The climb to the church calls for sacrifice, its placement on one of the highest points in the village being intentional, so that the climber gets at least a taste of the passion Christ went through while climbing Golgotha carrying his cross.

3. Conclusion

The history of the old wooden church started in 1706 and continues, thanks to a small community in the village of Drăghia, which has great confidence in its future —the church finds part of cultural heritage for their descendants. After going through the hardships of the two world wars and the persecution of the Communist period, the villagers raised funds to repair the damage to the roof and the wooden structure of the church. Due to the involvement of the priest, Radu Petru, and the official recognition of the heritage value, the church is included in the Historical Monuments List, under the LMI code: MM-II-m-A-04569, its inclusion being

Figure 6.
The sequence in the ceiling.

approved by the Directorate of Historical Monuments from the Department of Worship.

On the church's 300th anniversary, its condition was very badly damaged unfortunately. But again with the support of the community and of the Ministry of Culture, the restoration of the church as an architectural structure succeeded.

Unfortunately the funds were exhausted; the mural painting had no chance to be restored. The age of the church and the current climatic conditions lead to an advanced degradation of the painting from the interior of the wooden church (**Figures 6** and 7).

The scientific research specialists from Babeş-Bolyai University of Cluj-Napoca and Ovidius University of Constanta express their expert opinions that a new restoration project is required inside the "Holy Archangels Michael and Gavril" Drăghia church, Maramureş county, Romania.

Figure 7.
The sequence in the wall.

The wooden church is, and will remain, the cultural and spiritual heritage of the village and, together with the many other wooden churches from the Land of Lăpuş, forms an important part of the Romanian national patrimony.

Acknowledgements

Conflict of interest

None of the authors have any competing interests in the manuscript.

Author details

Patricia Săsăran[1], Ancuţa Ţenter[2*] and Lorelay-Diana Jianu[3]

1 Romanian Orthodox Diocese of Maramureş and Sătmar, Romania

2 Applied Environmental Research (CERAM), Babeş-Bolyai University, Cluj-Napoca, Romania

3 Cellular and Molecular Biology Department, Ovidius University, Constanta, Romania

*Address all correspondence to: ancuta.radutenter@gmail.com

IntechOpen

References

[1] Bratu A. Pictura murală maramureșeană. Meșteri zugravi și interferențe stilistice. ACS, Colecția monografii; p. 39

[2] Suciu C. Dicționar istoric al localităților din Transilvania. Vol. I; 1967-1968. p. 210

[3] Nagy F, Makkai A. Ladislaus: Documenta historiam Valachorum in Hungaria illustrantia, usque ad annum 1400 p. Christum. Budapest: Études sur l'Europe Centre-Orientale; 1941. p. 465

[4] Kádár József. Szolnok-Dobokavármegye monographiája, Dej. Vol. III; 1901

[5] Weatherhead F. Wooden Churches and Their Paintings in the Maramures Region of Romania: A Preliminary Study (Vol. 67, Issue 255). Antiquity

[6] Marin C. Proiect de conservare-restaurare a picturii murale din satul Drăghia; 2011

[7] Plan of the Holy Archangels Church from Drăghia, digital image of building plan, Direcția Județeană pentru Cultură Maramureș. Available from: https://lapus.culturamm.ro/biserica-de-lemn-sfintii-arhangheli-mihail-si-gavril-din-draghia/ [Accessed: 05 November 2019]

[8] Man G. Biserici de lemn din Maramureş. Baia Mare: Proema; 2005

[9] Bilțiu P ş M. Biserici de lemn din Țara Lăpușului. Baia Mare: Eurotip; 2017. p. 87

[10] Oliver V. Preliminariile legii din anul 1892 - Fapte istorice, juridice şi deprinderi estetice. În: Revista Monumentelor istorice Nr. 2/1992 Anul LXI. p. 5

[11] Cezara M. Legislația privind monumentele istorice din România; 1892-1992

[12] Revista Monumentelor istorice Nr. 2/1992 Anul LXI. p. 14. Available from: http://patriarhia.ro/suferine-adanci-si-multe-puse-in-lumina-7459.html [Accessed: 08 October 2019]

[13] Radu Petru P. Monografia parohiei Drăghia. Presently found at the priest's family

Tropaeum Augusti (France) and Tropaeum Traiani (Romania): A Comparative Study

Alexandru Ş. Bologa and Ana-Maria Grămescu

Abstract

Two Roman trophies, Tropaeum Augusti (or Trophée des Alpes) and Tropaeum Traiani, survived the time in France and Romania. They are considered to be the birth certificates of the French and Romanian peoples. The edifices, preserved in different ways over time, are particularly attractive tourist attractions in both countries. The two monuments are not only an ancient edifice dedicated to the victories of the Romans over the defeated peoples, but it is also a summum of scientific thought, of the age applied in the art of construction. The analysis of the technique of accomplishment of the two monuments highlights the Romans' understanding in architecture. Moreover, the two monuments stand out for the same destiny. The two edifices outline the history of the two countries. The architects applied the principles set up by Vitruvius Pollio in *De architectura*. The restoration works of the trophies from La Turbie and Adamclisi are emblematic. The trophies dedicated to Augustus and Trajan signify the honors devoted to the two emperors; the Romans attributed them the feeling of the deity so that the fate of the emperors is assimilated as sons of God, promised to be divine. Both trophies record the deeds of their heroes.

Keywords: Roman triumphal monuments, restoration, construction, France, Romania.

1. Introduction

The noun *trophy* means the defeated armor can be defeated by an enemy sitting on a tree trunk, which can signal victory; a stone or marble monument carrying the weapons that can be used to celebrate holidays and buildings to celebrate a victory; sculpture or painting depicting a monument; prey of war taken from the enemy; victory, offering to a deity, proven from the prey of war; and the horns between the hunted deer.

The notions about the Latin *tropaeum* and the Greek *tropaion* mean a triumphal monument built in ancient Greece or the fulfillment of ancient Rome, inside or outside its territory, with the purpose of marking either consuls or military or naval victory and other defeated persons, to create posterity.

2. Tropaeum Augusti

Tropaeum Alpium (or *Tropaeum Augusti*) is a Roman construction located in the Maritime Alps, in the current locality of La Turbie, above the Principality of Monaco [1].

The building was built in honor of Emperor Augustus in 7/6 B.C. The emperor's motive for erecting the monument was constituted by the alpine military campaign from 15 B.C. in which Drusus and Tiberius conquered a total of 46 tribes, this significant event being recorded by Plinius the Elder as a historical source. The building was rebuilt by Jean-Camille Formigé at the beginning of the twentieth century so that at least the original Roman construction became recognizable [2–5] (**Figures 1** and **2**).

The construction, a *tropaion*, that is, a monument of victory, was designed according to the Vitruvian architectural model and consists of a rectangular base with sides of 38 m length, whose western facade has an inscription. The second floor was slightly behind the pedestal. On the podium 24 Doric columns were placed, arranged circularly, and decorated with a frieze with metopes[1] and triglyphs[2] throughout.

Between the columns were niches, in which the statues of the participating commanders were arranged, for example, of Drusus. The dome carried by columns narrowed up in the form of steps and was crowned by a colossal statue of Augustus.

In ancient times, the building as a whole had a height of almost 50 m. According to the records, the podium was in the shape of a square with a side of 32.5 m and height of 12 m, on which the inscription is in Latin, flanked by two victories (an aspect that makes it look more like the Mausoleum at Halicarnassus) [7].

The second level, accessible by stairs, consisted of a covered circular colonnade. Between the 24 columns, statues of different commanders could be seen. Its height was 35 m. On the tip of a cone, up to the height of 49 m from the ground level was the statue of Augustus. The golden components were visible from a great distance and would have been a beacon for the ships. By its greatness the monument was unique in the Roman Empire. The monument was made of local stone; the quarry, which is located approximately 600 m northwest of the monument, is still in use. Today the cone and statue are missing; the debris reaches only a height of 35 m.

In the Middle Ages, the triumphal monument was transformed into a fortification with a watchtower, the remains of which could still be seen in the upper part of the building until 1705 when under the order of King Louis XIV, it was mined and later used as much as a stone quarry, under the open sky, an aspect evidenced by the blocks and fragments reused at the construction of the Saint Michael church at that time, as well as at several residential constructions in the area [8].

At the reconstruction and the partial restoration, no more than four columns could be completely erected, and only the western facade with the inscription was completely restored; the rest of the fragments are kept in the local museum.

The inscribed block is framed by two large marble reliefs. On them is recognized a trophy, namely, the captured weapons, which are hung by a tree trunk. At the foot of the *tropaeum* kneels on each side a barbarian and a barbarian, both chained. Moreover, near the inscription on each side floats a small goddess of victory.

During all this time, 1858 can be noted as important for the monument, because the Royal House of Savoy made its decision to consolidate it, and in 1865, shortly after the Nice area became part of France, the building was classified Historical Monument.

---

[1] Metop: Space between the triplets of the Doric frieze, closed with a smooth stone plate or decorated with paintings or sculptures [6].

[2] Triglyph: Decorative element of the frieze of the Doric temples, in the form of a rectangular stone plate, decorated with three ridges in relief (which are repeated at equal intervals) [6].

Figure 1.
Tropaeum Augusti (trophy of the Alps), from La Turbie, Department of the Maritime Alps (France).

Figure 2.
Reproduction of the Romanian trophy in the La Turbie Museum.

The restoration works carried out at the Tropaeum Augusti monument, located in La Turbie, are representative through the procedure and technologies adopted. The restoration engineers in Sardinia proposed a strict consolidation in the existing composition, while Viollet-le-Duc and his followers adopted the procedure

of restoration by anastylosis. The complete change of the restoration doctrine is coupled with the change of the historical stage.

Indeed, the archeological monuments and sites of Nice are integrated before 1860 in the initiative of the Savoy dynasty, which has been committed since 1848 to build a unique Italy.

The problem of styles had a great political dimension in northern Italy, where the architects tried to transform historicism into a national architecture for the new Italy.

At the time of the first laws and institutions for the protection of the monumental heritage between 1830 and 1860, France and the Kingdom of Piedmont-Sardinia developed the heritage policy concurrently. The buildings and sites of Nice experienced two administrations of the cults and two services of the historical monuments due to the transfer of sovereignty in 1860. These political changes contributed to the illustration of two national histories, the one of Piedmont, later that of France after 1860, when *Giunta di Antichità e Belle Arti* has ordered the first systematic census of monument buildings [9].

At that time, four categories of buildings classified as monument were identified: the buildings of the old Cimiez amphitheater, the trophy of the Alps in La Turbie and two medieval buildings, the TENDA College and the Utelle parish church.

The prioritizing of the ancient remains of the Cimiez amphitheater and of the Augustus trophy in La Turbie in 1865 is the first application in the Nice area of the French system of protection of historical monuments (**Figure 3**).

The restoration work was resumed at the beginning of the twentieth century when the French Archeology Society gave Philippe Casimir, a teacher, the extensive responsibility for these sites (1905–1908).

The campaign continues under the leadership of Jean-Camille Formigé and Jules Formigé, chief architects appointed to restore the Historical Monuments, who are the authors of the reconstruction of a part of the building. Initially, the works were

Figure 3.
Augustus trophy from La Turbie 1880/1915, Ministry of Culture in France-archive of historical monuments and heritage, photos taken from the Jean Gilletta collection [10, 11].

financed by the French state (1908–1909) and then by American owner Edward Tuck, who assumes most of the reconstruction (1929–1933) [12].

The two architects, Jean-Camille Formigé and Jules Formigé, are trying to restore the original appearance of the monument by reconstructing the western facade (towards the village) with old fragments, supplemented with contemporary materials.

According to the reconstruction, the building is provided with a double square base superimposed by a circular plan with Doric-Tuscan elements. On the high square basement, there is the famous inscription, flanked by victories and sculptures that present trophies of weapons to which the captives are chained. Several hundred ancient blocks are incorporated at this altitude, the missing parts being restored and the sculptures integrated as half-finished. On the circular plate, where several columns are erected, some fragments that probably belong to statues of general are hung on the wall, behind the colonnade. The metopes of the limestone frieze are adorned with various motifs: armor (heroic representations in Roman sculpture/ armor), the bow of the ship, and the head of the cattle adorned with strips.

The facade has been partially reconstructed. Behind it, the monument remained open and reveals the original state. In this area there is a massive structure, composed of strong walls and a huge amount of mortar commonly used in Roman architecture. The central cylinder composed of radial pillars, which constitute the foundations of the columns of the circular plate, is clearly delimited. These materials are extracted from the trophy quarries. For decoration, sculptures, and inscription, the marble was imported from Carrara, in Liguria.

The reconstruction of the Trophy of the Alps was achieved by integrating the pieces, which led to completing the overall image, significantly altering the conical part and the roof, to support the statues of Augustus and the two captives positioned at his feet. The new reconstruction significantly modifies the conical part and the roof surmounted by a hexagonal floor with a circular base, to support the statues of Augustus and the two captives at his feet. Thus reconstructed, the monument in the locality of La Turbie shows a great resemblance of the outline architectural lines with the triumphal monument of Adamclisi. Even J. Formigé points out that in the reconstruction of the La Turbie monument, it was attracted by the architecture of the Adamclisi monument.

The Trophy of the Alps that has dominated over time and so far dominates the Principality of Monaco is an exceptional symbol dedicated to Augustus, which he honors as a god. His position, which seems to be derived from Greek mythology, from the life of Hercules, is the expression of the deity of the emperor as the son of God, promised to be deified. Augustus also goes after the great conquerors Domitius Ahenobarbus, Pompeii and Caesar, and even, before them, Hannibal.

Although located in a somewhat more difficult environment, this monument has always attracted the visiting public—Romans, barbarians, poets, and tourists. The commune La Turbie is proud to own one of the two Roman monuments, the one dedicated to the first Roman emperor, Augustus, located at the ends of Europe. The second, dedicated to Emperor Trajan, is in Romania [13].

This extremely impressive and important monument signifies for France also the monumental proof of the trace of the border between Gaul and Italy on the ridge of the Alps. Recovering its monumentality, the trophy becomes the signal monument of origin, which marks the border of the Alps at the same time as it affirms peace. The intention and success of the restoration of the monument and its inclusion in the French national heritage support the highlight of the interest of the states of Europe to encourage the writing of their national history. Archeology and monumental heritage are promoted as illustration or proof. The monument becomes the signal of national history in the landscape [14].

3. Tropaeum Traiani

At the beginning of the twentieth century, an archeological complex of great significance was discovered in Romania, one of the most valuable ancient Roman monuments on the Romanian territory [15].

They are the ruins of the triumphal monument [16–19] and of the fortress of Tropaeum Traiani, located in the present locality Adamclisi, Constanța county, in Dobrogea. Here, in the winter of 101/102 A.D., the battles took place between Romans and Dacians (allies with the Sarmatians) [20].

The triumphal monument from Adamclisi is part of the category of military construction works raised in gratitude for the Roman conquests led by Trajan. During this period, the conquest of Dacia represented the triumph of Emperor Trajan. The specialized literature records the fact that during the years 98–103 A.D., the Romans concentrated on the Danube specialists in engineering works that raised the bridge over the Danube, moved the Danube riverbed, and restored roads, and the triumph over the Dacians determined the erection of a monument as a sign of the victories gained, a monument paved with drawings on panels that were scenes during the battles [21].

The Adamclisi monument is located on the highest hill in the area, a specific location in the ancient world. This monument represents a combination of the architectural relationship with the structural composition accompanied by narrative and iconographic elements. It can be appreciated that, from an architectural point of view, the elements of the monument were made by the same architect, Apolodor from Damascus [21].

It is not known how long the triumphal monument has been unbroken. It seems that in the second and third centuries A.D., it suffered degradation caused by earthquakes or human activity. In 170 A.D. the citadel of Tropaeum Traiani was subjected to the attacks of the Goths.

Its state leads to the hypothesis that it was either attacked or destroyed by an earthquake until 316 A.D.

The impressive monument, circular in shape (**Figures 4** and **5**), was erected from the disposition of Roman Emperor Trajan in 109 A.D. The battle scenes were carved in bas-reliefs on large blocks of stone (metopes), which surrounded like a wide belt the monument. Around it, the monument had seven rows of stone steps, and above it stood a pedestal bearing the carved statue of a warrior dressed in armor. Only the central part, like a huge earthen mound, has been preserved from the monument. The ruins of the fortress Tropaeum Traiani, one of the largest Roman civil settlements in Dobrogea, stand on a nearby hill.

Thus, the Tropaeum Traiani is a Roman monument, built in honor of Trajan between 106 and 109 A.D. to celebrate the Roman victory over the Dacians in 102 A.D. He was rebuilt in 1974–1977, after one of the hypothetical models of the old monument in ruins. Parts of the original can be found in the museum housed inside it.

The first excavations were undertaken in 1882 by Grigore Tocilescu.

The monument, which was reconstructed by archeologists, consists of a cylindrical base, based on several rows of circular steps, and at the top a conical roof, with scales on concentric rows of stone, from which the hexagonal superstructure rises. At the top is the bifacial trophy, featuring an armor with four cylindrical shields. At the base of the trophy are two statuary groups.

The height of the monument together with the trophy is approximately equal to the diameter of the base, that is to say about 40 m. Around, the 54 metopes of the limestone of Deleni depict war scenes in bas-relief. The metopes were rectangular slabs with a height of 1.48–1.49 m. Of the 54 initial metopes, 48 are still preserved.

Figure 4.
Tropaeum Traiani, Adamclisi, Constanţa county (Romania).

Figure 5.
Tropaeum Traiani reconstruction [21].

Above the metopes is a frieze with 26 battlements, of which only 23 were preserved, also carved in bas-relief, which make up the crown of the circular core.

The ensemble also contained a funerary altar, the walls of which were inscribed with the names of the approximately 3800 Roman soldiers probably fallen in the Adamclisi battle, and also a concentric wall with 3 concentric walls, where it appears that the commander (*praefectus castrorum*) was buried.

At 2 km west, the Roman fortress Tropaeum Traiani was founded by Trajan, which is mentioned in the inscriptions for the first time as a municipality in 170 A.D.

Under the ruins of the monument, the remains of martyrs in the name of Christianity have been hidden for millennia [17].

The only evidence regarding the configuration of the Adamclisi monument appears to be sketched on the Tomitan coins of Trajan's time. These numismatic documents can be another proof that the work was completed in the period 108–109 A.D. [22].

After a long period, in the nineteenth century, the monument appears destroyed about a third of the height and uncovered the entire architectural envelope. There is the hypothesis of its destruction in the first stage of earthquakes of the second and third centuries. The monument as a whole was composed of the triumphal monument, altar, and tumulus. It is known that in 170 A.D., the city of Tropaeum Traiani was subjected to the unleashed attacks of the migratory peoples (the Goths). It is possible that some of the damage also belongs to this period [21].

Since the fourth century, the Christian religion is officialized, which is why there are a number of offenses by people who still shared the pagan philosophy against the ancient cults represented by sculptures and images. The notes from the "Life of St. Honoratus" highlight the fact that there was an action initiated by him for the demolition of the statues on the top of the similar monument built in France, in La Turbie. Probably a similar attitude existed for the Adamclisi monument. Towards the end of the fifth century A.D., more precisely in the year 477, there was a great earthquake [23] which led to the inclination of the edifice, found by the topographic elevations carried out later [21].

The location of the monument is characterized by a loessoid terrain but also by a seismic sensitivity, considering the proximity to the Silistra-Varna region. The archeological studies carried out in the field have found fragments from the inscriptions of the triumphal monument and of the altar used as a building stone in the late Roman era [24].

Therefore it can be considered that the upper part of the monument from the cone trunk of the roof upwards was destroyed by a great earthquake, after which there was a period when the inhabitants of the city of Tropaeum took this monument stone, even some slabs with inscription to repair the enclosure wall but also to erect other buildings.

Thus, it can be appreciated that the scattering of fragments took place between the fifth century and the beginning of the nineteenth century. During this time, after establishing the capital of the Ottoman empire in Constantinople (today Istanbul) in 1453, the specialized literature records that in the Dobrogean area, a Turkish general arrives, who mentions in writing for the first time the presence of a special monument, extracting and sending to Constantinople a sculpted metope.

If these stones of the monument were partially found again, the specialized literature records that the stone scales that made up the monument's cover were no longer found during the archeological excavations carried out between 1882 and 1890.

In 1801, Lord William Bentinck, passing from Egypt to Constantinople, made a relief of the monument with a brief description, appreciating that it was made of brick plated with decorations from the battles fought. A similar description is made by the Prussian officer Karl von Vincke-Olbendorf [21, 25].

In 1855, engineer Jules Michel, a member of the French mission Lalanne, being appointed with the accomplishment of a road and railway in the Dobrogea area, visited the monument and made a brief description of the ruin. And he, like the other visitors, appreciated that the monument has a Roman character.

The first records in Romanian about the triumphal monument from Adamclisi appeared in the newspaper *Farul Constanta* on May 12, 1880, when the first Prefect of Constanta made reference to this objective, and in the same period in the archeological journal, the article of Mihail C. Șuțu is published who points out that the monument has been altered over time.

Research carried out between 1882 and 1890 revealed about 1680 stones removed from the ruins, including fragments of stone lions, pieces of friezes, pilasters, stone scales, and some inscribed tiles. In the structure of the foundation was identified a layer of 1.48-m-thick concrete on which the pedestal was placed [21].

The Adamclisi monument is not only a work dedicated to the battles but also a summit of the scientific thinking of the respective period applied in the art of construction. The Romans had knowledge about the quality of the foundation lands, about the loess, which explains the construction of the concrete pavement and at the same time that they knew the dosage and composition of the concrete. From the study of the elements of the construction, it appears that the ancient architects and engineers observed the existing principles synthesized by Vitruvius Pollio in *De arhitectura* [8].

The technique of building the triumphal monument, the dry masonry, and the very fine-processed stone blocks highlight the preparation and the level of knowledge of the colossal blocks at that time.

The wall of the Adamclisi monument is worked in the *opus quadratum* technique, without mortar, with Greek influence, only the *emplecton* denoting the Roman technique [8].

With reference to the architectural conception, the triumphal monument appears as a creation of the era of Trajan. It can be appreciated that the architect who made the initial plans was Apollodor of Damascus who in the same period also made the bridge over the Danube.

The development of the volumetric registers vertically, the construction of the base to support the weight of the top statue, required a design "in floors," which led to a construction with a diameter of about 40 m and a height of 40 m.

It is noteworthy that A. Furtwangler [7, 21] considers the alternation of the different floors of the constructions from Tropaeum Traiani and from La Turbie. In support of these theories, he refers to the lighthouse in Alexandria, which was built between 300 and 280 B.C., kept in its original form until the eighth century A.D. and which consists of three floors. The Adamclisi monument can be considered a Roman art monument from the time of Trajan, as an expression of the Hellenistic tradition.

The first archeological excavations were carried out by a team led by G. Tocilescu (the first Romanian archeologist), who began to research the Adamclisi ruins in 1882, following four other campaigns in 1883, 1884, and 1890, the archeological research being carried out by the Romanian archeologist in collaboration with Otto Benndorf and George Niemann [26].

In 1895 appears the work *The monument of Adamklissi, Tropaeum Traiani* [22]. Impetuous discussions have appeared in Romanian historiography, if this monument is or is not built by Trajan. Tocilescu calls this monument the second column of Trajan, but even Nicolae Iorga doubted the idea that this colossal construction was built in the time of Trajan. However, the archeologist shows in a study that the trophy was raised by Trajan in 109 B.C. and the proof is in the inscription on which the name of victor Decebal was read.

The excavations highlighted fragments from the monument's inscriptions used as a building stone from the late Roman era. A specialized literature (William Bentinck's *Travel Journal*. published in *The Journey of an English Aristocrat Through Balkans*, in 1801) gives a brief description of the monument's ruin as it appeared then. In this work are presented some sketches of the monument.

In 1856 C.W. Wutzer, a surgeon, professor at the University of Bonn, makes a presentation of the monument, describing even some pieces of architecture that were scattered on the floor.

In 1864 Karl Ferdinand Peters, a professor at the University of Graz, who came to document the geology and mineralogy of Dobrogea, made a detailed sketch of the monument.

From all these descriptions, it turns out that at that time, the monument was a huge dome-shaped masonry surrounded by massive deposits of earth and debris, where shrubs had grown, among which were carved stones.

After 1878 the archeological research in Dobrogea began, in 1882, under the leadership of G. Tocilescu (at that time director of the National Museum of Antiquities in Bucharest), excavation works began, finding that there are deposits with the thickness of 3–4 m. In the following period, the ruin was completely revealed, recovering from the ruins a large number of architectural pieces and sculptural elements that had once formed the shell of the monument.

With the beginning of archeological research around 1890, this monument was still imposing and stood out. Then, in 1890, from all the monuments, the aftermath of a massive construction was only seen, 16 m high, built of limestone boulders linked with mortar and surrounded by nine rows of steps of which seven are visible. Research has shown that at the top was a prismatic construction of large shaped blocks, a tower with a quadrilateral section with slightly uneven sides. This tower with the quadrilateral section with slightly uneven sides is placed in the middle of the monolithic nucleus of the cylindrical body, and this is reported in the writings of Vincke and Moltke.

The first graphic reconstruction of the trophy was made by the Viennese architect George Niemann and designed by him as it was in his opinion during Trajan's time.

According to the aforementioned project, the trophy contained a lot of registers which, from bottom to top, were arranged as follows:

- The ladder is composed of nine rows of steps, the only element in the clothing exterior of the monument, which was preserved almost entirely on the original site, the small displacements being due to the settlement of the earth and the tectonic movements [7].

- The platform promenade consists of a 1.75-m-wide platform, consisting of sculpted elements (alternating piles of metopes).

- The socket from the base of the cylinder is represented by a row of blocks (height of 0.56 m) connected to each other by folded metal plates.

- The wall is represented by six rows of non-ornamental blocks, with a height of 0.59 m and a length varying between 0.95 and 1.20 m.

- The lower frieze is the first ornamented architectural element consisting of parallelepiped blocks.

- The upper frieze is formed by blocks of 0.67 m height.

- The cornice is based on a torus worked in the form of a spiral (*torsada*); the blocks are shorter than the two strips; the cornice is executed very simply, based on a torus.

- The crenelated parapets are made of rectangular slabs, and each captive is carved with a captive tied to a tree. Of the 26 battlements, almost 23 were kept in front. In front of the crenelated parapet were two carved lions placed from

the same limestone from which the water flows from the roof; the roof had, according to Niemann's calculations, a slope inclination of 30 degrees.

• The hexagonal construction was on two floors supporting the trophy itself. The correct reconstruction of this part of the trophy was performed by the Munich archeologist A. Furtwangler [7, 21].

This was the Adamclisi Trophy after the reconstruction of Niemann and Tocilescu. The quarries from which the stone for the construction was extracted are located on the Enigea valley, about 4 km away from Adamclisi, and the research carried out in the 1970s proved the truthfulness of Tocilescu's words.

The sculptures of the monument can be grouped into two categories [27]:

a. Ornate sculptures

b. Figurative sculptures

The upper frieze forms a pendant with the lower frieze. The blocks were 67 cm higher than those of the lower frieze. The ornament consists of braided spirals like some ropes, alternating with palmettes. The blocks were shorter than the two strips but wider. The crenelated parapet forms the decoration of the upper part of the cylindrical body.

The battlements were formed by the succession of rectangular slabs; on the outer surface of each crenel is carved a defeated one tied to a tree. Behind the crenelated parapet was the conical roof made of stone slabs, in the form of scales, arranged in 25 concentric rows; the scales were higher in the first rows gradually decreasing at the top.

On the inner tower in the center of the cylindrical body, constructed of molded blocks, a hexagonal construction was supported on two floors, which supported the trophy itself.

The metopes were rectangular slabs as high as the pilasters (1.48–1.49 m). Of the 54 metopes, 49 whole or fragmented pieces were recovered, today having a corroded relief so that the content of the scenes can hardly be distinguished.

A group of metopes represents Trajan. Another metope group represents the Roman soldiers in the march, standing still. Most of them depict battle scenes, by representing the bravery of the Roman army, and in many scenes wounded and dead are seen only between the Dacians and their allies. A special two-piece group reveals a Roman legionary who pierces a man with a spear, the woman stands with her arms outstretched, and a child runs around the chariot. The last group of metopes portrays the end of the battles, the victory of the Romans, and the taking of prisoners (in chains) of Dacian men and women.

The first variant on the positioning of the metopes belongs to Tocilescu-Benndorf, recorded in the monograph published in 1895. According to these records, the arrangement of the metopes could have been according to those carved on Trajan's Column, which sought to reconstruct the narration of the two Dacian-Roman wars, divided into two equal segments for each war and for half of the number of metopes, respectively 27 [28].

In addition to the carved metopes can be found other carved elements such as battlements with captives, where in each battlement there is carving of a prisoner tied to a tree.

A very important factor in the construction of these metopes also had the fact that they were carved by groups of different master craftsmen (five groups) according to the degree of professional mastery (some made human sculptures in a clumsy way, but others were very knowledgeable of the proportions of the human body).

The analysis of the architectural composition shows that the architect who elaborated the project of the triumphal monument from the Tropaeum Traiani was aware of all the monuments of the time: Eastern, Greek, and Roman from the Mediterranean. G. Tocilescu calls the cylindrical body with the truncated roof "tumulus." In this context, he considered the resemblance of this monument to the funeral monuments in Italy. Therefore, the presence of the cylindrical body with grooved edge and conical roof is of Italian inspiration. The type of monument with a cylindrical drum and the circular base on which a statuary group is placed resembles that of La Turbie from this point of view. It can be appreciated that in the case of the Adamclisi monument, the architect was inspired by the cylindrical body of the Italian funeral monument drum.

The hexagonal base existing above the structure, composed of two floors, also has components from the monuments of Italy, but the monuments created in the Hellenistic era, which had trophies on a polygonal plane, are not excluded.

The last architectural part of the Adamclisi monument is the *tropaion* that surmounted the upper hexagonal base, otherwise a very widespread element in the Roman Empire, which can be seen as a "ready-made" takeover, and is therefore original in the variant of the Adamclisi monument.

The research carried out during the period 1960–1963, in the area of the steps and the foundations, revealed the existence of a modular frame of the triumphal monument. It is worth noting that the height of both monuments is 6 Roman feet, respectively, 6 × 17,742 m (the latter represented the standard in the Roman army for a Roman legionary soldier).

After the 1960 research, the diameter of the construction was recorded as 40.21 m, which represented 136 feet and 22 modules, and what exceeds this dimension belongs to the foundations and sidewalks. The perimeter corresponding to the base step is 126.26 m or 427 feet, so 71 modules in 1/6 ratio. From the center of the monument to the fourth step is 18.63 m, respectively, the sum between the radius of the wall 15.26 m and the upper 3.37 m [21].

The modular network of the monument is preserved 1.7742 (6 feet = one module) and forms the basis of the constructive system.

The diameter of the foundation is 42.58 m, respectively, 144 feet and 24 modules.

The angles alternate between 30 and 60 degrees.

Inside the cylindrical drum, there is a square-shaped masonry core which represents the center of the monument and whose depth in the ground can be appreciated to 1/3 of the height of the monument [21].

With reference to the architectural conception, the triumphal monument appears as a creation of the era of Trajan. The development of the volumetric registers vertically, the construction of the base to support the weight of the top statue, required a design "in floors," which led to a construction with a diameter of about 40 m and a height of 40 m.

After the reconstruction of this triumphal monument Tropaeum Traiani from Adamclisi appears in Vienna, in 1895, the work *the triumphal monument Tropaeum Traiani from Adamclisi*, belonging to the authors G. Tocilescu, G. Niemann, and O. Benndorf. After 10 years Teohari Antonescu publishes in Iassy *Le trofée d'Adamclisi*. Minister Mihai Kogălniceanu gave G. Tocilescu's proposals to rebuild monumentally damaged at that time, but not in Adamclisi, but in Bucharest. This decision recognized the historical value of the monument. M Kogălniceanu obtained the necessary funds for this project, which is why at the beginning of the twentieth century, the stage of transfer of the pieces of great historical importance to Bucharest began.

The project of restoration of the monument in Bucharest, as it results from the records of archeologist Adrian Rădulescu, has dragged on for many years. The

transfer of the pieces is blocked in 1909, when a considerable number of pieces with many transhipments from the old ones that were already transported in ships wagons and then deposited first at the university, from where they were transported to the National Museum of Antiquities, after which in the Freedom Park where they remain until 1948. In 1948, thanks to Horia Teodoru, Professor at the Faculty of Architecture, the sculpted pieces including the statue are deposited at the History Museum in Bucharest.

However, the desire to restore and rehabilitate the monument even in Dobrogea is reinstated in the period 1957–1969 when Vasile Caranache organizes the Dobrogea Archeology Museum, which also includes the Tropaeum Traiani. Contemporary with this period, A. Rădulescu reports on the difficult road of implementation of the project of historical reconstruction of the glorious monument to the place where it was born 2000 years ago (**Figures 6** and 7) [29].

Even if authenticity could be interpreted as illusory, historical expressiveness was undeniable. In 1960 there is a first debate followed by many others, by which the specialists propose two variants: the first solution was to restore the pieces from Bucharest to Adamclisi and the reconstruction of the missing ones, and the second solution was to keep the original pieces at the History Museum in Bucharest and the creation of a copy that respects the architectural lines, the geometry, and the volumetry of the monument but with copies made of stone according to the original ones. After long debates, the second version was approved, and it became applicable only after 12 years. In 1973 the works begin so that in the year of the centenary, 1978 (100 years after Dobrogea's joining the Romanian State), the monument was rebuilt with new technology using a metal structure clad with stone pieces from the same quarry exploited 2000 years ago, which recreates the conditions for cultivating the historical heritage. All these stages are fully presented in publications published after 1960 (**Figure 7**).

They were published on this occasion, papers comprising the research results, both in PONTICA magazine, e.g., the works of the *Triumphal Monument Tropaeum Traiani from Adamclisi* [22] or *An act of patriotic significance - Reconstruction of the triumphal monument from Adamclisi* [29], as well as to the Romanian Academy Publishing House, in a second volume of the monograph *Tropaeum Traiani* with subtitle *Roman Monuments* [21] and *Tropaeum Traiani Monument and fortress* [30] in the period that followed.

They were published on this occasion, papers comprising the research results, both in PONTICA magazine, e.g., the works of the *Triumphal Monument Tropaeum Traiani from Adamclisi* [22] or *An act of patriotic significance-Reconstruction of the triumphal monument from Adamclisi* [29], as well as to the Romanian Academy Publishing House, in a second volume of the monograph *Tropaeum Traiani with*
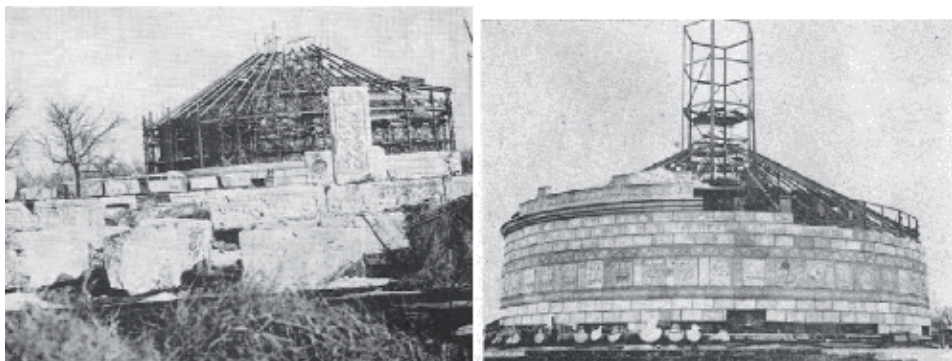
Figure 6.
Images during the work of reconstruction [29].
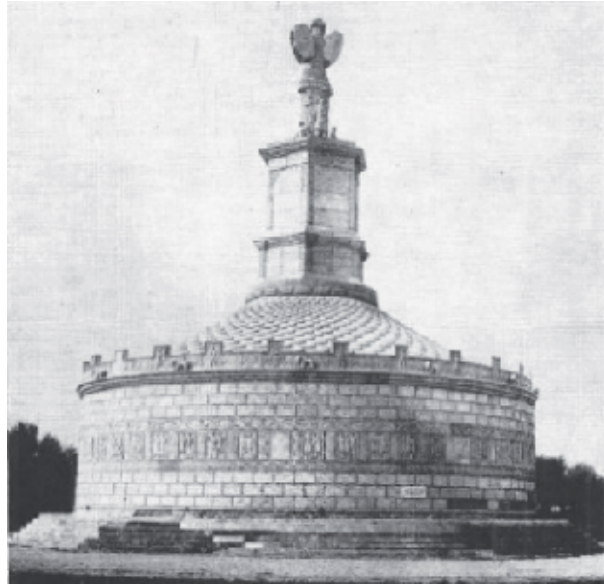
Figure 7.
The restored monument [29].

subtitle *Roman Monuments* [21] and *Tropaeum Traiani Monument and fortress* [30], in the period that followed.

The Roman triumphal monuments from La Turbie and Adamclisi show both *similarities and differences*, between them, from a constructive point of view and from the point of view of the conception and manner of restoration.

4. Similitudes and differences

4.1 Similitudes

The triumphal monuments signify the military victory of the Roman empire over some foreign and distant territories and peoples, Gaul and Dacia, respectively.

Both monuments are cylindrical in shape and are inscribed and decorated.

The buildings, with their surroundings of historical importance and with the related archeological discoveries, continue to appear in the contemporary tourist circuits, increasing the prestige and importance of the respective historical and archeological sites, with their documentary, cultural, and spiritual load.

Monuments belong to the category of military construction works raised in gratitude for the Roman conquests led by emperors Trajan and Augustus.

Both monuments are located in a high, representative position, with specific visibility as well as the ancient world.

The great height of the two monuments served not only the constructive purpose but more for the successive and gradual embodiment of the Roman idea of triumph, respectively: the victory is described by plastic through the register of metopes, the submission of the defeated ones in the images carved on battlements that are finalized with the materialized triumph, and the trophy with top weapons that crown the monument.

Both monuments were destroyed and restored.

Both monuments date from the Roman era, and methodologically the geometric principles of architectural composition were applied.

It is noteworthy that A. Furtwangler considers the alternation of the different stages of the trophies at La Turbie and Adamclisi as similarity. In support of these theories, he refers to the lighthouse in Alexandria, which was built between 300 and 280 B.C., kept in authentic form until the eighth century A.D. and which consisted of three floors. The Adamclisi monument and in fact also the La Turbie one can be framed as an expression of the Hellenistic tradition in a Roman art monument of the time of Augustus and Trajan, respectively.

The shape and dimensions of the two monuments are comparable and strikingly similar to one of the Seven Wonders of the World–the Mausoleum at Halicarnassus (completed in 350 B.C. and which collapsed after 850 years). The latter has a configuration similar to the monument of La Turbie–the square base with the height of the base of 12 m and a total height of the monument of 49 m, respectively.

The same architectural composition of the base is found as in the monument in France, built at La Turbie, at the Tivoli temple. And in the Orient, there is the architectural composition described, isolated at the Roman mausoleum in Adalia (Delik Tas), and located on the coast of Asia Minor (historical research records locate this last monument somewhere in the second century, an aspect that excludes it from the category of the two compared monuments).

The type of monument with cylindrical drum and with circular base can be found in La Turbie. Another architectural component of the Adamclisi monument is the hexagonal base on the structure, composed of two floors, an element that corresponds to numerous monuments in Italy.

From an architectural point of view, also at the Adamclisi monument, it can be identified the circular base, the cylindrical drum, and a hexagonal structure, on which the trophy is placed, an expression of the repertoire of the Roman architecture. The existence of the steps around the circular base is the expression of the Greek architecture which at that time intersected with the monumental Roman architecture.

Both monuments have the main register consisting of metopes and pilasters. The upper friezes form a pendant with the lower friezes. The lower friezes of both monuments represent the first ornamental architectural element.

Jules Formigé notes that in the main part of the Adamclisi monument, the architectural forms from La Turbie would be reproduced, and he also notes other similarities among which the hexagonal base that supports the statues, two captives, the height of the cylindrical drum heights, a.o.

Both monuments were subjected to the destruction and reconstruction during about 2000 years.

The image of the Alps monument has been reconstructed graphically three times: by architect and archeologist George Niemann, by J.C. Formigé, and by Jules Formigé (father and son) who, following archeological research, collected over 3000 fragments of stone and marble that came from the building. After G. Niemann collaborated in the reconstruction of the triumphal monument at Adamclisi from 1890 to 1895, under the guidance of G. Tocilescu and with O. Benndorf, he also helped to reconstruct the triumphal monument in the Alps.

Roman builders have appealed since the third century B.C., at *opus caementicium*, a technique clearly apparent in the trophy from La Turbie and a technique found also to achieve the Adamclisi monument.

The monument of La Turbie is mentioned in a poem from the thirteenth century, which refers to the monument called "La Tor del jayan" (Tower of the Giants), about which the destruction of the statues of the peak, considered as representing idols, is recorded, and the trophy of Trajan was mentioned timidly in the fifteenth century and after only another 400 years later.

4.2 Differences

Tropaeum Augusti was built in the year 6 B.C. in honor of Roman Emperor Augustus to celebrate the definitive victory over the 45 Alpine tribes, and Tropaeum Traiani was raised in honor of Roman Emperor Trajan between 106 and 109 A.D. to highlight the definitive victory over the Dacians in 102 A.D.

Currently, the two monuments illustrate two different conceptions and ways of reconstruction: Tropaeum Augusti preserves the original ancient construction consolidated, thus having an incomplete aspect of the edifice, while Tropaeum Traiani was subsequently renovated, presenting a complete aspect of the edifice.

The monuments contain different constructive, structural, and decorative elements.

From the point of view of the restoration solutions, it can be appreciated that by the restoration solutions applied to the two monuments, they differ, motivated by the fact that:

- The reconstruction of the trophy in La Turbie Alps was achieved by integration of the original pieces and partly by reconstruction, which led to the complete image of the whole, while preserving the authenticity of the monument, noticeably altering the conical part, the roof, to support the statues of Augustus and the two captives positioned at his feet. Very little restored, combining anastylosis with reconstruction, the facade allows to understand the structure of the monument as well as the techniques applied by the Romans. Quite remarkable constructors, the Romanians have combined in their constructions rationality and greatness.

- The reconstruction of the triumphal monument from Adamclisi respects the architecture and the geometry of the original monument but was made in exchange from new materials, so that the authenticity is no longer preserved.

For both countries, France and Romania, the restoration of these two monuments represents a national and patriotic desire, charged with historical substance, and represents the stone chronicle of the great warrior epics of the two countries.

5. Conclusions

The monuments of Tropaeum Augusti and Tropaeum Traiani constitute by their designation and symbolism the birth certificates in stone and attest the Latin origin of the French and Romanian peoples and languages.

The durability of these imposing buildings over time represents the guarantee of the inheritance of Romanity and Latinity in the two European extremities, western and eastern, respectively.

The quite remarkable achievements of the Roman architecture and engineering have kept their tourist interest until now, appearing in most of the touristic circuits organized in the two maritime areas, the Maritime Alps (France)/Monaco Principality and Dobrogea/Constanța (Romania), respectively.

As shown, both monuments at La Turbie and Adamclisi represent the historical expression of the bravery of the Roman people, using art in conception, sciences in structure composition/structure geometry, and science and technology of materials and sculpture.

These monuments represent not only an ancient work dedicated to the victories but also a summit of the scientific thinking of the era applied in the art of construction.

Author details

Alexandru Ș. Bologa[1*] and Ana-Maria Grămescu[2]

1 Romanian Committee on the History and Philosophy of Science, Romanian Academy of Scientists, Romania

2 Romanian Committee on the History and Philosophy of Science, Ovidius University Constanța, Romania

*Address all correspondence to: bologa1813@yahoo.ro

IntechOpen

References

[1] Bologa AȘ. În fuga anilor. Constanța: Ed. Ex Ponto; 2017. 329 p

[2] Guide du Pneu Michelin, Côte d'Azur Haute Provence. 1954. pp. 143-144

[3] https://fr.wikipedia.org/wiki/Trophée_des_Alpes

[4] https://en.wikipedia.org/wiki/Tropaeum_Alpium

[5] https://de.wikipedia.org/wiki/Tropaeum_Alpium

[6] Romanian Dexonline

[7] Popescu Prelipceanu AE. Misterul monumentului antic de la Adamclisi. București: Ed. Brumar; 2018. 106 p

[8] Fiche de visite-Centre des monuments nationaux-Trophée d' Auguste a La Turbie

[9] https://journals.openedition.org/insitu/docannexe/image/20293/img-16.jpg

[10] http://www.mediatheque-patrimoine.culture.gouv.fr

[11] https://journals.openedition.org/insitu/docannexe/image/20293/img-10.jpg

[12] Binninger S. Le trophee d'Auguste a'. La Turbie: Éd. du Patrimoine; 2009. 64p

[13] http://www.as-lashha.com/medias/files/2011-10-15-sti-ml-turbie.pdf

[14] Le patrimoine monumental du comté de Nice entre France et Piémont

[15] Papuc G. Complexul muzeal de la Adamclisi. Ghid ilustrat, Ed. Ex Ponto; 2019. 46 p

[16] https://ro.wikipedia.org/wiki/Tropaeum_Traiani

[17] https://sites.google.com/site/cetatidindobrogea/tropaeum-traiani/ *Magazinculturalstiintific*

[18] https://www.youtube.com/watch?v=9g86cuK4lJA

[19] https://en.wikipedia.org/wiki/Tropaeum_Traiani

[20] Rădulescu A, Bitoleanu I. Istoria Dobrogei. Ed. Ex Ponto; 1998. 640 p

[21] Sâmpetru M. Tropaeum Traiani-Monumente romane. Ed. Acad. Rom. 1984. Available from: www.cimec.ro.

[22] Florescu FB. Monumentul de la Adamklissi. Ed. a II-a, Acad. Rom. 1961. 750 p

[23] Grumel V. Traité détudes byzantines. Paris: La Chronologie; 1958. pp. 477-478

[24] Cronica cercetărilor arheologice din Romania, MIC, pp. 12-13. Available from: http://patrimoniu.gov.ro

[25] Culture, historie et patrimoine de Passy; 2019. Available from: www.forgottenbooks.com

[26] Tocilescu G, Benndorf O, Nieman G. Das Monument von Adamklissi: Tropaeum Traiani. Wien; 1895. 150 p

[27] Barbu V. [1]Monografie-"Trofeul lui Traian". București: Ed. Albatros; 1987. 1018p

[28] Papuc G, Bodolică V. Despre amplasarea metopelor de la monumentul triumfal Tropaeum Traiani, Pontica. Vol. 41. 2008. pp. 393-402

[29] Rădulescu A. Un act de semnificație patriotică-Reconstituirea monumentului triumfal de la Adamclisi, Pontica. Vol. 10. 1978. pp. 9-14

[30] Rădulescu A. Tropaeum Traiani Monument și Cetate. Ed. Sport Turism; 1988. 196 p

Section 2

Natural Heritage

What Does the Mass Accumulation of 100 Late Pleistocene Fallow Deer Skeletons (*Dama geiselana*) and Red Deer Skeletons (*Cervus elaphus*) from Neumark-Nord Reveal about the Cause of Death?

Thekla Pfeiffer-Deml

Abstract

In the open-cast lignite mine of Neumark-Nord (Saxony-Anhalt, Germany, Eemian interglacial period) the richest fossil fallow deer material which has been found so far was collected. About 80 articulated skeletons and partial skeletons of Dama geiselana Pfeiffer, 1998 (Cervidae, Mammalia) and 20 partial skeletons of *Cervus elaphus* in perfect state of preservation were recovered, together with skeletons of Elephas antiquus, Stephanorhinus kirchbergensis and hemitoechus, *Bos primigenius*, and *Panthera leo* spelea. The extraordinary composition of the thanatocoenosis of the deer provided decisive information on the cause of death, which is presented here. The deer show the typical preservation of drowned carcasses; 75% of the deer skeletons belong to strong males, while juveniles and females are rare, and very old individuals are missing in the deer assemblage. Several disasters in different years have led to the mass occurrence of deer. The individual age determination of the juveniles, the stage of antler development, and the level of epiphyseal adhesion are explained here. They show that the majority most probably died in autumn. This information provided the crucial approach to investigate nitrifying toxic cyanobacterial blooms as a cause of death. The biochemical results obtained by absorption spectroscopy and RP-HPLC with UV-detection, published in 2002, showed that pigments, and probably toxins, characteristic of cyanobacteria are preserved in the sediment.

Keywords: Pleistocene, *Dama geiselana*, *Cervus elaphus*, Neumark-Nord, Eemian, skeletal morphology, mass death, individual age determination, toxic cyanobacterial bloom

1. Introduction

Brown coal mining during the years 1986–1996 in Neumark-Nord, situated at the northern periphery of the Geiseltal valley southwest of Halle (Saxony-Anhalt,

11°44′E, 51°21′N, **Figure 1**), exposed a Pleistocene lake basin yielding one of the most spectacular mass accumulations of fossil of large mammal skeletons that have ever been found. The dating of the locality was long disputed, formerly dated to an Intra Saalian interglacial period [1]; now dated to the Eemian [2–4].

Articulated skeletons and partial skeletons of 80 fossil fallow deer *Dama geiselana*, 20 red deer *Cervus elaphus*, 40 straight-tusked elephants *Elephas antiquus*, 8 aurochs *Bos primigenius*, 12 forest and steppe rhinos *Stephanorhinus kirchbergensis* and *hemitoechus*, and a cave lion *Panthera leo spelea* were recovered, indicating a warm to temperate climate. Under the direction of D. Mania, the "Working group Bilzingsleben" together with M. Thomae, the discoverer of the first large mammal skeletons, carried out the fieldwork of the site and the extensive evaluation of the results [1, 5–8].

The excavations had to be carried out parallel to the lignite mining work, often under time pressure in front of the approaching excavator. Numerous skeletons were cut by the excavator and could only be recovered incompletely. The brown coal mining company Braunsbedra employees are responsible for the recovery of many remains of skeletons, some of which were run over by the excavator. Often the excavator was stopped for the rescue of a skeleton. It is hard to estimate how many skeletons had been actually embedded in the sediments of the small lake of 300 by 500 m extension, before the lake was finally dredged in 1996. In addition, small mammals, birds, fishes, amphibians, reptiles, insects and other invertebrates, numerous plant megafossils, often with chlorophyll preservation, and abundant pollen occur in the finely laminated sediments.

In 2010, the Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt— Landesmuseum für Vorgeschichte Halle/Saale (LDA) dedicated a special exhibition named "Elefantenreich—eine Fossilwelt in Europa" (Elephant Kingdom—a fossil

Figure 1.
Neumark-Nord, site of a mass accumulation of large mammal skeletons, fallow deer were especially numerous.

world in Europe) to the extraordinary mass occurrence of straight-tusked elephants and the accompanied fauna and flora of Neumark-Nord, which was to be seen in several German cities in the following years. The accompanying volume to the exhibition summarizes the research results [9].

The morphology of the deer skeletons was studied intensively by Pfeiffer [10–12]. Ontogenetic stages, sexual dimorphism, and variation of bone and tooth features were examined. The variation range of the bone dimensions and proportions and the antler development in all ontogenetic stages could be determined. The fallow deer could be distinguished from the recent *Dama dama,* and was initially described as a fossil subspecies *Dama dama geiselana* Pfeiffer, 1998 [10], but upgraded later to species level *Dama geiselana* [13].

All fossil finds are housed in the LDA and recorded in the catalog. HK 87:300, 713-799, means, for example, that the skeleton was entered in the "Hallenser Katalog" (HK) in 1987 under numbers 300, 713–300, 799. The number of preserved skeletal elements can be seen that way.

2. The lake basin

The origin of the lake basin presumably was caused by depressions between coal ridges and probably was influenced by halotectonics [1, 5]. With the help of numerous vertical and three horizontal sections, Mania was able to reconstruct the three-dimensional structure of the deposits in the lake basin [8]: "The sedimentary sequence shows that the interglacial lake deposits could be dated to between the Groundmoraine of the Saale ice-age (Drenthestadium, Saalian I), and an older loess sequence (Saalian II, III). Over this lay a soil complex and the younger loess sequence (Weichselian) … . The analysis of the annual horizons of the organogenic sediments of the early and middle interglacial suggested a deposition process lasting 8.800 years.... There was then a middle interglacial lake phase (climatic optimum). This was interrupted by two regressions.... Each time however a small area of lake remained. The wide littoral zone, which was formed by the two major regressions, was the main finds horizon (**Figure 2**). The lake phases in the second half of the climatic optimum are marked by an intensive eutrophication and stronger salination of the lake." All ecological zones from the littoral to the limnic profundal of the shallow lake are present. The high carbonate content of the warves (**Figure 3**) and the Neumark-Nord sediments in general afforded conditions for the preservation of calcareous invertebrate hardparts as well as phosphatic vertebrate bones and teeth.

Especially the fallow deer finds were concentrated in the coarse and fine detrital mud zone and algae mud zone of the site, which were deposited during the climate optimum of the interglacial period. Along with elephants, isolated red deer were also found in the deeper deposits of the first regression phase of the lake; red deer are also preserved in strata above the highly eutrophic strata indicating warm to moderate climate (**Figure 2**).

During deer's lifetime, the landscape was open parkland, thermophilic trees such as the oak and hornbeam were abundant, and the shallow shoreline of the lake was characterized by reeds and a floating leaf belt. Special feature of the flora are proven halophytes indicating high salt concentrations [5, 14, 15]. Coal diapirism probably caused halotectonics in the lakeshore zone [1, 5]. Salt licks formed, which were extraordinarily attractive for large mammals. What was the doom in this pleasant landscape for so many deer? The skeletons themselves provided important clues.
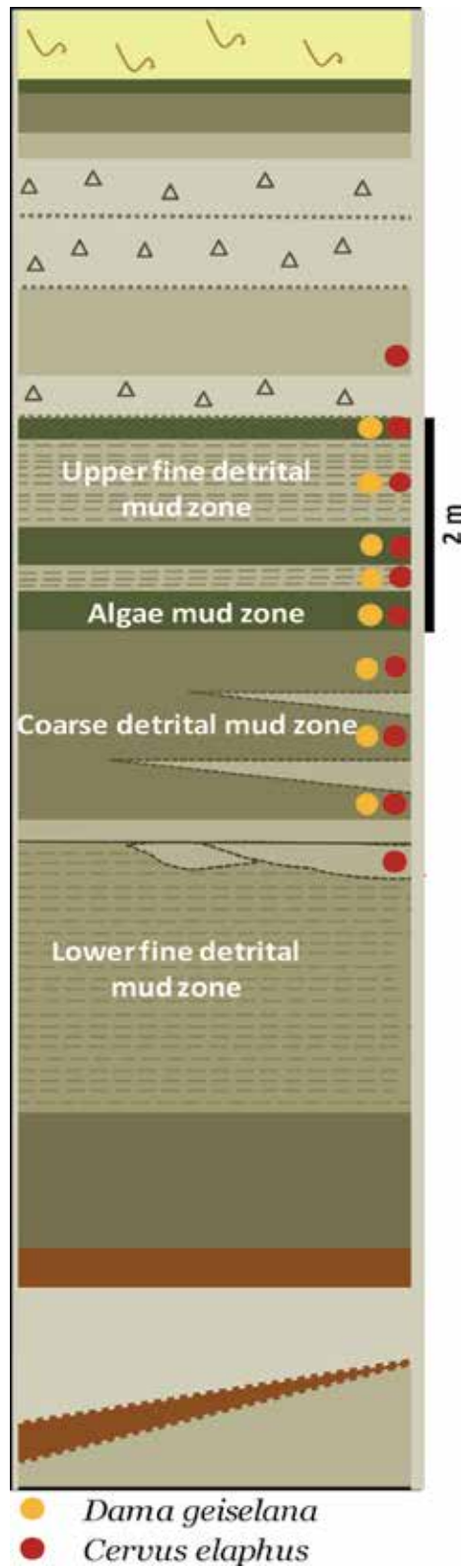
Figure 2.
Vertical sections of the interglacial lake sediments based on figures of Mania [5, 8]: fallow deer skeletons were especially numerous in the upper fine detrital mud zone and the algae mud zone.
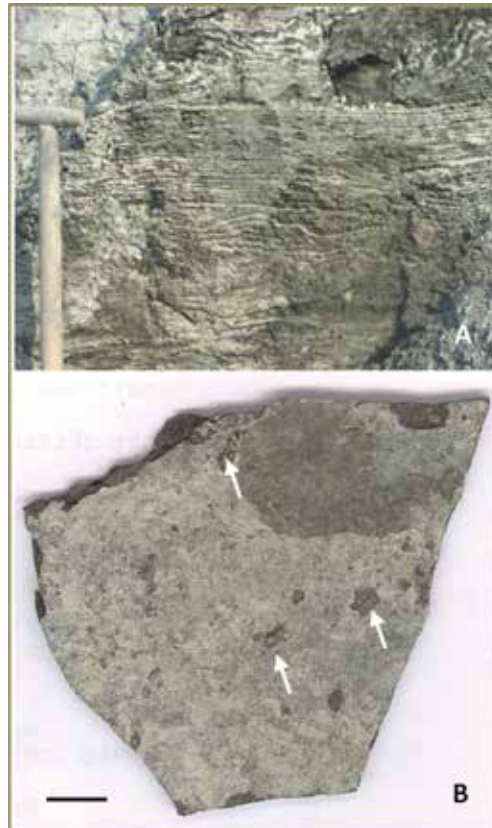
Figure 3.
A) Warves in the fine detrital mud zone. B) The carbonate portions of the warves appear to be cyanobacterial layers. The sediment is easily split at its boarder. The arrows mark leaf rests (scale bar 1 cm).

3. The find situation of the cervid skeletons

The 100 recovered deer were preserved as complete articulated skeletons or partial skeletons, many lying on the side with backwardly curved cervical spine and parallel leg position (**Figure 4**).

The skeletons were spread throughout the lake basin, few lay right on the shore (**Figure 5**). The actual number of embedded deer must have been much higher. On May 29, 1987, three skeletons, which were close to each other and were almost completely destroyed by the excavator, were detected by Mania in the coarse detrital mud zone. During an excavation with students, 17 cervids were found on May 22, 1989. The excavation work took place under unfavorable conditions in front of the approaching excavator. A month later, on June 21, 1989, Mania recorded 12 more fallow deer finds. All came from the fine detrital mud zone and showed the same state of preservation with two exceptions. The bones were very bright, slightly honey-yellow, and of firm consistency with a slightly glossy surface. On the other hand, skeletons of two subadult male deer with a brown surface must have come from another layer. There was no time to make sketches of the fallow deer skeletons in situ. The finds of these 2 days are marked with a box in **Figure 5**.

From 1994, finds of *Cervus elaphus* increase in frequency. The complete skeleton of a roughly 4-year-old red deer (HK 97: 14253) from March 13, 1995, which was discovered by members of the Paleontological Institute of the University of Bonn
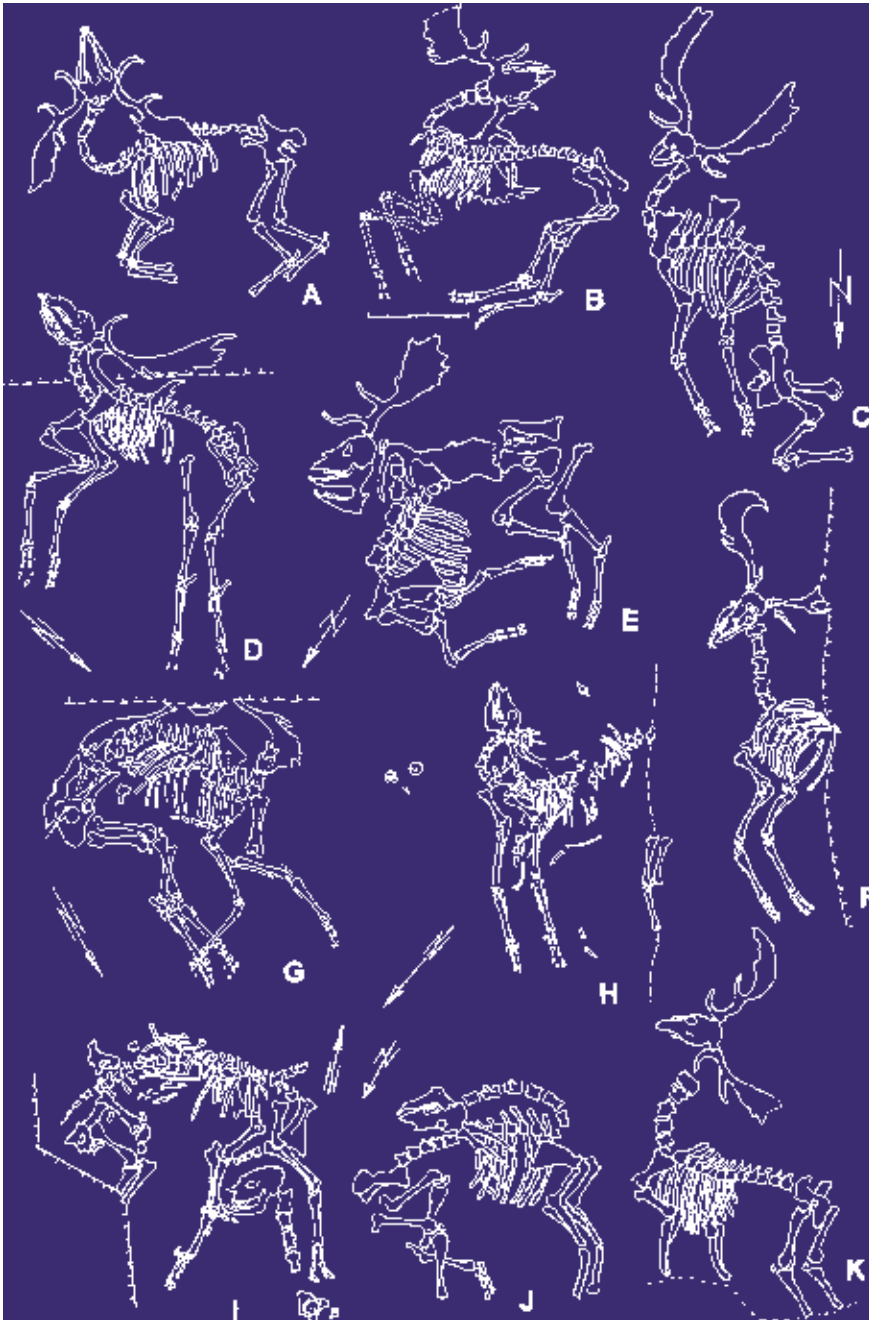
Figure 4.
Fallow deer skeletons in embedding position based on sketches by Mania. The skeletons show the typical preservation of drowned carcasses. A–G) Skeletons of adult stags. C) Skeleton of the holotype of Dama geiselana *HK97: 14165. F, K) Skeletons of subadult stags. H) Partial skeleton of a three year old stag with small antler blades. F, G, and H were cut by the excavator. I) Skeleton of a female with strong bite marks in the cervical spine (compare* **Figure 8**). *J) Skeleton of a juvenile stag with his first antlers (compare* **Figure 12**).

(including the author) during a visit to the site. It could be measured and photographed in situ (**Figure 6A**). The skeleton was articulated, with the rear body slumped deeper into the sediment; only the antlers and the skull were cut off from the excavator. This animal could be recovered intact. Another adult red deer (HK 97: 14254) was stuck about 3 m higher in the wall, already cut by the excavator, recovered as a partial skeleton on this day (**Figure 6B**).
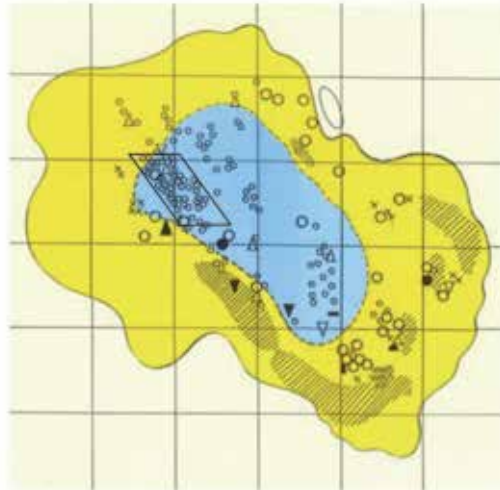
Figure 5.
Spread of the skeletons based on sketches from Mania. The box encloses the excavation area on May 22, 1989 and June 21, 1989; small empty dots mark deer skeletons.

Figure 6.
A) Red deer skeleton (HK 97: 14253) in situ, found on March 13, 1995. The skeleton was overrun by the excavator, skull and antlers cut off. B) Skeleton of an adult red deer (HK 97: 14254), sticking in the wall 3 m above the former skeleton and already cut by the excavator.

The majority of the skeletons were intact, without cut marks and further treatment by humans, but had numerous fresh fractures due to heavy sediment load or damage caused by the excavator. Human activities were mainly detected from

Figure 7.
Antler fragment of Dama geiselana *with strong bite marks. The rest was accompanied with the female red deer skeleton HK: 97: 14147.*
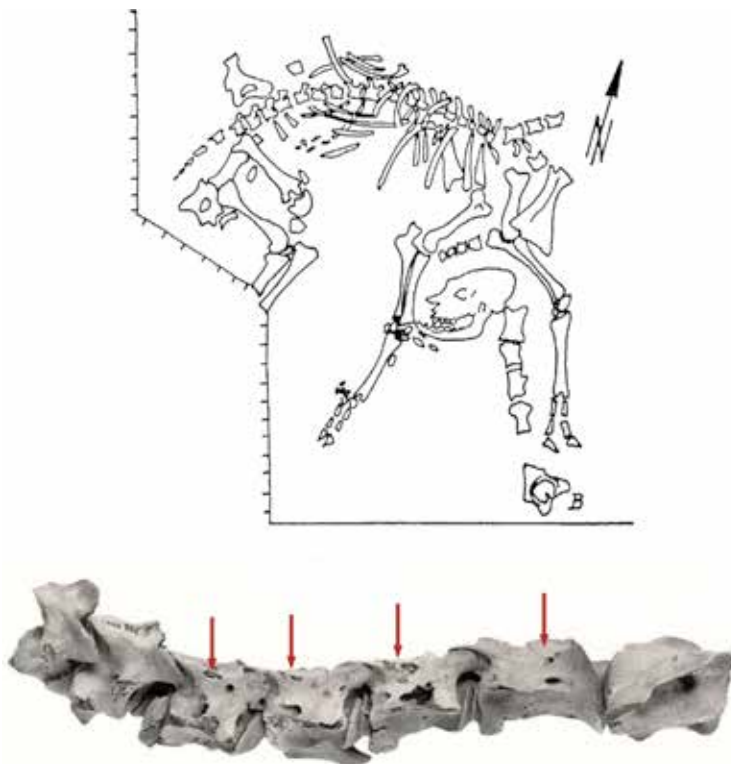
Figure 8.
The cervical spine of the juvenile female of Dama geiselana *shows bite marks of a strong carnivore (arrows). The rest of the skeleton was articulated and undamaged, without gnawing marks.*

the shore area of the lake's lower littoral zone, a zone from which many straight-tusked elephant skeletons originate. Mania was able to excavate clusters of silex artifacts in an area south and east of the lake. He documented a slaughter place with the skeletal remnants of an aurochs at the littoral edge of the lower littoral zone. The bones were often smashed, detached from the natural bone articulation, a completely different embedding situation than with the deer skeletons [16]. Gaudzinski-Windheuser [17] analyzed surface modifications on bones from complete cervid carcasses and attested the marginal exploitation of these resources by Neanderthals. She suggested an indication of scavenging by the Neanderthals on some individuals, coming from the lake shore area, though the carcasses showed no sign of disarticulation.

The hunting of deer can be assumed by some isolated battered and charred bones coming from the lake shore area. However, the vast majority of the articulated deer skeletons do not show any indication of human use.

The activity of predators could be proven in some cases. In 1991, the rear partial skeleton of a female deer *Cervus elaphus* (HK 97: 14147) was recovered, in the vicinity of which lay an antler remnant of a strong fallow deer. The burr shows gnawing marks of a strong carnivore, presumably a cave hyena or a cave lion (**Figure 7**).

The articulated skeleton of a juvenile female of *Dama geiselana* (HK 87: 300, 958-1046 and HK 87: 300, 1113-1114) has strong bite marks in the area of the cervical spine. The head and cervical vertebrae are detached from the body. However, the animal was not further disassembled and eaten by predators (**Figure 8**). There are no bite marks on the meat-carrying parts of the skeleton.

4. The composition of deer finds from Neumark-Nord

4.1 The composition of deer species

The recovered skeletons and partial skeletons of *Dama geiselana* represent 80 individuals, only 10 of which belong to females. Finds of single, isolated bones have been neglected. Mania was able to observe the destruction of four other skeletons during dredging. The isolated relics of *Dama geiselana* increase the minimum number of individuals by at least 10 and a maximum of 20.

Twenty individuals of *Cervus elaphus* could be clearly identified by complete skeletons, partial skeletons, and isolated rests, of which at least two, possibly three finds are partial skeletons of female animals. A very young animal is preserved only by a phalange (epiphyseal joint still visible) that cannot belong to any of the other older red deer. An antler rest of *Cervus elaphus* with characteristic terminal fork was not included in the minimum number of individuals [11]. Surprisingly, *Megaloceros giganteus* is represented only by an antler rest [18], *Capreolus* completely missing. The composition of the cervid finds from Neumark-Nord is shown in **Figure 9A**.

The find composition is extraordinary. The fossil fallow deer is a very rare element in the interglacial faunas of Central Europe, while the red deer is common in cold and warm stages [19, 20]. In Neumark-Nord, *Dama geiselana* represents 80% of distribution, only 20% are red deer.

4.2 The distribution between juveniles, females, and males

The distribution between the sexes is also unusual, 88% are males, only 12% are females. Even more unusual is the composition of the age structure of the deer (**Figure 9B**); 75% belong to robust males with well-developed antlers. About 25% of
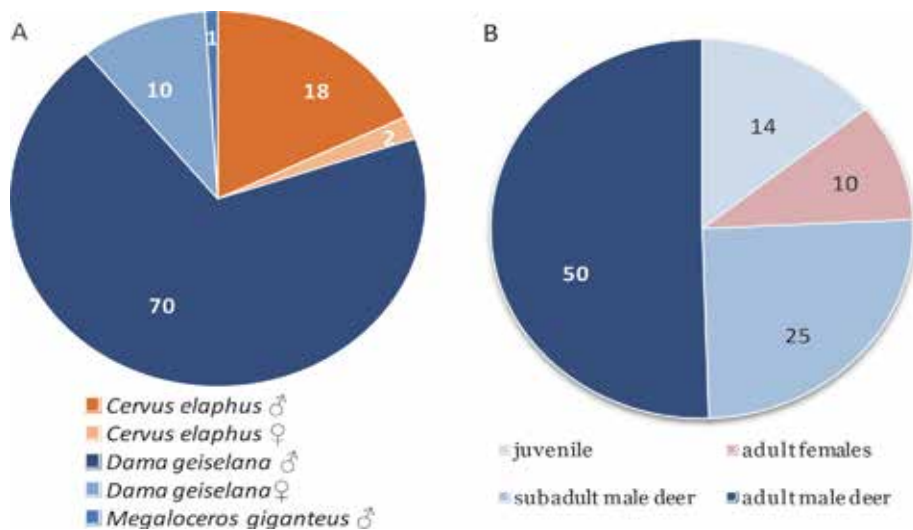
Figure 9.
A) Composition of the cervid finds. Dama geiselana *is represented with 80 individuals,* Cervus elaphus *with 20. Females are underrepresented with only 12 individuals. From* Megaloceros giganteus*, only an antler fragment is preserved. B) The age structure shows that strong males (50) and subadult males, coming close to the adult stage (25), were especially frequent. Juveniles (14) and adult females (10) are clearly underrepresented.*

the males were younger than 6 years at death (subadult), but they already had large antlers and came close to the adult stage. If no antlers are preserved, the subadult stage can be established on a series of non-fused epiphyses of the postcranial skeleton (see below). Only 9% of the skeletons belong to adult females, and only 14% belong to juvenile cervids including four juvenile females. The end of the juvenile stage is marked by the completed tooth change at the end of the second year of life. Very old individuals with worn teeth were totally lacking.

Assuming a natural mortality, the composition is most unlikely. Males and females should be evenly distributed. Inexperienced juveniles and very old animals should be frequent, and especially the young, strong stags should rarely be represented in the find material. The finding situation gives a clear indication that one or more catastrophic events led to the deer's death.

The question arises as to why the strong male animals are particularly affected. A crucial indication arose from the individual age determination of the deer, which allowed the death period to be limited for many skeletons to autumn, the rutting season of the deer.

5. Individual age determination

5.1 Individual age determination on teeth

Based on the knowledge that more than 90% of the fallow deer calves are born in the second half of June [21–23] the tooth status of the young animals can be used for the individual age determination (compare **Figure 10**). The method of tooth age determination in *Dama dama* is presented particularly well by Ueckermann and Hansen [23]. Illustrations used there are used here for the tooth age determination of fossil *Dama geiselana*. The permanent dentition is complete between the ages of 24 and 26 months, with the M_3 arising in the last 2 months of the second year of life. The deciduous premolars are changed this time.

Tooth change of *Dama dama* at the mandible											
June	1. Month	DI_1	DI_2	DI_3	DC						
July	2. Month					DP_2	DP_3	DP_4			
October	5. Month								M_1		
June	13. Month	I_1	I_2							M_2	
September	16. Month			I_3	C						
May	24. Month					(P_2)	(P_3)	(P_4)			(M_3)
July	26. Month					P_2	P_3	P_4			M_3
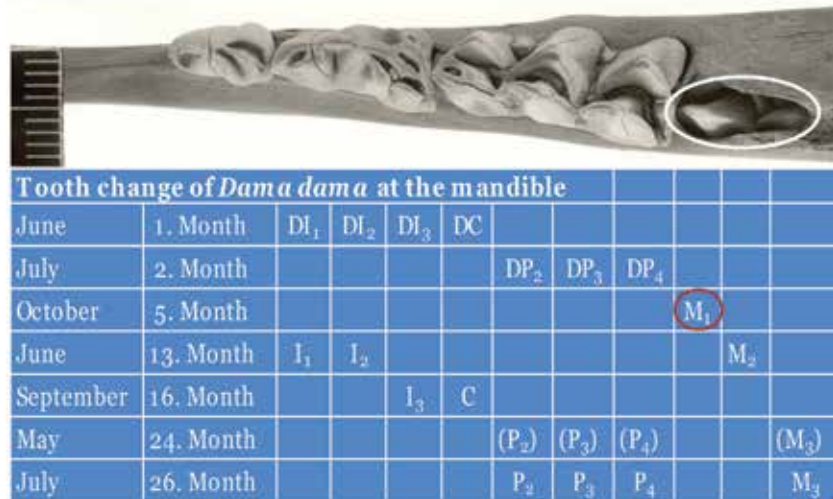
Figure 10.
Age determination based on the change of the teeth in Dama dama. *An age of 4–5 months can be determined on this mandible of* Dama dama. *The M_1 was just breaking through.*

After changing the teeth, an age assessment can be carried out on the degree of tooth wear. It is highly dependent on the amount of hard, silicate-rich plants in the food and becomes increasingly inaccurate after the age of 4. In the third year of life, the last lobe of M_3 is still completely covered by white enamel. With increasing age, the teeth are stressed during rumination, brown dentin emerges more and more. Enamel rings are formed, which can be used for age determination [24]. This method was additionally used.

In *Cervus elaphus*, the temporal sequence of the tooth change is different from that of *Dama dama* (**Figure 11**).

All deciduous teeth appear in the first months of life, the M_1 in the fourth month, usually in September. The first year of life ends with the appearance of the M_2. From the 14th to the 19th month, the incisors and the canine are successively changed. In the 21st month, the deciduous premolars are changed, the M_3 appears. In the 25th month, the permanent dentition is completely developed.

5.2 Individual age determination by the ossification of the epiphyses

On the basis of the level of epiphyseal adhesion, Pohlmeyer [25] has established a calendar for the individual age determination of recent *Dama dama* (**Table 1**). Here, this calendar was applied to *Dama geiselana*.

There is a clear difference between the sexes. In the female skeletons all epiphyses are fused with 4 years except the thoracic vertebrae, the females are adult then. Observations on recent fallow deer have shown that females are successful with reproduction at the age of 3, in some cases they start at an age of 2 years [21, 23]. The males reach the optimum of physical development much later at the age of 11. They then have the heaviest and most impressive antlers. To adapt to the antler weight, the cervical vertebrae, the proximal humerus, radius, and ulna can grow significantly longer than in the females [11]. This allows determining the individual age also in male fallow deer skeletons whose skull is not preserved. Many epiphyses are joined in a chronological order in the second and third year of life. Therefore, for young fallow deer up to an age of 4, the time of death can be limited.

Tooth change of *Cervus elaphus* at the mandible											
June	1. Month	DI_1	DI_2	DI_3	DC_1	DP_2	DP_3	DP_4			
September	4. Month								M_1		
May	12. Month									M_2	
July	14. Month	I_1									
September	16. Month		I_2								
October	17. Month			I_3							
December	19. Month				C						
February	21. Month					(P_2)	(P_3)	(P_4)			
June	25. Month					P_2	P_3	P_4			M_3

Figure 11.
Tooth change of Cervus elaphus. *In the juvenile female HK 97: 14161, the M_2 already shows slight wear (older than 12 months), the deciduous premolars have not yet changed (younger than 21 months), the M_3 just appears.*

A 6-year-old stag can be well identified based on the ossified humerus epiphysis. From then on, the stags can be considered adult. The final shoulder height is reached, while the antlers increase in size and weight in the following years.

Fallow deer stags younger than 5 years can be identified by the lack of ossification at the epiphyses of the cervical vertebrae. They are classified as subadult. The ossification of the tuber coxae and the spina iliaca of the pelvis was completed at the age of 5, according to Pohlmeyer. In *Dama geiselana*, one significant difference was detected; the pelvic apophyses could be incompletely fused at the age of 8 years. This observation was also made in some recent fallow deer skeletons from Germany.

Fallow deer that are older than 9 years can be recognized by the complete ossification of thoracic vertebrae epiphyses and the pelvic symphysis.

There was no calendar of epiphyseal adhesion available for *Cervus elaphus*. Own observations on 23 recent skeletons with partly known individual age showed clear deviations from the fallow deer. The caput of MC III + IV and MT III + IV fuse at an age less than 2 years with the diaphysis, earlier than in *Dama*. The caput humeri

		Male ♂	Female ♀
Spinal column		data in month	
Atlas	disappearance of the joint cartilage in the median of the arcus dorsalis	22	22
Axis	caudal epiphysis	42 – 54	30 – 42
III-VII cervical vertebra	cranial and caudal epiphyses	42 – 54	30 – 42
Thoracal vertebrae	cranial and caudal epiphyses	84 –108	84 – 108
Lumbar vertebrae	cranial and caudal epiphyses	12 – 36	12 – 36
Os sacrum	synostis vertebrarum sacrarum		
Vert. Sac. II, III and IV		6	6
Vert. Sac. I and II, III, IV		15 – 18	15 – 18
Thoracic bones			
Scapula	tuberculum supraglenoidale/ processus coracoideus	15	15
Humerus	caput humeri	72	36
	tuberculum majus	24	24
Radius	trochlea radii	24 – 28	24
Ulna	synostis ossium antebrachii	48	42
	tuber olecrani	22	22
	processus styloideus ulnae	24	24
MC III + IV	caput	24	24
Phalanx	proximal epiphysis	12 – 14	12 – 14
Pelvic bones			
Ilium	tuber coxae, spina iliaca dorsalis	60	38
Ischium	tuber ischiadicum	30	48
	adhesion of the symphysis pelvina	96	
	insertion of the os interischiadicum into the symphysis	48	48
Femur	caput femoris, trochanter minor, distal epiphysis	22 – 24	22 – 24
Tibia	proximal epiphysis, tuberositas tibiae	27 – 28	27 – 28
Tarsal bones			
Calcaneus	tuber calcanei	23 – 24	23 – 24
MT III + IV	caput	22	22
Phalanx	proximal epiphysis	12 – 14	12 – 14

Table 1.
Age determination by the ossification of the epiphyses of Dama dama *(data adopted from [25]).*

fuses with the diaphysis about an age of 4 in males, much earlier than in fallow deer. The proximal and distal radius epiphyses fuse after completion of the fourth year of life in male red deer, much later than in *Dama*. At the same age, the tuber olecrani grows together with the ulna shaft. Also, the proximal tibia epiphysis and proximal and distal femur epiphyses do not fuse until 4 years of age. This level of development had reached the red deer skeleton HK 97: 14253, found on 1995, 13 March (**Figure 6A**).

As with *Dama*, the phalanges grow together at the beginning of the second year, cervical vertebrae in the fifth year of life, and thoracic vertebrae very late, from eighth year onward. These observations go well with the red deer from Neumark-Nord. However, the age assessment of the postcranial skeleton is not as well secured in the red deer as in *Dama*.

5.3 Age determination on antlers

The antler development in fallow and red deer is well studied [21–23]. The calves born in June develop the pedicle in the following February. On it grows a first antler without a burr, ending in a peak (**Figure 12**).

Figure 12.
Antler and atlas of a juvenile male of Dama geiselana *(HK 97: 14154). The young stag had developed his first antler without a burr.*

In April of the following year, the antlers are dropped off. Shortly thereafter begins the growth of a new, more complex antler. The second antler starts with a small burr, the diameter of which increases each year with the growth of a new antler. The pedicle is long and narrow in young individuals and gets shorter and wider each year with the increase in antler size. In *Dama* in the third year of life, a small antler blade evolves, which increases in size in the following years. The differences of the antler morphology between *Dama dama* and *Dama geiselana* are significant and discussed in detail by Pfeiffer [11, 13]. The optimum of antler development is reached in the eleventh to twelfth year of life. In the following years, the antlers of the very old deer are increasingly reduced to small peaks.

They can be clearly distinguished from juveniles by the strong burr. During growth, the antler bone is surrounded by a heavily perfumed skin. With completion

Figure 13.
Antler of an adult stag of Dama geiselana *that was salvaged in fragmentary condition by employees of the coal mining company Braunsbedra in May 1995. The antlers show traces of rut fights. The first anterior tine looks polished; from the second anterior tine, the top is broken off, and the front edge of the antler blade shows numerous scratches (scale bar 10 cm).*

of the antlers, the skin perishes and is stripped off. The antlers of robust males of *Cervus elaphus* were used in rutting fights in the period September to October and those of *Dama* in October. Traces of this can be seen in the anterior tines. They look polished, or have scores, or are broken off at the end. These conditions are typical of the antlers of strong stags in Neumark-Nord (**Figure 13**).

5.4 Age determination of the cervid skeletons of Neumark-Nord

5.4.1. Juveniles and subadult individuals of Dama geiselana

Only in three of the ten juvenile skeletons of *Dama geiselana*, the individual ages could be determined on the dentition.

- The juvenile female with the bite marks in the cervical vertebrae HK 87: 300,958-1056 already had a fully developed M_2, the DP_4 had not yet changed. That means, it was older than 13 months and younger than 24 months at death. With the only weakly fused epiphyses of the phalanges and the not-fused coracoid process of the scapula, the age could be further limited to 14–15 months; the time of death was in autumn.

- The young male of *Dama geiselana* HK 88: 2,1-72 died at the beginning of its third year of life. Its teeth show freshly raised premolars with M_3, still without wear. That indicates an age of minimum 26 months. The skeleton is very well preserved. The fully developed juvenile antlers confirm a death date in autumn.

- In the teeth of the juvenile male HK 97: 14151, the M_3 was just arising. This indicates an individual age of less than 2 years. The trochlea radii and the tuber olecrani were not fused, indicating an age of less than 22 months, a first antler was developed. This young fallow deer died in the spring.

- In a second juvenile female (HK 97: 14150), mainly the front limb was preserved. Teeth were not recovered, but the phalanges without any fusion of the epiphyses indicate an age of about 10 months. This young female died in spring. The skeleton was found together with the previous skeleton of the young male HK 97: 14151.

- HK 88: 4,1-59 is a juvenile male. No teeth are preserved. On the femur, an age younger than 22 months could be estimated, the phalange epiphyses were just growing together, the age was about 15 months. Time of death was in autumn.

- From HK 88: 17,7-14, only fragments are preserved of a juvenile male younger than 22 months, determined on the not-fused femur.

- The young male HK 97: 14194 was 15 month old, based on based on the not-fused tuber calcanei. Time of death was in autumn.

In the third year of life, the time of death can be limited by the fusion of the epiphyses of the proximal radius, the proximal tibia, and the lumbar vertebrae (compare **Table 1**).

With the proximal tibia, the time of death could be dated to the autumn in six young fallow deer (HK 88,2,1-72; HK 97: 14170; HK 97: 14174; HK 97: 14182; HK 97: 14183; HK 97: 14201).

HK 97: 14190; HK 97: 14197; and HK 97: 14158 are deer that died in the third year of life, but their skeletal elements are so incompletely preserved that one can only make the statement: little older than 2 years. They most probably died in autumn.

In the fourth year of life, the female fallow deer HK 97: 14164 died in autumn. This could be ascertained in the not-fused cervical vertebrae epiphyses (younger than 42 months) and the freshly fused caput humeri (older than 36 months). Also the female fallow deer HK 97: 14173 died in autumn at an age between 38 and 42 months, verified on the fused tuber coxae (38 months) and non-fused axis epiphysis (max. 42 months).

5.4.2. *Adult males and females of* Dama geiselana *and* Cervus elaphus

Although they are very complete, six female skeletons of *Dama geiselana* and one skeleton of a female of *Cervus elaphus* do not allow any statement about the period of death. All epiphyses are fused, the adult dentition is complete.

Stags of *Dama geiselana* with an individual age between 5 and 6 years can be well identified by the beginning fusion of the caput humeri, their antlers are already well developed. The time of death can be approximately determined by the development of the antlers. The same applies to fallow deer stags older than 6 years.

Their antlers were used in rutting fights as visible in signs of wear at the anterior antler tines and the front edge of the antler blades. The brow tine and the second anterior tine often look polished, or have scratches, or may be broken off at the end. In 20 fallow deer and 4 red deer, the antlers are preserved well enough to detect these traces (**Figure 13**). Therefore, the death period can be narrowed between October and February. In February, the antlers are dropped off.

5.4.3. Age determination in juveniles of Cervus elaphus

- In the juvenile female HK 97: 14161, the M_2 already shows slight wear (older than 12 months), the deciduous premolars have not yet changed (younger than 21 months), the M_3 is just breaking through (**Figure 11**). The time of death must have been between September and January in its second year of life. This age classification fits with the non-fused epiphyses of most long bones. MC III + IV and MT III + IV are fused distally, an indication that these epiphyses fuse earlier in *C. elaphus* than in *Dama*.

- In the skeleton of HK 97: 14161, coming from the lower fine detrital mud zone, the epiphyses of the long bones are not fused. Vertebrae of the sacrum are not completely ossified, confirming an age classification of 15–18 months. Period of death was in the autumn.

- The young male of *Cervus elaphus* HK 97: 14184 had just completed the change of teeth, the M_3 shows minimal wear. Its age is therefore at least 26–28 months, the time of death falls in the autumn. The age can be verified with the postcranial skeleton, most epiphyses of the long bones are not fused.

- The beginning of the fusion of the epiphysis of the caput femoris indicates a time of death in the beginning of the third year of life in the young stag HK 97: 14155.

6. Limitation of the death period

73 of the 100 deer skeletons from Neumark-Nord were included in the age determination. Isolated relics of dredged skeletons were neglected due to incompleteness.

In 13 young individuals of *Dama geiselana* and 4 juveniles of *Cervus elaphus*, the time of death could be determined quite precisely. Of these, 14 died definitely in autumn. Also 2 nearly adult females, and 2 juvenile males of *C. elaphus* definitely died in autumn (**Figure 14**). Two juvenile fallow deer died in the spring.

For most of the deer (44), the period of death was limited between September and January. Even with them, a death in autumn is probable. This group includes a juvenile red deer and three juvenile fallow deer, which most probably died in autumn. Twenty adult stags of *Dama geiselana* and four of *Cervus elaphus* have antlers with traces of rut fights. Out of 21 partial skeletons of adult male deer, only remnants of the antlers are preserved. They make it possible to limit the time of death between September and January.

Nine skeletons were complete enough to estimate the individual age in years, but they do not allow an indication of the death period. These include incomplete adult male skeletons without preserved antlers and the well preserved adult females.
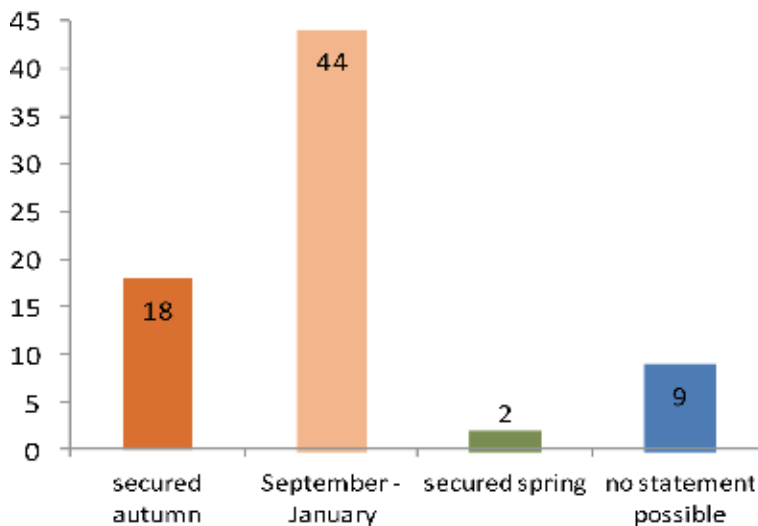
Figure 14.
Limitation of the death period of 18, predominantly juvenile deer the time of death was in autumn, verified by the change of teeth and the degree of epiphyseal fusion. The second group (44) includes adult stags with antlers used in rut fights; they most probably died in the autumn. Two juveniles died in the spring. The last group includes the adult females. They also may have died in the autumn, but their skeletons do not allow any statement.

7. Discussion on the cause of death

The great frequency of complete or nearly complete skeletons repeatedly raised the question on the cause of death, and is discussed in the literature. Mania [5] as well as Bosinski [26] favored hunts of the deer of early humans before an analysis of the deer skeletons was made. The observation that most cervids died in the rut fighting season contradicts the hunting hypothesis; in autumn, male deer do not live together in herds. Humans would have dissected and eaten the hunted prey. But most skeletons are intact, without traces of cut marks or further treatment by humans.

Could the animals have broken into thin ice during the winter? This hypothesis cannot be completely excluded for the adult deer whose death period is determined only by the fully developed antlers. Deer with large antlers could get out of this situation worse than females without antlers. However, the occurrence of heat-loving plants speaks against the occurrence of hard frosts during the climatic optimum of the interglacial period of Neumark-Nord.

Also predators are not the cause of the deer mass accumulation. Only few skeletal elements show bite marks (see above). Even the juvenile female HK 87: 300, 958-1046 (**Figure 8**) with strong bite marks in the cervical spine was not eaten up either.

Poisoning by a gas cloud or gas eruption can be excluded. The lake was shallow, not more than 5–15 m deep, the pressure of the water column was not high enough to make a gas eruption likely [11].

The composition of the taphocoenosis speaks for several disasters in autumn in different years with varying intensity over a period of possibly more than 300 years during the climatic optimum of the interglacial period. Mania [1] estimated this time span on the basis of warve counts.

Pfeiffer suggested that toxic cyanobacterial blooms in the water poisoned the deer [11, 15, 17, 27, 28], the main arguments are repeated here.

Cyanobacteria of the genera *Anabaena, Microcystis, Nodularia, Nostoc*, and *Oscillatoria* produce hepatotoxic microcystins and neurotoxic anatoxins that can kill large mammals within a few hours [29, 30]. Microcystins have been responsible worldwide for repeated cases of thickness and death in pets and wildlife after ingestion of water containing toxic cyanobacteria [31–35]. From Germany, several cases have been described in recent years under comparable climatic conditions as in Neumark-Nord [36–39].

The poisonous effect of a cyanobacterial bloom was first described by Francis in 1878 in Nature [40]: "Being very light, it floats on the water except during breezes, when it becomes diffused. Thus floating, it is wafted to the lee shores, … it is swallowed by cattle when drinking, especially such as suck their drink at the surface like horses. This acts poisonously, and rapidly causes death." Hennig and Kohl [39] showed that the highest toxicity is reached when the cyanobacteria cells die, degenerate, and set the included poison free.

Park et al. [32] showed seasonal variations of *Microcystis* ssp. in Lake Suwa and found a second blooming period in October after the first bloom in spring. After the death of a summer algal bloom, much nitrogen is removed from the water. In spring, the selective advantage of cyanobacteria is achieved by the inhibition of eukaryotic algae, in autumn by nitrification (**Figure 15A**). Therefore, the two juvenile fallow deer who died in the spring may also have been victims of cyanobacteria toxins.

The sinking bloom of eukaryotic algae together with the generally high organic content of the water caused poor light penetration in the lake and favored nitrogen-fixing cyanobacteria drifting near the surface with the aid of gas vacuoles. During some sunny days in autumn, they can multiply explosively (**Figure 15B, C**) [29–32].

That cyanobacteria could be responsible for the mass accumulation of the deer was confirmed by investigations of the sediment [27].

The carbonate portions of the warves (**Figure 3C**) appear to be cyanobacterial layers that have been decomposed and deposited above a layer of chrysophycean cysts, which belong to the summer algal bloom. The distinct separation of the chrysophycean cyst layers from the overlying microbial carbonate layers indicates that the bloom of chrysophyceans was separated in time from that of the cyanobacteria and their subsequent calcification. The sediment is easily split between the two layers.
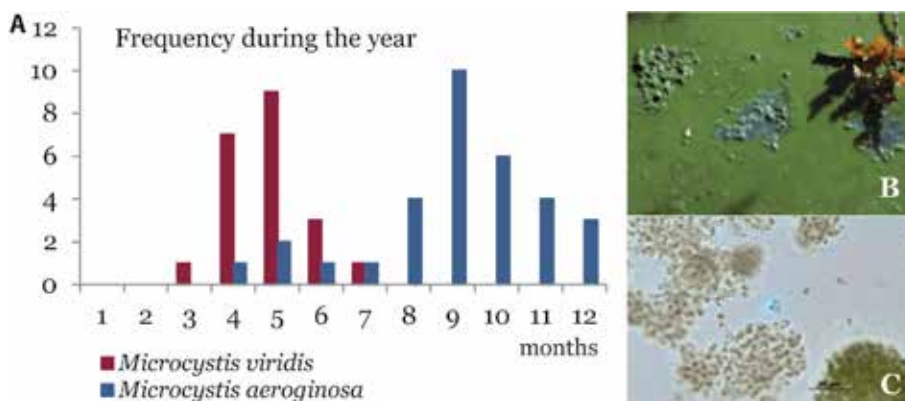

Figure 15.
A) Seasonal variation in Microcystis *ssp. (graph based on data from Park et al. [32]).* M viridis *is dominant in spring,* M. aeroginosa *in the autumn. B and C: Bloom of* Microcystis *sp. in a small shallow lake in Riddagshauen (Germany, Lower-Saxony) on October 6, 2012.*

The biochemical results obtained by absorption spectroscopy and RP-HPLC with UV-detection showed that photosynthetic pigments, and probably toxins, characteristic of cyanobacteria were preserved in the sediment [11, 27]. The results of the study of Braun and Pfeiffer [27] indicated the presence in the lake of large amounts of toxic cyanobacteria that most probably occurred in seasonal blooms.

In autumn, the following scenario may have occurred repeatedly in different years at the Pleistocene lake of Neumark-Nord.

Salt licks in the lakeshore region had made the area extremely interesting for large herbivores. A stag that has occupied such an area will be extremely attractive to an incoming female herd. The possible reproductive success causes the stags to embittered rut fights. Considering that only about 10% of the stags are involved in reproduction in their lifetime [21, 23], it takes a tremendous amount of effort to occupy the area. If they succeed, they will be the father of the entire subsequent generation of calves of the female herd.

Stags, being especially thirsty after their rut fights, would have been tempted to drink profusely from the lake. They do not dunk their nose while drinking to be able to smell predators. The toxic bloom is odorless [30], so they do not smell the danger. Thus, while drinking, the stags may easily have taken up a lethal dose of the cyanobacteria drifting near the water surface.

Females pay little attention to the rut fights. They were not forced to increase their water intake. They get the most liquid from juicy plant food [21, 22]. This explains why they are so rarely found among the victims.

Anatoxins and microcystins cause a rapid immobilization [31, 32, 41]. Before they died, the deer could not get far from the shore.

Most of the deer skeletons display the preservation typical of water carcasses, with parallel leg position and recurved neck, as evidenced, for example, from the Eocene site of Messel [42]. This could have happened as follows:

Higher rainfall in the late autumn will have led to an increase in the lake's water level. After death in the lake shore area many carcasses, inflated by digester gases, will be washed into the lake and distributed over the whole lake. With increasing decay the abdominal cavity broke open, the digester gases escaped, and the carcasses sank to the bottom of the lake. Then, the antlers acted as anchors, which got caught in the bottom sediment. The slack body came to rest beneath the head in side position. The cervical spine, twisted in many skeletons, can be explained in this way. In addition, the tensile force of the ligamentum nuchae caused a recurved neck, as it remained intact longer during decay than the antagonistic muscles.

Embedding in the sediment took place at a time when the skeletons were still clearly surrounded by soft tissues, because the bones are preserved in articulation.

Carcasses poisoned by cyanobacteria are spurned by predators. Should a scavenger tackle a poisoned animal, he quickly abandons it [30]. In Neumark-Nord, this was observed in the juvenile female HK 87: 300, 958-1046 (**Figure 8**). Although the animal has strong bite marks in the cervical spine, it was not eaten up, as the undamaged meat-bearing bones show.

Even the few skeletons from the lakeshore that have cut marks of stone tools [17] were not completely disassembled by the Neanderthals; may be the danger was recognized.

Acknowledgements

Conflict of interest

The author declares no conflict of interests.

Author details

Thekla Pfeiffer-Deml
Cremlingen, Germany

*Address all correspondence to: thekla.pfeiffer@web.de

IntechOpen

References

[1] Mania D. Neumark-Nord - ein fossilreiches Interglazial im Geiseltal. Cranium. 1992;**9**(2):53-76

[2] Litt T. Zur stratigrafischen Einstufung des Interglazials von Neumark-Nord aufgrund neuer pollenanalytischer Befunde. Altenburger naturwissenschaftliche Forschungen. 1994;**7**:328-333

[3] Litt T, Behre K-E, Meyer K-D, Stephan H-J, Wansa S. Stratigrafische Begriffe für das Quartär des Norddeutschen Vereisungsgebietes. Eiszeitalter und Gegenwart (Quaternary Science Journal). 2007;**56**(1/2):7-65

[4] Strahl J, Krbetschek M, Luckert J, Machalett B, Meng S, Oches E, et al. Geologie, Paläontologie und Geochronologie des Eem-Beckens Neumark-Nord 2 und Vergleich mit dem Becken Neumark-Nord 1 (Geiseltal, Sachsen-Anhalt). Eiszeitalter und Gegenwart (Quaternary Science Journal). 2010;**59**(1/2):120-167

[5] Mania D. Das Mittelpaläolithikum von Neumark-Nord - eine besondere ökologisch- ökonomische Fazies. *EAZ*. 1990;**1**:16-24

[6] Mania D. Das Interglazial von Neumark-Nord (Geiseltal).- Zum Untersuchungsstand 1994. Tübinger Monographien zur Urgeschichte. 1996;**11**:217-229

[7] Mania D. Quartärforschung im Tagebau Neumark-Nord, Geiseltal (Sachsen-Anhalt) und ihre bisherigen Ergebnisse. Veröffentlichungen des Landesamtes für Denkmalpflege und Archäologie Sachsen-Anhalt – Landesmuseum für Vorgeschichte. 2010;**62**:11-69

[8] Mania D, Thomae M, Altermann M. Der fossile See von Neumark-Nord. In: Meller H, editor. Elefantenreich – eine Fossilwelt in Europa. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; 2010. pp. 46-62. ISBN: 978-3-939414-48-3

[9] Elefantenreich – eine Fossilwelt in Europa. Meller H, editor. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; 2010. p. 652. ISBN: 978-3-939414-48-3

[10] Pfeiffer T. Die fossilen Damhirsche von Neumark-Nord (Sachsen-Anhalt) - D. dama geiselana n. ssp. Eiszeitalter und Gegenwart. 1998;**48**:72-86

[11] Pfeiffer T. Sexualdimorphismus, Ontogenie und innerartliche Variabilität der pleistozänen Cervidenpopulationen von Dama dama geiselana Pfeiffer 1998 und Cervus elaphus L. (Cervidae, Mammalia) von Neumark-Nord (Sachsen-Anhalt, Deutschland). Berliner geowissenschaftliche Abhandlungen E. 1999;**30**:207-313

[12] Pfeiffer T. Die Stellung von Dama (Cervidae, Mammalia) im System plesiometacarpaler Hirsche des Pleistozäns - Phylogenetische Rekonstruktion - Metrische Analyse. Courier Forschungsinstitut Senckenberg. 1999;**211**:1-218

[13] Pfeiffer-Deml T. The fossil fallow deer Dama geiselana (Cervidae, Mammalia, upgrade to species level) in the context of migration and local extinctions of fallow deer in the late- and middle Pleistocene in Europe. PalZ. 2018;**92**(4):681-713

[14] Mania D, Mai D. Die Blätterfunde aus den gewarvten Feindetritusmudden der Eichenmischwald – Hainbuchenzeit der Warmzeit von Neumark-Nord (NN 1). In: Meller H, editor. Elefantenreich – eine Fossilwelt in Europa. Halle (Saale): Landesamt für Denkmalpflege und Archäologie

Sachsen-Anhalt; 2010. pp. 150-153. ISBN: 978-3-939414-48-3

[15] Mai D, Hoffmann J. Die Vegetation von Neumark-Nord – Eine Rekonstruktion anhand karpologischer Reste. In: Meller H, editor. Elefantenreich – eine Fossilwelt in Europa. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; 2010. pp. 141-149. ISBN: 978-3-939414-48-3

[16] Mania D. Mittelpaläolithische Jäger und Sammler am See von Neumark-Nord. In: Meller H, editor. Elefantenreich – eine Fossilwelt in Europa. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; 2010. pp. 531-552. ISBN: 978-3-939414-48-3

[17] Gaudzinski-Windheuser S. Preliminary results on the analysis of bone surface modifications at Neumark-Nord 1. In: Meller H, editor. Elefantenreich – eine Fossilwelt in Europa. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; 2010. pp. 427-429. ISBN: 978-3-939414-48-3

[18] van der Made J. Riesenhirsch. In: Meller H, editor. Elefantenreich – eine Fossilwelt in Europa. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; 2010. p. 408–412. ISBN: 978-3-939414-48-3

[19] v Koenigswald W. Paläoklimatische Aussage letztinterglazialer Säugetiere aus der nördlichen Oberrheinebene. In: v Koenigswald W, editor. Paläoklimaforschung 4. Stuttgart: Gustav Fischer; 1988. p. 205–314.

[20] Pfeiffer T. Das Vorkommen von Dama dama in Mitteleuropa im Pleistozän unter besonderer Berücksichtigung der Funde von Neumark-Nord (Sachsen-Anhalt). Zeitschrift für Jagdwissenschaft. 1995;**41**:157-170

[21] Heidemann G. 1973 Zur Biologie des Damwildes (Cervus Dama Linné 1758). Mammalia Depicta. 1973;**9**:1-95

[22] Hansen I-E. Damwildhege. Hoffmann: Mainz; 1988. p. 148

[23] Ueckermann E, Hansen P. Das Damwild. 3rd ed. Paul Parey: Hamburg; 1994. p. 327

[24] Rieck W. Damwildalter-Merkblatt. 3rd ed. Schalenwildausschuß des Deutschen Jagdschutz-Verbandes e.V: Mainz; 1965. p. 7

[25] Pohlmeyer K. Zur vergleichenden Anatomie von Damtier (*Dama dama* L. 1758), Schaf (*Ovis aries* L. 1758) und Ziege (*Capra hircus* L. 1758): Osteologie und postnatale Osteogenese. Berlin: Parey; 1985. p. 287. ISBN: 9783489763161

[26] Bosinski G. Der Neandertaler in seiner Zeit. Archäologie im Ruhrgebiet. 1993;**1**:25-48

[27] Braun A, Pfeiffer T. Cyanobacterial blooms as the cause of a Pleistocene large mammal assemblage. Paleobiology. 2002;**28**:138-153

[28] Pfeiffer-Deml T. Massenfund von Hirschskeletten im pleistozänen Seebecken von Neumark-Nord 1 – ein grausamer Gifttod wird zum Glücksfall für die Paläontologie. In: Meller H, editor. Elefantenreich – eine Fossilwelt in Europa. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; 2010. pp. 405-425. ISBN: 978-3-939414-48-3

[29] Carmichael W. Cyanobacteria secondary metabolites - the cyanotoxins. The Journal of Applied Bacteriology. 1992;**72**:445-459

[30] Carmichael W. Cyanobacterielle Toxine. Spektrum der Wissenschaft. 1994;**3**:70-77

[31] Sivonen K. Preliminary Charcterization of neurotoxic cyanobacteria blooms and strains from Finland. Toxicity Assessment. An International Journal. 1989;**4**:339-352

[32] Park H, Watanabe M, Harada K, Suzuki M, Hayashi H, Okino T. Seasonal variations of Microcystis species and toxic Heptapeptide microcystins in Lake Suwa. Environmental Toxicology and Water Quality: An International Journal. 1993;**8**:425-435

[33] Azevedo S, Carmichael W, Jochimsen E, Rinehart K, Lau S, Shaw G, et al. Human intoxication by microcystins during renal dialysis treatment in Caruaru-Brazil. Toxicology. 2002;**181-182**:441-446

[34] Edwards C, Beattie K, Scrimgeour C, Codd G. Identification of Anatoxin-a in benthic cyanobacteria (blue-green algae) and in associated dog poisonings at loch Insh, Scotland. Toxicon. 1992;**30**(10):1165-1175

[35] Anadotter H, Cronberg G, Lawton L, Hasson H-B, Göthe U. Skulberg O. a large outbreak of gastroenteritis associated with the toxic cyanobacterium Planktothrix agardhii (Oscillatoriales, Cyanophyceae) in Scania, South Sweden. In: Chorus I, editor. Cyanotoxins – Ocurrence, Effects, Controlling Factors. Berlin: Springer; 2001. pp. 200-208

[36] Gussmann H-J, Molzahn J, Bicks B. Poisoning of young cattle by Nodularia spumigena. Monatshefte für Veterinärmedizin. 1985;**40**:76-79

[37] Jakobi C, Rinehart K, Codd G, Carmienke I, Weckesser J. Occurrence of toxic water blooms containing microcystins in a German lake over a three year period. Systematic and Applied Microbiology. 1996;**19**:249-254

[38] Fastner J. First evidence on the occurrence of microcystin-LR in Berlin and Brandenburg lakes. In: Codd G, Jefferies T, Keevil C, Potter E, editors. Detection Methods for Cyanobacterial Toxins. Camebridge: The Royal Society of Chemistry; 1994. pp. 149-151

[39] Hennig M, Kohl J-G. Toxic blue-green algae water blooms found in some lakes in the German Democratic Republic. Internationale Revue der Gesellschaft für Hydrobiologie. 1981;**66**: 553-561

[40] Francis G. Poisonous Australian lake. Nature. 1878;**18**:11-12

[41] Nehring S. Mortality of dogs associated with a mass development of Nodularia spumigena (Cyanophyceae) in a brackish lake at the German North Sea coast. Journal of Plankton Research. 1993;**15**(7):876-872

[42] v Koenigswald W, Braun A, Pfeiffer T. Cyanobacteria and seasonal death: A new taphonomic model for the Eocene Messel lake. Paläontologische Zeitschrift. 2004;**78**:345-352

Section 3

Intangible Heritage

Thanking in Cameroon French

Bernard Mulo Farenkia

Abstract

This chapter discusses aspects of Cameroon French pragmatics, with focus on gratitude expressions. The chapter presents the taxonomy of patterns employed by Cameroon French speakers to express their gratitude to friends, strangers, and superiors/professors. Cameroon French speakers are found to express their gratitude directly or indirectly using a wide range of linguistic and pragmatic strategies, and the expressions employed mostly occur in speech act sets, which generally involve combinations of direct and indirect gratitude expressions and supportive acts. The results also reveal the use of nominal address terms to modify the illocutionary force of gratitude expressions. Overall, the linguistic and pragmatic choices made by Cameroon French speakers vary according to degree of familiarity and power distance between the interlocutors. The study adds to a growing body of research on Cameroon French pragmatics.

Keywords: Cameroon French, postcolonial pragmatics, expression of gratitude, politeness, variation

1. Introduction

Cameroon French has been the focus of many studies, and the research carried out so far has mainly explored phonetical, phonological, morphological, syntactic, lexical, and semantic features. In recent years, the scope of research on Cameroon French has been expanded considerably, with scholars also giving more attention to pragmatic and discursive aspects of this postcolonial variety of French. The topics examined so far include address terms [1], speech acts (e.g., compliments and compliment responses [2], greetings [3], invitations and expressions of sympathy [4]), politeness strategies [5], discourse markers [6], etc.

The present study focuses on the analysis of pragmatic and linguistic choices made by Cameroon French speakers when expressing gratitude in three different situations. The speech act of giving thanks has been studied in many different languages and mostly within the framework of speech act and politeness theories. While there is an abundant literature on thanks in languages such as English, French, German, Spanish, Arabic, etc., there is a need to look at the impact of region on the realization of thanks in different regional varieties of the same language. With respect to French, the studies currently available mainly focus on the variety spoken in France. This paper is an attempt to extend the scope of research on thanks in French by examining the ways in which Cameroon French speakers express their gratitude in different situations. The study is based on data collected by means of a discourse completion task questionnaire that was administered to two

groups of university students[1]. This paper is structured as follows. After this intro-
duction, the next section presents the theoretical framework of the study. Section 3
reports on the methodology employed. The findings of the study are presented and
discussed in Section 4. Section 5 summarizes the main outcomes of the study and
evokes some avenues for future research.

2. Theoretical framework

2.1 The communicative act of thanking

Thanking is generally described as an expressive speech act, i.e., its illocution-
ary force is the expression of a psychological state about the speaker or the world.
This speech act is produced in face-to-face situations or in written form when the
speaker feels indebted to the addressee for a favor or help done in the past. The
communicative act of thanking can also be performed as a reaction to compliments,
offers, invitations, greetings, good wishes, etc. Thanks can also function as a closing
signal in conversations or transactions in service encounters.

In research on the speech act of thanking in and across languages and cultures,
it has been shown that giving thanks may occur in a single speech act (e.g., *thanks,
thank you, that is kind of you* in English; *merci, je vous remercie, c'est très gentil*, in
French; *danke, vielen Dank, ich danke Ihnen* in German; etc.). Gratitude expressions
may also appear in combinations of several acts or speech act sets. In such cases,
speakers may combine/repeat two or more expressions of gratitude or combine
expressions of gratitude with other speech acts. For instance, in the data used for
the present study, the communicative act of thanking is realized in some cases by
combining greetings with thanks (*Bonjour monsieur, je vous remercie pour votre aide*
"Good morning sir. I thank you for your help") or thanks with familiarization acts
(*Oh! Merci beaucoup de ton aide! Moi c'est Sonia et toi?* "Oh, thanks very much for
your help. I am Sonia and you?"). Given the complexity of many examples provided
by the participants, it would be more appropriate to consider thanking as a speech
act set or a communicative act made up of several acts (cf. [7]). It is also interest-
ing to note that the choice of single or complex realization patterns depends on a
number of factors, including social distance (degree of familiarity between the
interlocutors), power distance (social or institutional status of the interlocutors),
the magnitude of the benevolent act carried out, and politeness considerations in
the social context where the interaction is taking place. As Siebold ([8], p. 158) put
it: "the greater the imposition there is on the giver, the more polite gratitude forms
will be used".[2]

2.2 Thanking, face, and politeness

The present study is based on Brown and Levinson's [9] theory of politeness,
which uses the central concept of face of Goffman. Within this framework, there
are two opposing views on thanks. The first view describes thanks as a face-flatter-
ing act, whereby giving thanks is considered as a communicative act that recognizes
the effort of the interlocutor and enhances his/her negative face. A gratitude
expression is viewed as a means employed to establish and maintain a harmonious
social atmosphere between the speaker and the hearer. In other words, the speech

---

[1] See Section 4.1. for more explanation regarding the benefits of using this data collection instrument.

[2] The understanding here is that polite forms will consist of combinations of many different strategies,
thus rendering the thanks more complex.

act of thanking has a "convivial function" ([10], p. 83). Overall, a gratitude expression can be defined as a

> *"recognition of something which has already happened in [the speaker's] favor. In this situation, the thanks acts as a kind of reward for the action carried out by the hearer [...]. The speaker doing the thanking appreciates the efforts of the hearer, who has previously to some extent forfeited his own freedom of action through this act. In this way, the expression of thanks serves to recognize the personal restriction experienced by the hearer for the benefit of the speaker, thus safeguarding and protecting his negative face" ([8], p. 157).*

On the other hand, giving thanks is viewed as a face-threatening act. Brown and Levinson [9], for instance, describe thanks as a threat to the speaker's negative face, as the latter "accepts a debt [and] humbles his own face." The self-humiliation is due to the fact that s/he who expresses his or her gratitude is "to some degree subordinated to the hearer as a result of accepting the benevolent act in [his/her] favor and is at times in conflict with [his/her] positive face." Eisenstein and Bodman [11] also classify thanking as a face-threatening act: they are of the opinion that the speaker threatens his/her own negative face by acknowledging a debt to the hearer (p. 65).

Overall, it is safe to view thanks as a multidirectional communicative activity, with respect to face concerns. Thanks can flatter the positive image of the hearer, since the gratitude expression presents the hearer (the thankee) as someone who has done something beneficial to the speaker (the thanker). In this case, the thanks is an attempt to satisfy the hearer's need to be approved of. Thanks can also be considered as an enhancing strategy directed toward the negative face of the hearer as it is employed to recognize the efforts of the hearer [8]. Thanks can also enhance the positive face of the speaker by presenting him/her as someone who recognizes the efforts of others and acknowledges benevolent actions. By expressing his/her gratitude, the speaker emerges as someone who knows how to satisfy the desire of the hearer. At the same time, thanks can threaten the positive face of the speaker because s/he subordinates himself/herself to the hearer. Finally, thanks can threaten the negative face of the speaker, since s/he admits having an obligation to the hearer.

2.3 Literature review

The speech act of thanking has been extensively examined in many languages and from many different perspectives. Many studies have dealt with gratitude expressions and responses to thanks in languages such as Akan [12], German [13], English [11, 14], and Cameroon English ([15], p. 548).[3] Studies from a cross-cultural or contrastive pragmatics perspective compare French and Italian [17], German and Spanish [18], German and Iraqi Arabic [19], French and Romanian [20], etc., gratitude expressions with Jordan and England [21]. Comparative studies focusing on regional varieties of English include Jautz's [22] analysis of gratitude expressions in British and New Zealand English radio programs and Elwood's [23] examination of gratitude expressions in Irish English and New Zealand English.

As far as French is concerned, the studies currently available mostly analyze the speech act of thanking alongside other speech acts. For instance, Kerbrat-Orecchioni [24] examines apologies, thanks, and responses to both acts in the same chapter of her book on speech acts in discourse. She classifies thanks expressions in many subcategories. She distinguishes between direct thanks, i.e., those using either the performative utterance "je te/vous remercie" or the elliptical "merci"

---

[3] Also see Gesuato [16].

([25], p. 129) and indirect thanks, i.e., those occurring in the form of different speech acts. She identifies the following types of indirect thanks:

a. expressions that focus on the thanker (the beneficiary of the benevolent act): expressions of a specific feeling (gratitude, pleasure, joy) such as *"Je vous suis reconnaissant"* and *"je suis ravi/touché."*

b. expressions that focus on the thankee (the author of the benevolent act): appreciations of the addressee such as *"c'est très gentil à vous"* and *"vous êtes bien amiable."*

c. expressions indicating that there is/was no need to grant the favor: *"Il ne fallait"* and *"tu n'aurais pas dû."*

d. expressions that focus on the benevolent act: appreciations of the act such as *"C'est superbe"* and *"c'est trop beau."* ([24], p. 129–130).

A number of studies have been carried out in the past on gratitude expressions and responses to thanks in Cameroonian contexts. Investigations on the speech act of thanking include Dnzoutchep Nguewo's [25] comparative study of gratitude expressions in German and some languages spoken in the western region of Cameroon. The author illustrates the complex structure of the speech act of thanking, which he describes as a communicative act made up of several other speech acts, and supported by compliments, good wishes, address terms, etc. The complexity of gratitude expressions in the Cameroonian languages examined is viewed by the author as a reflection of sociocultural norms of many ethnic groups in the western region of Cameroon. Another investigation of the author yielded similar results (cf. [26]). Another analysis of thanking in Cameroonian context is Anchimbe's [27] study of thanking in written political discourse called "motions of support." These are letters read on the radio or TV or published in newspapers, addressed to the president thanking him for a political favor or action deemed beneficial to the group writing the motion. The study shows that thanking in "motions of support" appears as a communicative act made up of several other speech acts (cf. [27], p. 240). Also interesting is the conclusion that "the sociocultural interactional norms of indigenous Cameroonian cultures could be said to have influenced the structure and content of [Motions of Support] through their decorum and the extensive use of linguistic oratory in traditional hereditary systems" ([27], p. 240–241).

The goal of the present study is to contribute to a better understanding of Cameroon French speakers' patterns in giving thanks. The approach used here operates on the premises of postcolonial pragmatics (cf. [27]), which takes into account the complex, multilingual, multiethnic, and multicultural postcolonial nature of the Cameroonian society, and thus considers giving thanks in Cameroon French (an ex-colonial language in a postcolonial space) as a postcolonial pragmatic behavior. Using this framework, the analysis reveals traces of indigenous cultural and communication patterns in the communicative act of giving thanks in Cameroon French. This impact could be noted in the use of nominal address terms by Cameroon French speakers as markers of group culture and in-group identity, on the one hand, and as expressions of deference and respect in formal situations, on the other hand. Also interesting here is the complexity of thanks utterances, which seems to be a reflection of indigenous sociocultural norms (see Section 5).

3. Method

3.1 Procedure and informants

The data for the study were collected in Yaoundé and Douala, Cameroon, by means of a discourse completion task questionnaire (see [28]) consisting of several situations in which the participants had to realize a number of different speech acts in short dialogs. Each scenario comprised a brief description of the setting, i.e., "the general circumstances [...] and the relevant situational parameters concerning social dominance, social distance, and degree of imposition" ([22], p. 43).

Recordings of spontaneous or naturally occurring conversations could have been the ideal data for a study like this. Getting such data is, however, difficult: apart from the time-consuming nature of such recordings, a large quantity of the data obtained may contain a very small number of gratitude expressions. It may also be difficult to examine the impact of factors such as social status, social distance, types of gratitude expressions, etc., because these variables are difficult and even impossible to control in spontaneous conversations (cf. [29, 30], p. 35–37). The discourse completion task (DCT) questionnaire is one of the most widely used data collection instruments in pragmatic research. Established in the CCSARP [28], this instrument has the greatest advantage of producing a large number of data in a short time and it helps to account for variation in speech act realization influenced by social and contextual variables. While such data may not always be natural, they at least help to "inform about speakers' pragmalinguistic knowledge of the strategies and linguistic forms by which communicative acts can be implemented and about their sociopragmatic knowledge of the context factors under which strategic and linguistic choices are appropriate" ([31], p. 329). The three scenarios used to elicit thanks, the focus of the present study, were described as follows:

1. Situation 1 (friend): *Vous déjeunez avec votre ami(e) dans un restaurant du coin. Au moment de payer l'addition, vous constatez que vous n'avez pas votre porte-monnaie sur vous. Vous l'avez certainement oublié à la maison. Votre ami(e) paie pour vous. Qu'est-ce que vous lui dites?* "You are having lunch with a friend in a restaurant. When you are about to settle the bill you realize that you left your wallet at home. Your friend pays for your lunch. What do you say to him/her?"

2. Situation 2 (stranger): *En allant en classe, vous laissez tomber accidentellement vos documents et notes de cours, lesquels s'éparpillent dans le couloir encombré. Un(e) étudiant(e) inconnu(e) vous aide à ramasser vos documents. Qu'est-ce que vous lui dites?* "On your way to class, you accidentally drop your notes and a student you do not know helps you pick them. What do you say to him/her?"

3. Situation 3 (professor): *Votre professeur(e) vous accorde quelques jours supplémentaires pour la remise de votre travail de recherche. Lorsque vous lui remettez le travail en question que lui dites-vous?* "Your professor grants you an extension to submit a term paper. When you turn in the paper, what do you say to him/her?"

In situation 1 (friend), the speaker, i.e., the person thanking for the favor (the thanker), and the addressee, the person being thanked for the favor (the thankee), are close friends and equal in social status. In situation 2 (stranger), the speaker and the addressee do not know each other. The relationship here is one of total social distance. Situation 3 (professor) illustrates an asymmetrical interaction: the

addressee has a higher power position (professor) than the speaker (student) and they know each other as acquaintances. The respondents were asked to write down what they would say in order to express their gratitude in the three situations.

A group of 148 French-speaking Cameroonian students participated in the study: 104 students at the University of Douala and 44 students at the University of Yaoundé I. Of the 148 respondents, 100 (67.6%) were females and 48 (32.4%) were males. They ranged in age from 18 to 30; however, 105 (70.9%) of the respondents were between 20 and 25 years old. The respondents were speakers of French in a multilingual context where two official languages (French and English) are permanently in contact with more than 250 native languages. All the participants indicated that they acquired French through school education and that they have been speaking French for more than 15 years. With regard to the questions of the main language used at home, 118 (79.7%) use indigenous languages and 41 (27.7%) use French. Concerning the main language used with friends: 144 (97.3%) use French, 11 (7.4%) use Camfranglais, 8 (5.4%) use English, 3 (2%), and 3 (2%) use German. The complex sociolinguistic and cultural background and language choices of the participants certainly also play an important role in the choice of strategies when expressing gratitude in French[4].

3.2 Data analysis

The participants provided 411 answers for the three questionnaire tasks, namely 139 examples in situation 1, 137 examples in situation 2, and 135 examples in situation 3[5]. The analysis of the examples collected involved both quantitative and qualitative aspects. Some of the utterances provided consist of only one move/act as in *merci, c'est gentil, je suis recnnaissant*. Each of such utterances is a communicative unit that realizes thanks independently of any other unit of a conversational turn: they are "head acts."

Other examples in the corpus consist of two moves as in (1) or more than two moves as in (2) and (3). In (1), the speaker combines a direct gratitude expression, namely *merci beaucoup*, with an indirect gratitude expression, namely an appreciation of the addressee (*c'est gentil de ta part*). Each of these strategies could be used alone to express gratitude. The example (2) consists of three moves: two direct thanks, namely *merci* and *je ne sais comment vous remercier*, and an invitation act ("*Ça vous dirait de prendre un verre ensemble?*"), which serves here as a supportive move. In (3), the speaker employs a more complex structure and does three things: (a) he uses a familiarization act to introduce himself (the speaker says who he is and why he has come to see the professor), (b) he produces an utterance presenting the paper to the professor, and (c) he expresses his gratitude for the favor. Of these three acts, only the last one could be employed alone to realize the speech act of thanking.

---

[4] It is worth mentioning that English and French, the two official languages, are the sole medium of education, while the indigenous languages, Pidgin English and camfranglais are used in nonofficial domains. All the participants in this study acquired French in education settings (starting in elementary school) and they were university students. The analysis did not pay attention to the impact of French proficiency level on the use of gratitude expressions.

[5] This number (instead of 444 examples) is due to the fact all the respondents did not do all the questionnaire tasks.

1. *Merci beaucoup! C'est gentil de ta part!* (friend[6])
   "Thanks very much. That's kind of you."

2. *Merci, je ne sais comment vous remercier. Ça vous dirait de prendre un verre ensemble?* (stranger)
   "Thanks, I don't know how to thank you. Do you mind having a drink with me?"

3. *Monsieur je suis l'étudiant à qui vous avez accordé un autre délai pour la remise du travail, voici le rapport et je vous remercie pour votre compréhension* (professor)
   "Sir, I am the student whom you granted an extension to submit the paper. Here is the paper and I thank you for your understanding."

Due to the complexity of some thanks utterances in the data, the first step of the analysis was to segment each of the examples collected in individual acts and to classify each of them as a head act (i.e., a gratitude expression proper) or as a supportive act. The next step was to examine types of gratitude expressions attested in the data, namely direct gratitude expressions and indirect gratitude expressions, with emphasis on their pragmatic functions and distributions. The last step focused on the analysis of types, pragmatic functions, and situational distributions of supportive acts in the corpus. The next section presents the results of the analysis.

4. Results and discussion

4.1 Overall use of strategies

Table 1 shows the distribution of the three main strategies used to construct thanks utterances in the data. Overall, the participants produce 754 occurrences in the corpus. Direct expressions of gratitude are by far the most frequently employed in the examples, and they represent 407 occurrences and account for 54% of the data. There are 267 instances of indirect expressions of gratitude, which represent 35.4% of all examples and 80 tokens of supportive acts (10.6%). **Table 1** also indicates that while direct gratitude expressions are most preferred in the professor situation, indirect gratitude expressions mostly appear in the friend situation. We also see that the respondents mostly prefer supportive acts in the friend situation.

	Friend	**Stranger**	**Professor**	**Total**
Direct expressions of gratitude	123 (43%)	138 (59%)	146 (62%)	407 (54%)
Indirect expressions of gratitude	128 (45%)	73 (31.2%)	66 (28%)	267 (35.4%)
Supportive acts	34 (12%)	23 (9.8%)	23 (10%)	80 (10.6%)
Total	285 (100%)	234 (100%)	235 (100%)	754 (100%)

Table 1.
Overall distribution of strategies.

---

[6] The examples from the data are coded as follows: friend for "thanks in the friend situation," stranger for "thanks in the stranger situation," and professor for "thanks in the professor situation."

4.2 Complexity/length of expressions of gratitude

The analysis of the complexity of the thanks utterances in the corpus reveals that the participants employ simple thanks as well as complex thanks. Simple expressions of gratitude consist of one act/move as in *merci beaucoup* "thank you very much" or *c'est très gentil (de ta part)* "that's very kind of you." As can be seen in **Table 2**, the respondents most frequently use complex gratitude expressions, i.e., those made up of several acts/moves as in (1), (2), and (3). In (1), the second gratitude expression (*C'est gentil de ta part*) is intended to intensify the illocutionary force of the first one (*Merci beaucoup*). Example (2) consists of three moves. The first two acts "*Merci" and "je ne sais comment vous remercier*" are used to express the speaker's gratitude, while the third move "*Ça vous dirait de prendre un verre ensemble?*" serves to intensify the two preceding gratitude expressions. In (3), the speaker expresses his gratitude using a combination of three moves: a familiarization act (*Monsieur je suis l'étudiant à qui vous avez accordé un autre délai pour la remise du travail*), a presentation of the work (*voici le rapport*), and an expression of gratitude (*je vous remercie pour votre compréhension*). ([24], p. 131) argues that combinations of several moves in the expression of gratitude appear to be more polite than simple thanks.

The analysis also reveals that the distribution of simple and complex gratitude expressions varies across the three situations. Of the 111 simple expressions identified in the data, there are 47 tokens in the professor situation, 47 in the stranger situation, and only 17 in the friend situation. Complex gratitude expressions are more commonly employed in the friend situation. However, it is worth mentioning that complex utterances are generally much longer in the professor situation than in the other two situations: they are employed in order to emphasize the speaker's sincerity in expressing gratitude to a superior.

The next section focuses on the realization patterns and distribution of the direct thanks, indirect thanks, and supportive acts found in the data.

4.3 Direct expressions of gratitude

Direct expressions of gratitude occur in the data in many different ways. In most cases, the respondents use the word *merci* "Thanks," which in some cases is accompanied by modifiers such as adverbs (*merci beaucoup* "thanks a lot"), address terms (*merci mon frère* "thanks my brother"), adjectives (*grand merci* "big thank you"), interjections (*oh merci* "oh thanks"), or combinations of many intensifiers (*merci beaucoup professeur* "thank you very much professor").

Another direct strategy consists in expressing gratitude and stating the beneficial action at the same time. This type appears in the form of *merci de/pour + NP* (*Merci beaucoup pour/de votre aide* "thanks very much for your help," *Une fois de plus merci pour votre indulgence* "once again thank you for your indulgence"), and *merci de VP* (*Merci mon ami d'avoir payé la note* "thanks my friend for having paid my bill").

	Friend	Stranger	Professor	Total
Simple expressions of gratitude	17 (12.2%)	47 (34.3%)	47 (34.8%)	111 (27%)
Complex expressions of gratitude	122 (87.8%)	90 (65.7%)	88 (65.2%)	300 (73%)
Total	139 (100%)	137 (100%)	135 (100%)	411 (100%)

Table 2.
Distribution of simple and complex expressions of gratitude.

A third direct strategy found in the data is the performative utterance *je te/ vous remercie* "I thank you," which may be modified in many different ways. Some respondents use adverbs and address terms to upgrade the illocutionary force of the performative utterance, as in *professeur je vous remercie sincèrement* "Professor I sincerely thank you"; *je te remercie beaucoup mon ami* "I thank you very much my friend." In other examples, the performative utterance is followed by a statement of the favor/beneficial action as in *je vous remercie infiniment pour la faveur que vous m'avez accordée* "I thank you very much for the favor you have given me" and *je te remercie beaucoup d'avoir payé* "I thank you very much for having settled the bill".

Also attested are examples in which the participants indicate their inability to express their gratitude as in *monsieur je ne sais pas comment vous remercier pour votre générosité* "Sir, I do not know how to thank you for your generosity." Some participants indicate lack of words to articulate their gratitude as in *Les mots me manquent pour exprimer ma gratitude pour cette faveur* "I lack word to express my gratitude for this favor" and *Je ne saurais vous remercier autant* "I can't thank you enough." Also attested are expressions of long term/permanent gratitude/indebtedness as in *je ne cesserai de vous dire merci* "I won't stop thanking you."

The data also consist of examples in which the participants state their desire to express their gratitude as in *Professeur, je tiens/tenais à vous remercier de m'avoir accordé un autre délai* "Professor, I want(ed) to thank you for giving me another deadline"; *Monsieur, je voudrais bien vous remercier pour ce vous m'avez fait*. The following examples were also found in the data: *Je n'ai qu'une chose à vous dire merci et mille fois merci* "I have only one thing to tell you thanks and thousand thanks"; *je te dis merci* "I say thanks."

Overall, the performative utterances and their variants are intended to maximize the expression of sincerity in the gratitude expressed and to maximize its acceptance by the interlocutor, and these direct strategies mostly appear in the professor situation (see **Table 2**). It is worth mentioning that direct thanks appear in the data either alone or in combination with indirect thanks and/or supportive acts, as in (4–6).

4. *Merci mon ami d'avoir payé. Prochainement c'est moi qui paye* (friend)
    "Thanks my friend for paying. Next time I will foot the bill."

5. *Je vous remercie beaucoup pour votre aide. Je ne sais pas ce que j'aurais fait sans vous. Encore merci!* (stranger)
    "I thank you so much for your help. I do not know what I could have done without you. Thanks again."

6. *Professeur, je tiens à vous remercier de m'avoir accordé un autre délai. Grâce à cela, j'ai pu réaliser mon rapport de recherche. Une fois de plus merci monsieur* (professor)
    "Professor, I would like to thank you for giving me an extension. Thanks to this, I was able to complete my research report. Once again thank you sir."

The frequencies and situation distribution of direct thanks strategies are summarized in **Table 3**.

Table 3 shows that the participants most frequently use the word *merci* accompanied by various types of modification devices (adverbs, address terms, interjections, etc.) to realize direct thanks. This strategy appears in 223 (54.8%) instances of the 407 tokens of direct thanks, and it is mostly employed by the respondents

	Friend	Stranger	Professor	Total
Merci	33	28	2	63 (15.5%)
Merci + adverbs/address terms/adjectives, interjections, etc.	72	75	76	223 (54.8%)
Merci de/pour + NP/VP	10	20	19	49 (12%)
Je te/vous remercie and variants	8	15	49	72 (17.7%)
Total	123	138	146	407 (100%)

Table 3.
Distribution of direct expressions of gratitude.

in both the professor and the stranger situations with fairly equal distribution (76 tokens, i.e., 34%) in the professor situation and 75 examples, i.e., 33.6% in the stranger situation. The frequency of this strategy is a bit lower in the friend situation (72 tokens, i.e., 32.4%).

The second most common direct strategy is the use of performative utterances. This strategy represents 72 (17.7%) tokens of all direct thanks. With respect to situational distribution, **Table 3** indicates that this strategy mostly occurs in the professor situation (49 tokens of 72 attested occurrences, i.e., 68%). The high number of such expressions in this situation may be due to the level of formality and the weight of the favor granted by the superior.

The third strategy is the use of the word *merci* alone. It represents 63 (15.5%) instances of all direct thanks. It appears mostly in the friend (33 tokens) and the stranger (28 tokens) situations. The very low number of *merci* in the professor situation (only two examples) is probably due to the fact that this simple form would appear to be very impolite in an asymmetrical situation, where the student has received a huge (unmerited) favor from their professor. In other words, a simple thanks would not be sufficient to express the debt of gratitude of the speaker. As can be seen in **Table 3**, the low number of *merci* is compensated by a very high frequency of *merci* with intensifiers and a very high frequency of performative utterances.

The fourth strategy is the use of the word *merci* followed by statements of the favor. It appears in 49 (12%) instances of all direct thanks and is mostly employed in the stranger (20 tokens) and the professor (19 instances) situations. After discussing types of direct thanks, let us now turn to the strategies employed to express gratitude indirectly.

4.4 Indirect expressions of gratitude

The participants produced 267 tokens of indirect gratitude expressions. As can be seen in **Table 4**, six types of speech acts were used in the data to realize indirect thanks: (a) praising the addressee, (b) promising to compensate, (c) praising the act, (d) expressing indebtedness, (e) expressing wishes, and (f) expressing lack of obligation or necessity for the act. The three most frequent types in the data, namely "praising the addressee," "promising to compensate," and "praising the act," represent more than 70% of all tokens of indirect gratitude expressions.

The results also show that the speech acts employed as indirect gratitude expressions are distributed differently across the three situations. As seen in **Table 4**, the participants used more praises of the addressee in the stranger situation (54 tokens: 63.5%) than in the other two situations (friend (23 tokens: 27%), professor (8 tokens: 9.5%)). The "promising to compensate" strategy only occurs in the

Types of indirect gratitude expressions	Friend	Stranger	Professor	Total
Praising the addressee	23	54	8	85 (31.8%)
Promising to compensate	64	0	0	64 (24%)
Praising the act	28	7	25	58 (22.4%)
Expressing indebtedness	11	4	25	40 (15%)
Expressing wishes	2	5	8	15 (5.6%)
Expressing lack of obligation or necessity	0	3	0	3 (1.2%)
Total	128	73	66	267 (100%)

Table 4.
Types of indirect expressions of gratitude.

friend situation. The third most frequent indirect gratitude expression, "praising the act," is mostly used in the friend (28 instances: 48.3%) and professor situations (24 tokens: 41.4%). In contrast, the fourth type, "expressing indebtedness," is most frequent in the professor situation (25 tokens: 62.5%).

Let us now examine the individual speech acts employed as indirect thanks and describe their pragmatic functions and realization patterns.

4.4.1 Praising the addressee

This strategy serves to return the favor to the addressee by indicating that s/he has done something good. By employing this strategy, the speaker does two things simultaneously: s/he expresses his/her gratitude for the favor and highlights attributes such as kindness, generosity, indulgence, etc., as the driving force of the addressee's action. In this sense, this type of indirect thanks is a positive politeness strategy and it is employed to notice and approve the addressee's remarkable character (cf. [10], p. 103).

The examples attested show that the respondents mostly employ constructions like: *c'est (vraiment) gentil (de ta/votre part/à vous)* "that's (very) kind of you," *tu es vraiment gentile* "you are really nice," (C'est) *très amiable de votre part* "that is very kind of you," *c'est vraiment sympa* "that's really nice," *vous êtres vraiment serviable* "you are really helpful," *quelle gentillesse* "how nice," etc. Generally, praises of the addressee are associated with other indirect gratitude expressions as in (7) and/or with direct gratitude expressions as in (8) and (9). Some of the praises focus on the physical appearance of the addressee as in (10).

7. *Ce fut gentil de votre part et j'en suis vraiment reconnaissant* (professor)
   "That was kind of you and I'm really grateful."

8. *Merci de votre geste. Ce fut très gentil de votre part* (stranger)
   "Thanks for your gesture. That was very kind of you."

9. *Merci beaucoup, les gens comme toi on les compte du bout des doigts* (stranger)
   "Thanks very much, people like you are very rare."

10. *Merci de m'avoir aidé à ramasser mes documents. Je ne savais pas qu'une jolie fille comme vous pouvait m'aider jusqu'à ramasser mes feuilles pour me remettre* (stranger)
    "Thanks for helping to pick up the documents. I did not know that a pretty lady like you could help me pick my papers."

4.4.2 Promising to compensate

The speaker promises to reimburse what the addressee has spent for them. This type occurs only in the friend situation. This result is due to the nature of the situation. The addressee had spent some money to pay for a friend's lunch. Despite the friendship, the addressee was not obliged/did not expect to spend his/her money in that manner and the friend did not have the right to oblige him/her to do so. Consequently, the speaker deems it appropriate to thank the friend for the kind gesture and to return the favor by reimbursing the money spent for him/her. This type of indirect thanks could be interpreted as a politeness strategy with two functions: it helps to save the face of the person who benefited from the favor granted and to restore balance/cohesion/harmony in the relationship.

This strategy appears in two realization patterns. The first pattern consists in promising to refund the money spent by the friend. In this case, the respondents mostly use constructions like: *je te rembourserai* "I will reimburse you," *je te rembourse très prochainement* "I will reimburse very soon," *je te rendrai la somme que tu as payée pour moi* "I will refund you the amount you spent for me," *Une fois à la maison je te restituerai l'argent* "Once we get home I will pay you back the money," etc. The second pattern consists in promising to settle the bill next time. In this case, the participants employ constructions like: *C'est moi qui vais payer prochainement* "I am the one to settle the bill next time," *la prochaine fois tu mangeras à mes frais* "the next time you will eat at my expense/next time I will settle the bill," etc. Another construction employed to promise repayment is *je te revaudrai ça un jour* "I will repay you someday." It is less used than the other structures. Also attested are the constructions *ça va gérer* and *on va gérér* that are also employed as promises to reimburse the money spent. In most of the examples attested, this strategy is associated with direct gratitude expressions as in (11) and/or comments as in (12).

11. *Merci mon ami d'avoir payé. Prochainement c'est moi qui paye* (friend)
    "Thanks my friend for having paid the bill. Next time it's on me."

12. *Ah, c'est tellement gênant j'ai honte. Je te promets samedi on déjeune et je paie la note OK?* (friend)
    "Oh, it's really embarrassing I am ashamed. I promise you that we will have lunch on Saturday and I will settle the bill, right."

4.4.3 Praising the act

Contrary to praises of the addressee, the praises in question in this section are made to express gratitude while highlighting the value of the beneficial action. While praises of the addressee are explicit face-flattering strategies, positive comments on the beneficial action could be considered as implicit face-enhancing strategies. Praises of the favor appear in two different patterns. The first pattern consists in simply describing the act as good helpful, kind, great, immense, etc., as in (13) (*Vous m'avez rendu un grand service*). The second pattern consists in explicitly stressing the outcome of the act. More specifically, the speaker indicates that the addressee's intervention/action/favor really saved the speaker from an embarrassing or humiliating situation as in (14). In (15), the speaker says that the extra time granted by the professor saved them from a disaster. Also attested are examples in which the speaker indicates that s/he really appreciates the action of the addressee, using constructions like *ce geste m'a vraiment marqué me va droit au coeur/me touche* as in (16).

13. *Je vous remercie sincèrement de votre compréhension, vous m'aviez rendu un énorme service* (professor)
    "I sincerely thank you. You did me a great favor."

14. *Merci gars! Si tu n'avais pas été là cela aura été honteux et humiliant pour moi* (friend)
    "Thanks man. If you were not there it would have been embarrassing for me."

15. *Je vous remercie grandement monsieur, sans votre faveur je n'imagine pas le désastre de mon travail* (professor)
    "I sincerely thank you sir, without your favor I can't imagine the disaster I would have been in with my work."

16. *Merci beaucoup! C'est gentil de ta part. Ce geste me va droit au cœur. Que Dieu contribue à la réalisation de tes rêves* (stranger)
    "Thanks very much. That's very kind of you. I really appreciate this gesture. May God make your dreams come true."

4.4.4 Expressing indebtedness

This type is employed to express the speaker's indebtedness toward the addressee. The respondents mostly use the construction *je vous suis reconnaissant* "I am grateful," with variations regarding the intensity/sincerity and time frame of the indebtedness. While adverbs such as *vraiment*, *très*, etc., are used by the participants to express sincerity as in *j'en suis vraiment reconnaissant/je vous suis très reconnaissant* "I am really grateful," adverbs such as *infiniment, toujours, éternellement*, etc., seem to emphasize long-term indebtedness as in *je vous/te serai toujours reconnaissant* "I will always be grateful." Apart from these utterances, the respondents also employ constructions like: *Je te revaudrai ça* "I owe you," *je te dois une fière chandelle* "I owe you," *je te suis redevable* "I owe you," *c'est une dette que j'ai envers vous* "It's a debt I owe you." The analysis also reveals that this strategy is highly recurrent in the professor situation. This could be explained by the nature of the situation and the type of favor granted to the speaker. The professor granted the student's request for extra time to submit an assignment. By choosing the expression of indebtedness, the student intends not only to stress the level of sincerity in gratitude expression but also to reinforce the student-professor relationship. This strategy seems to be vital in such situation as the student does not exclude the possibility of future requests of this nature. Therefore, using such a strategy not only convinces the addressee to accept the thanks. It also builds a solid platform for a harmonious student-professor collaboration.

4.4.5 Expressing wishes

This strategy consists mostly in invoking blessings upon the addressee. The speaker is saying indirectly: "since you have been so kind to me, I wish you well and I invoke God's blessings upon you." The most frequent construction used to pray to God to bless the addressee is *Que Dieu te/vous bénisse!* "May God bless you." This construction is, in some cases, modified by replacing the verb *bénir* "to bless" with *récompneser* "to recompense," *protéger/garder* "to protect," etc., as in *C'est Dieu qui vous récompensera* "God will reward you"; *Dieu vous bénira* "God will bless you"; *Que Dieu vous garde et vous bénisse*. "May God protect and bless you"; *Que Dieu vous protège* "May God protect you." Some informants use more complex structure to wish their interlocutors well as in *Que Dieu contribue à la réalisation de tes rêves* "May

	Friend	Stranger	Professor	Total
Comments	19	1	10	30
Familiarization acts	0	18	2	20
Apologies/regrets	10	1	2	13
Promise to change	5	0	7	12
Offers/invitations	0	2	2	4
Encouragements/advice	0	2	0	2
Total	34	24	23	81

Table 5.
Types of supportive acts and their distribution.

contribute to the realization of your dreams." This type of thanks is always associated with other types, as can be seen in (17).

17. Je vous remercie infiniment que Dieu vous garde et vous bénisse (stranger)

4.4.6 Stressing lack of need/necessity to help

This type of indirect thanks occurs with a very low frequency. It appears three times in the stranger situation where it serves to thank the addressee while reminding him/her that he/she did not have to bother himself/herself as in (18).

18. C'est très gentil de votre part, **mais il ne fallait pas vous gêner** (stranger)
   "That's very kind of you, but you shouldn't have bothered."

As already indicated above, direct and indirect expressions of gratitude are modified by means of supportive acts. The next section presents the types, functions, and distributions of these supportive acts.

4.5 Supportive acts

Supportive acts are different kinds of speech acts, which may come before or after direct and indirect expressions of gratitude. They play various pragmatic roles and serve mostly as external modification devices (softeners). As can be seen in **Table 5**, the participants used many different types of speech acts as supportive acts. Their frequencies and distribution vary across the three situations. There are 81 tokens of supportive acts in the data, 34 occurrences in the friend situation, 24 tokens in the stranger, and 23 instances in the professor situation. The most preferred supportive acts are, in decreasing order, comments (30 tokens), familiarization acts (20), apologies/regrets (12 examples), and promises to change (12 instances).

Comments are used to reinforce direct and indirect thanks. The contents of the comments identified vary from one situation to another. In the friend situation, the speaker attempts to save his/her own face by expressing his/her surprise that s/he could forget his/her wallet as in (19).[7] Some comments serve to reiterate the fact that what happened was accidental and not planned, as in (20).

---

[7] The comments are in bold.

19. *Merci mon ami, je vous rendrai ce geste salutaire,* **je ne comprends pas comment j'ai pu oublier mon porte-monnaie** (friend)
"Thanks my friend, I will repay this kind gesture, I can't understand how I could forget my wallet."

20. *Je te suis profondément reconnaissante.* **Je ne sais pas où j'avais la tête pour oublier de la sorte mon porte-monnaie.** *On pourrait se faire une sortie dans le restaurant de ton choix. Qu'en dis-tu? Et je pourrai payer en guise de remerciement* (friend)
"I am deeply grateful to you. I don't where my head was to forget my wallet. We could go to a restaurant of your choice. What do you say? And I will pay as thank you."

In the professor situation, the comments relate to the quality of the work submitted. In order to reinforce his/her gratitude, the student assures the professor that the extra time granted was wisely used and that s/he believes or hopes the professor will not be disappointed as in (21) and (22).

21. *Monsieur, je vous remercie infiniment et* **je crois qu'après la lecture du travail vous ne serez pas déçu** (professor)
"Sir I thank you so much and I think that you will not be disappointed after reading the work."

22. *Monsieur je vous remercie une fois de plus pour votre compréhension.* **J'espère que mon travail sera à la hauteur de vos attentes** (professor)
"Sir I thank you once more for your understanding. I hope my work will meet your expectations."

The only comment found in the stranger situation serves to emphasize the importance of the help rendered and to reinforce the gratitude expressed. As can be seen in (23), the speaker explicitly says that the document the addressee helped to pick is a very important one. In making this comment, the speaker is indirectly appreciating the addressee and the act.

23. *Merci énormément.* **Ce document que vous veniez de me remettre est très important pour moi** (stranger)
"Thanks a lot. This document you just handed to me is very important to me."

The second most common supportive act is familiarization. It appears in 20 instances in the data, and it mostly occurs in the stranger situation. Familiarization appears in the form of self-introductions as in (24).[8] These acts entail telling the name of the speaker and/or asking the name of the addressee. Familiarization acts also occur in the form of questions whether the interlocutors can meet subsequently as in (25) and farewells as in (26). Overall, familiarization acts are intended to help the interlocutors know each other better and to prepare the ground for future interactions.

24. *Je vous remercie grandement mademoiselle.* **Puis-je connaitre votre nom?** (stranger)
"Thank you very much, miss. Can I know your name?"

---

[8] The familiarization acts are in bold.

25. *Merci bien! Que vous êtes gentils!* **Puis je vous rencontrer après? Ok à toute à l'heure après le cours de 15 heures** (stranger)
    "Thank you very much. How nice you are. Can I meet you later? Ok see you soon after the class a 3 pm."

26. *Merci, merci pour votre aide.* **Je m'appelle "X," et vous? Ravi de vous connaitre et à la prochaine** (stranger)
    "Thanks, thanks for your help. My name is "X" and you? Nice to meet you and see you next time."

The third supportive act found in the data, the apology/regret act, generally appears with direct and indirect gratitude expressions. This supportive move serves to indicate that the speaker is aware of the potential disruption of the favor to the addressee's plan and apologizes for any inconveniences as in (27) and (28)[9].

27. *Monsieur, je vous remercie pour votre compréhension* **et je suis une fois de plus désolé pour le retard** (professor)
    "Sir I thank you for your understanding and once again I am sorry for the delay."

28. *Merci de m'avoir sauvé de cette situation,* **je suis vraiment désolé**, *j'ai complètement oublié le porte-monnaie à la maison. Je te rembourserai* (friend)
    "Thanks for having saved me from this situation. I am very sorry, I completely forgot my wallet at home. I will refund your money."

The fourth supportive act in the data is the promise to change. It appears in the friend and the professor situations. It serves to mitigate the potential negative impact of the help rendered on the speaker's face. More precisely, the promise to change is employed to protect the positive face of the speaker. In the friend situation, the favor was granted because the speaker forgot his/her wallet and was unable to pay for his/her food. In the professor situation, the student was not able to submit his/her assignment on time. In both situations, the speaker is grateful to the request granted but feels guilty of any potential negative impact the favor could have on the addressee's face wants. In order to protect his/her own face, the speaker promises that this will not happen again as can be seen in (29) and (30).

29. *Je vous remercie de m'avoir accordé quelques jours supplémentaires.* **Je m'efforcerai la prochaine fois pour qu'il n'y ait pas de situations embarrassantes pareilles** (professor)
    "I thank you for having granted me a few more days. I will try next time to avoid such embarrassing situations."

30. *Merci bien,* **la prochaine fois je m'assurerai que mon porte-monnaie est bel et bien sur moi** (friend)
    "Thank you very much, next time I will make sure that I have my wallet."

Another supportive act used with thanks is the act of offering or inviting. Of the four tokens found in the data, there are two examples in the stranger situation and two instances in the professor situation. In the professor situation, the speaker invites the professor to a drink as in (31). In the other example, the speaker offers a gift to the addressee as in (30).

---

[9] Apologies are in bold.

31. *Merci infiniment vous êtes vraiment gentil, vous êtes compréhensible.* **En fait ça (ne) va pas finir ainsi, on va quand même couper une gorge!** (professor)
    "Thank you very much you are really nice, you are understandable. Actually it is not going to end this way, let's have a drink together."

32. *Merci monsieur.* **Acceptez ce présent en signe de reconnaissance** (professor)
    "Thank you sir. Accept this gift a token of appreciation."

In the stranger situation, the speaker invites the addressee for lunch as in (33) or for a drink as in (34).

33. *Merci de ton aide.* **Est-ce que je peux t'inviter à déjeuner ce soir afin de te remercier pour ton aimable service?** (stranger)
    "Thank you for your help. Can I invite you to lunch tonight to thank you for kind service."

34. *Merci, je ne sais comment vous remercier.* **Ça vous dirait de prendre un verre ensemble?** (stranger)
    "Thank you, I don't know how to thank you. How about having a drink together?"

The last supportive act is the act of encouragement or advising. The speaker exhorts the addressee to keep up being helpful to people. This act is preceded by a direct gratitude expression, as can be seen in (32).

35. *Merci beaucoup pour votre geste.* **Il faut toujours continuer comme ça car vous ne serez bloqué en aucun jour quelle que soit la situation et cela vous aider aussi dans la société** (stranger)
    "Thank you very much for your gesture. Always continue in the same manner and you will face any difficulty for whatever the situation may be and this will also help you in society."

4.6 Intensification of gratitude expressions

The respondents use many different strategies to intensify their gratitude expressions. The analysis reveals that direct thanks are the most frequently intensified in the corpus. Our analysis focused on three types of intensification. The first type consists in the use of lexical intensifiers such as adverbs and nominal address terms in direct gratitude expressions. **Table 6** summarizes the distribution of the lexical intensifiers across the three situations.

The second type of intensification consists in mentioning the object of gratitude. **Table 7** presents the distribution of this type in the data.

The third type of intensification consists in the combination of different types of gratitude expressions. The most common patterns found in the data involve the combinations of direct gratitude expressions and indirect gratitude expressions. The most preferred combinations in the friend situation are, in decreasing order, *merci + promise to reimburse* (41 examples), *merci/je te remercie + praising the act* (27 tokens), and *merci + praising the addressee* (9 instances). The most frequent combinations in the stranger situation are *merci/je vous remercie + praising the addressee* (46 tokens) and *merci/je vous remercie + praising the act* (7 examples). The predominant combination in the professor situation is *merci/je vous remercie + appreciation of the act* (19 examples). The other combinations are very diverse.

	Friend	Stranger	Professor	Total
Merci/je te/vous remercie beaucoup	28	45	12	85
Merci bien	7	6	1	14
Merci/je te/vous remercie infiniment	7	2	8	17
Grand merci	3	4	3	10
Mille fois merci	2	2	1	5
Merci encore	2	0	1	3
Vraiment merci/je vous remercie vraiment	2	2	5	9
Merci/je/te vous remercie franchement/énormément/ grandement/(très) sincèrement	4	4	5	13
Une fois de plus	0	0	6	6
Cordialement	0	0	1	1
Du fond du cœur	0	0	1	1
Merci/je te/vous remercie + address term/address term + merci	18	8	43	69
Total	73	73	87	233

Table 6.
Distribution of lexical intensification devices (adverbs and address terms) across the three situations.

	Friend	Stranger	Professor	Total
Merci de/pour + NP/VP	10	20	19	49
Je te/vous remercie de/pour + NP/VP	1	4	37	42
Total	11	24	56	91

Table 7.
Mentioning the object of gratitude across the three situations.

Nominal address terms	Friend (n = 20)	Stranger (n = 11)	Professor (n = 99)	Total
Mon ami/pote	7	0	0	7
Gars	6	3	0	9
(Cher) Camarade	1	3	0	4
Mon frère	1	2	0	3
L'ami	1	0	0	1
Cher ami/chère amie	1	1	0	2
(Cher) First name	3	0	0	3
Monsieur	0	0	99	99
Mademoiselle	0	1	0	1
Grand	0	1	0	1
Total	20	11	99	130

Table 8.
Distribution of nominal address terms.

4.7 The use of nominal address terms

The analysis also reveals that a number of nominal address terms were employed in the thanks utterances. The pragmatic functions of such terms are to signal and draw attention to existing as well as intended relationships between the speaker and the hearer and to upgrade the illocutionary value of the thanks utterances. As can be seen in **Table 8**, the participants employed 130 instances of nominal forms of address and the vast majority of these terms appear in the professor situation. The nominal forms of address attested in the friend and the stranger situations consist mainly of kinship and solidarity terms: their pragmatic role is to express closeness and solidarity to the interlocutors (friends and strangers). The terms used in the professor situation express respect and deference. In the three situations, the nominal address terms contribute, as already indicated, in enhancing the relational value of the gratitude expressions in which they occur.

5. Discussion and conclusion

The aim of this study was to examine some pragmatic aspects of Cameroon French, focusing on expressions of gratitude. Using data provided by a group of University students, the analysis reveals the use of a wide range of strategies to express gratitude in situations involving close friends, strangers, and professors.

Overall, factors such as the weight of the favor granted/received, level of familiarity between the speaker and the hearer, and power distance between the interaction partners played an important role in the choices and combinations of thanks strategies. As far as the complexity of the utterances is concerned, the informants mostly used complex gratitude expressions. The complexity of the utterances is due to the fact that the proper gratitude expressions are either repeated or combined with a number of other speech acts with various pragmatic functions (familiarization, comments, apologies, encouragements, etc.). Such complexity helps the speakers to give thanks while performing other face-saving and/or face-enhancing activities. The results show, for instance, that the familiarization act is mostly employed with strangers. This choice is due to the fact that familiarization is "important in multilingual and multiethnic postcolonial communities because of multiple identities people construct around their languages, cultures, religions, and social groups. Through familiarization, interlocutors quickly know the identity to adopt that fits the context of interaction and the status of their addressees" ([32], p. 58).

With respect to level of directness, the study has shown that the participants employed direct gratitude expressions as well as indirect gratitude expressions. Far more direct gratitude expressions were registered than indirect gratitude expressions. As far as the realizations of direct thanks are concerned, the results show that the simple form *merci* "thanks" is rather rare in the professor situation. A possible reason for this choice is that this simple pattern is not suitable to reflect the weight/value of the favor granted and the power asymmetry (student-professor) in this formal situation. When *merci* is employed in the professor situation, it is mostly accompanied and reinforced by nominal address terms. Also interesting is the fact that explicit performative patterns such as je vous remercie are most frequently employed in the professor situation. It could be said that the formality of the situation plays an important role in the choice of types of direct gratitude expressions.

With respect to indirect gratitude expressions, the results show that Cameroon French speakers use the "*praising the addressee*" realization pattern much more toward strangers (54 tokens: 63.5%) than with friends (23 tokens: 27%) and professors

(8 tokens: 9.5%). The "promising to compensate" strategy only occurs in the friend situation. The "praising the act" pattern is mostly used in the friend situation (28 instances: 48.3%) and the professor situation (24 tokens: 41.4%). In contrast, the "expressing indebtedness" pattern is most frequent in the professor situation (25 tokens: 62.5%).

The analysis also reveals the use of a number of supportive acts and different types of nominal forms of address that seem to be indicative of some sociocultural norms of interaction in postcolonial contexts. For instance, the collectivist nature of the Cameroonian society that is reflected in the abundant use of nominal address terms in gratitude expressions. Looking at the findings summarized in **Table 8**, we see that most of the terms used in the friend and stranger situations hint at the group-based conceptualization of relationship. Such terms index closeness, affection, in-group belonging, and the pragmatic intent behind their use is to intensify the gratitude expressions. Also noteworthy is the abundant use of honorific terms to index the power imbalance between the speaker (student) and the interlocutor (professor). In a postcolonial context such as Cameroon, such honorifics "mark respect and deference along a continuum of age and social hierarchy" ([32], p. 100). It could be said that in giving thanks to a professor, Cameroon French speakers use honorifics "as a sign of respect for his/her social, professional status, and possibly age" ([32], p. 100). Overall, address terms, a major postcolonial pragmatic component, play a vital role in the intensification of gratitude expressions [33–36].

The study has some limitations. Since it was based on written questionnaire data, it is not sure that the examples provided by the participants would be the same as their choices in naturally occurring situations. Nevertheless, the results obtained here still reflect potential trends of Cameroon French speakers' thanking behavior. Since the research considered only three situations, we cannot make any claim that the results obtained would be generalized to all situations. There is also a need to consider factors such as age, socioeconomic groups, gender, and ethnic group in the analysis of thanks strategies. It is likely that such factors may lead to the use of strategies that differ from those found in the present study. Future studies can expand the scope of the current study by overcoming these limitations.

Acknowledgements

Author details

Bernard Mulo Farenkia
Cape Breton University, Sydney, Nova Scotia, Canada

*Address all correspondence to: bernard_farenkia@cbu.ca

IntechOpen

References

[1] Mulo Farenkia B. Pragmatique de la néologie appellative en situation plurilingue: le cas camerounais. Journal of Pragmatics. 2010;**42**(2):477-500

[2] Mulo Farenkia B. Speech Acts and Politeness in French as a Pluricentric Language. Illustrations from Cameroon and Canada. Münster: LIT Verlag; 2014

[3] Mulo Farenkia B. C'est comment, Mon frère?—Gars, laisse-moi comme ça! Des routines de salutation en français camerounais. Le Français en Afrique. 2008;**23**:69-88

[4] Mulo Farenkia B. Pragmatique de la Compassion et l'invitation en français au Cameroun. Saarbrücken: Éditions universitaires européennes; 2017

[5] Mulo Farenkia B. De la Politesse Linguistique au Cameroun—Linguistic Politeness in Cameroon. Frankfurt am Main: Peter Lang; 2008

[6] Simeu S. Le français parlé au Cameroun: Une Analyse de Quatre Marqueurs Discursifs, là, Par Exemple, ékyé et wéè. Thèse de Doctorat. Université Grenoble Alpes; 2016

[7] Trosborg A. Interlanguage Pragmatics: Requests, Complaints and Apologies. Berlin: Mouton de Gruyter; 1995

[8] Siebold K. Implicit and explicit thanking in Spanish and German. In: de Zarobe R, de Zarobe LR, de Zarobe YR, editors. Speech Acts and Politeness across Languages and Cultures. New York: Peter Lang; 2012. pp. 155-171

[9] Brown P, Levinson S. Politeness: Some Universals in Language Usage. Cambridge: Cambridge University Press; 1987

[10] Leech GN. Principles of Pragmatics. London: Longman; 1983

[11] Eisenstein M, Bodman J. Expressing gratitude in American English. In: Kasper G, Blum-Kulka S, editors. Interlanguage Pragmatics. Oxford: Oxford University Press; 1993. pp. 64-81

[12] Agyekum K. The sociolinguistics of thanking in Akan. Nordic Journal of African Studies. 2010;**19**(2):77-97

[13] Marten-Cleef S. Gefühle ausdrücken. Die Expressiven Sprechakte. Göppingen: Kümmerle Verlag; 1991

[14] Aijmer K. Conversational Routines in English. Convention and Creativity. London. New York: Longman; 1996

[15] Talla S, Ouafeu Y. Thanking responders in Cameroon English. World Englishes. 2009;**28**(4):544-551

[16] Gesuato S. Responding to gratitude in elicited oral interaction. A taxonomy of communicative options. Lingue e Linguaggi. 2016;**19**:197-220

[17] Held G. Verbale Höflichkeit. Studien Zur Linguistischen Theorienbildung Und Empirische Untersuchung Zum Sprachverhalten französischer Und Italienischer Jugendlicher in Bitt-Und Danksituationen. Tübingen: Narr; 1995

[18] Mayor IS. Routineformeln im Spanischen und im Deutschen. In: Eine Pragmalinguistische Kontrastive Analyse. Wien: Praesens Verlag; 2006

[19] Ali Mahdi H. Die Routineformeln im Deutschen und im Irakisch-Arabischen Eine empirische Untersuchung [thesis]. Philipps-University of Marburg; 2010

[20] Radulescu A, Scurtu G. Expression de la relation interpersonnelle de politesse: Divergences de structuration et d'emploi en français et roumain. Information Grammaticale. 2003;**99**:11-12

[21] Al-Khawaldeh NN. Politeness orientation in the linguistic expression of gratitude in Jordan and England: A comparative cross-cultural study [thesis]. University of Bedfordshire; 2014

[22] Jautz S. Gratitude in British and New Zealand radio programmes. Nothing but gushing? In: Schneider KP, Barron A, editors. Variational Pragmatics. A Focus on Regional Varieties in Pluricentric Languages. Amsterdam. Philadelphia: John Benjamins; 2008. pp. 141-178

[23] Elwood K. An analysis of expressions of gratitude in Irish English and New Zealand English. The Cultural Review. 2010;**36**:109-153

[24] Kerbrat-Orecchioni C. Les Actes de Langage Dans le Discours. Paris: Armand Colin; 2005

[25] Dnzoutchep NBD. Dankbarkeitsbekundung in Deutschland Und Kamerun Als Kommunikatives Und Soziokulturelles Phänomen. Frankfurt am Main: Peter Lang; 2006

[26] Dnzoutchep NBD. De la complexité du remerciement en milieu Bamiléké Ouest—Cameroun. In: Mulo Farenkia B, editor. Im/Politesse et Rituels Interactionnels en Contextes Plurilingues et Multiculturels. Situations, Stratégies, Enjeux. Frankfurt am Main: Peter Lang; 2016. pp. 295-310

[27] Anchimbe E. Motions of support' and the communicative act of thanking in political discourse. In: Fetzer A, editor. The Pragmatics of Political Discourse. Explorations across Cultures. Amsterdam: John Benjamins; 2013. pp. 219-242

[28] Blum-Kulka S, House J, Kasper G, editors. Cross-Cultural Pragmatics: Requests and Apologies. Norwood: Ablex Publishing; 1989

[29] Beebe L, Tomoko T, Robin U-W. Pragmatic transfer in ESL refusals. In: Robin S, Elaine A, Stephen K, editors. Developing Communicative Competence in Second Language. New York: Newbury House; 1990. pp. 55-73

[30] Rue, Y. J. & Zhang, G. Q. Request strategies. A comparative study in mandarin and Korean. John Benjamins: Amsterdam/Philadelphia; 2008

[31] Kasper G. Data collection in pragmatics research. In: Spencer-Oatey H, editor. Culturally Speaking: Managing Rapport through Talk across Cultures. London/New York: Continuuum; 2000. pp. 316-341

[32] Anchimbe EA. Offers and Offer Refusals: A Postcolonial Pragmatics Perspective. Habilitationsschrift. University of Bayreuth; 2015

[33] Clyne M. Pluricentric Languages. Different Norms in Different Nations. Berlin/New York: Mouton de Gruyter; 1992

[34] Grando A. Acknowledging gratitude in American English: a pragmatic study of native speakers' role-play data [thesis]. Università degli Studi di Padova; 2016. Retrieved from: http://tesi.cab.unipd.it/52395/1/ANGELA_GRANDO_2016.pdf

[35] Bernard Mulo Farenkia. Décliner une offre en français au Cameroun. Lingue e Linguaggi. 2015;**13**:163-184. Online. Available at: http://sibaese.unisalento.it/index.php/linguelinguaggi/index

[36] Farenkia BM. Invitation refusals in Cameroon French and hexagonal French. Multilingua. 2015;**34**(4):577-603

Research on Works of Historian Virgil Drăghiceanu Discovered in the Archives of Romania's Historical Monuments Commission

Florentina Udrea-Manea and Gheorghe Carutiu

Abstract

Mr Virgiliu N. Drăghiceanu (1879–1964) was a Romanian historian, archaeologist, museographer and conservationist who played a major role in protecting and saving Romania's national heritage. In 1907, he started working for the Ministry of Cults (public servant and director), the Historical Monuments Commission (1892–1847). Between 1907 and 1938, he headed the department handling the collections preserved in the museums covered by the Commission. He was secretary of the Editorial Committee of the Bulletin of the Historical Monuments Commission, also a secretary director and an acting member of the Commission over January 1938–June 1940. Further to a proposal by the famous historian Nicolae Iorga, Virgiliu N. Drăghiceanu became a corresponding member of the Romanian Academy (1926–1947). His most important work involved archaeological excavations in Wallachia's old royal courts: Câmpulung, Curtea de Argeş and Târgovişte, but also the inscriptions on the discovered monuments. He is the one who discovered the tomb of Constantin Brâncoveanu on the premises of the church of Sfântul Gheorghe Nou in Bucharest (1914), but also the princely tomb (of Radu Negru-Vodă) in Curtea de Argeş (July 1920).

Keywords: historian, historical monuments commission, historical monuments, museum collections, heritage, conservation, exhibition, archaeologist, researcher, museographer

1. Introduction

The preoccupation to protect and conserve historical monuments, as vestiges of the past and also as identitarian symbols of the Romanian people, appeared as early on as the nineteenth century in the Old Kingdom and then in Greater Romania, after 1918. The desire to preserve and to restore "in situ" or to open museums urged the authorities to create a commission as early on as 1859 that had the task of studying monuments. On 17 November 1892, by Royal Decree, Romania's very first Law on the Preservation and Restoration of Public Monuments was passed.

The Historical Monuments Commission was created under on that law [1]. The Commission was formed of five members and one secretary, all of whom were personalities well known for their contributions to humanities, exact sciences, legal sciences, and members of the Romanian Academy; the Commission was chaired by a president. The main task of the Commission was to take stock of all old buildings and objects in the country that were historically or artistically interesting and for whose preservation action had to be taken. The inventory had to be updated every 5 years, when a decision was made to qualify and disqualify the monuments. The monuments registered in this inventory could not be demolished or altered in any way without a preliminary clearance from the Historical Monuments Commission, which reported to *Casa Bisericii*, a department of the Ministry of Cults and Public Instruction.

The laws passed to preserve and restore historical monuments in 1913 and 1919 would enable existing institutions to take up more responsibilities, and new institutions could appear in order to support and widen the concerns of the Commission, to increase its scope of activity and to assign some of its responsibilities to the regional sections. As soon as architecture, engineering, archaeology, history, philology, sciences, and law personalities came on board as members and presidents, the Commission became stronger and more widely recognized; therefore, during Nicolae Iorga's term (1923–1940), the institution was able to handle multiple activities: clearance, protection, restoration, works, and publications. The Commission's task was to recommend Romanian fellows for studies to be pursued in Italy and Greece; they would become trained specialists in the field of conservation and restoration of Byzantine paintings.

Under these circumstances, considering the professionalism of the people who made major contributions to the outstanding efforts made to save, restore, and conserve the vestiges of the past, the case of Virgiliu Drăghiceanu stands out as a remarkable case. His permanent dedication, his passion, his love of old documents, his thorough documentation and fieldwork performance turned him into an outstanding and highly appreciated personality. He paid all the due respects to the past and to historical monuments, and he also participated in the discovery, research, classification, conservation, and restoration of the heritage passed on by the ancestors. As a team player and an all-season traveller of tracks and back roads all across Romania, he always did his best to identify solutions to save all of the monuments he studied. He remained in Bucharest during the war and made every effort to diminish the systematic plundering and destruction of the cultural heritage that had not been evacuated. He considered that only by publishing the outcome of efforts like his own (books, magazines, yearbooks, lectures, museums, roving exhibitions) could he bring the past to the public at large, pass it over to the next generations, and protect it against vandalism and ill intent: "our past, therefore, is no confabulation or a mere random word. Or some anecdote one could recount to the audience of banquets or conventions hunting for acclaim. The past exists, you will see it in the monuments and churches and stones and crosses that are everywhere and that we need to honour, because we'll thusly honour our kind and our nation's forefathers" [2].

This chapter will take you on a journey following the career path which Virgiliu Drăghiceanu took to protect historical monuments; his efforts were very closely connected to the Historical Monuments Commission, as suggested by our research of the Commission's 1907–1940 archives and 1908–1940 Bulletins (the Bulletin was suspended between 1917 and 1922) which are now being stored at the National Heritage Institute in Bucharest. The archive is formed of 3885 folders, which is a huge repository of historic information, history studies, bills of quantities, layout

plans, discussion reports, and decisions, all of which refer to restoration problems, conservation projects, and plans to make the most of the historical monuments. All of these documents are of a remarkable rigour, concision, and reliability.

Out of the total 3885 folders, the name of Virgiliu Drăghiceanu will be found in 255. His contribution to the Bulletin was also outstanding: about 100 headlines over 1909–1934. In the upcoming sections, we will be reviewing his biography and his contributions as archaeologist, historian, secretary-director, Commission member, as well as a museographer, conservationist, and head of the Commission's Collections, who was deeply involved in saving, conserving, restoring, and protecting movable and immovable heritage and in making the most of it in articles, collections, and exhibitions, as suggested by the archived documents.

2. Virgiliu Drăghiceanu: the man

He was born in May 1879 in Râmnicu Vâlcea to a family of petty boyards who had come from Oltenia, with some roots in the former county of Romanați; he spent his childhood years in Târgoviște, where the Drăghiceanu family had settled in the latter half of the nineteenth century. His entire childhood but also his later life would be much influenced by his paternal grandfather and uncle. His grandfather, Mihalache Drăghiceanu, a baker, had contributed to the opening of a national school in Romanați and Dâmbovița Counties, and his uncle, Matei Drăghiceanu, had been a scientific personality (a mining engineer and geologist, graduate of the *École des Mines de Paris*, Romania's first mining engineer, the cartographer of Romania's first geological map, member of the Romanian Academy) [3]. Family members from his mother's side were also well known to the locals as petty boyards who had owned the land from the times of Constantin Brâncoveanu and had created and supported a number of religious settlements.

Drăghiceanu took his pre-academic courses in Târgoviște and obtained a degree in letters and philosophy from the University of Bucharest. Drăghiceanu's career path and evolution were strongly influenced by his childhood town, by how close his home was, and by the proximity of the Royal Court of Târgoviște. His first work as a historian (1907–1910) was to take stock of the monuments in Dâmbovița County and to create a county history museum, whose employees would have also been tasked with operations aimed at "stopping the ruin, devastation, and heavy-handed restorations" [4]. Starting from that moment on, he would dedicate the next 40 years of his life to saving, safekeeping, and passing on Romania's national heritage. His years of hard work; his field research; his results; his patience, tenacity, and problem-solving capacities; his team spirit; his skilled rhethoric; his position as a lecturer; his attitude as one of Bucharest's few monument protectors during the occupation; and the trust assigned to him by the Commission were the many reasons that recommended him for the position of corresponding member of the Romanian Academy in 1926, further to the proposal of the Nicolae Iorga, the great historian who chaired the commission over 1923–1940. He returned to Târgoviște in 1940 and continued to work on his research and studies. He died in 1964 and was buried in the Central Cemetery of Târgoviște.

3. Virgiliu Drăghiceanu and historical monuments

His nationwide studies and research, performed while working on Commission assignments, and his archaeological excavations, performed on behalf of the

Commission or as a delegate or supervisor, contributed to saving, restoring, and bringing to light numerous mediaeval historical and modern monuments, especially monuments dating back to the times of Constantin Brâncoveanu, but also tombs, inscriptions, tombstone inscriptions, etc. [5].

A total of the 255 folders with about 14,250 sheets feature Drăghiceanu's signatures, resolutions, reports, and minutes which he prepared as secretary, secretary-director of the Commission and which refer to the following: restorations, rehabilitation works, paint works, formal acceptance procedures, bills of quantities, contracts, buildings erected near monuments, the mediation of conflicts between owners and custodians of historical monuments, expropriations, unapproved works, repair works, maintenance works, memoires, Commission activity reports, correspondence, organizational documents, questionnaires, restoration works performed in workshops of the Commission, qualification and disqualification operations, cultural purposes for structures that are not historical monuments but are still important for documentary purposes, buildings donated to schools, deterioration caused by using historical buildings as military quarters during WWI, rainwater sewage works, works performed on monuments without a clearance from the Commission, stationing troops in historic castles, demolition clearance, proposals to the Academy to buy treasure items, expropriation, reburial of the human remains found during archaeological excavations, infrastructure systematization solutions, etc. I will line up chronologically the most important of them.

To put it in a nutshell, we consider that the most important excavation or salvage works he participated in or supervised under assignment by the Commission are those conducted on the premises of a number of churches in Bucharest (Stavropoleos, Antim, Cotroceni, the Romanian Orthodox Patriarchal Cathedral, Mihai Vodă, Radu Vodă, Curtea Veche) and also churches in Moldova (Golia, Trei Ierarhi, Bârnova, Cetăţuia) and in Oltenia (Tismana, Vodiţa, Hurezi, Arnota, Dintr-un Lemn, Cozia, Cotmeana, Govora, Bistriţa, Polovragi) but also the excavations performed in formal royal courts and mediaeval monuments erected during the times of Constantin Brâncoveanu (Doiceşti, Mogoşoaia, Potlogi, Brâncoveni), as well as the royal tombs of Matei Basarab, Elena Doamna, Mateiaş voievod (the church of St. Dimitrie in Craiova), Mircea cel Bătrân (Cozia monastery) [6–8].

Also the excavation works on non-religious monuments should not be forgotten: Bibescu's palace in Băneasa, the walls surrounding *Casa Băniei* in Craiova, the house of Cantacuzino in Măgureni, the fortified houses (*cula*) in Oltenia (Măldărești, Pojogeni, Moscueşti, Crăsnaru, Groşerea, Bujoreni, Furnicaşi), and Antina fortress [9]. The most remarkable are the excavation works done on the premises of the Royal Court (*Curtea Domnească)* of Târgoviște, the Roman church in Câmpulung Muscel (the tombstone of Nicolae Alexandru Basarab), and also the royal church (*Biserica Domnească*) in Curtea de Argeş (1920 excavation log) where he discovered the princely tombs of Radu Negru Vodă and his princely family [10–12]. At the peak of his career, he discovered the tomb of King Constantin Brâncoveanu in the church of St. Gheorghe Nou of Bucharest, after deciphering an inscription on an icon rushlight that Constantin Brâncoveanu's wife had donated to this church founded by Brâncoveanu [13]. But these achievements were not always accompanied by happy moments. A host of problems occurred, and the archaeologist, secretary-director, member, and conservationist had to find solutions and options; sometimes Drăghiceanu the professional entered into conflicts with state institutions (the Garrison in Târgoviște, etc.) but also with individuals (merchants, traders, shopkeepers, heirs of political and military personalities, representatives of the church, landlords, leaseholders, industrialists, etc.) [14, 15].

You will find a number of examples below to illustrate these circumstances.

A response to the request to restore Bishop Mailath's Roman Cathedral in Alba Iulia.

An essay on Virgiliu Drăghiceanu: "As per the assignment of the Commission's president, I, Bishop Mailath and prof. Müller, an architect from Budapest who has so far worked to restore the Roman Catholic Cathedral of Alba Iulia, visited together the monument that had been dated to the twelfth-century. It is one of the most interesting in Romania, because it illustrates the architectural evolution, from Roman, through Renaissance to the Baroque. The Bishop asked for 500,000 lei to start the works and prof. Müller requested clearance to cross the border anytime" (**Figure 1**).

A note from the Ministry of Cults and Arts in Romania about the high royal decree that King Ferdinand gave to assign the members of the regional section of the Commission in Bukovina. For the information of Mr Drăghiceanu: The section will report to the central Commission about the conservation and restoration works or about the excavations done in connection to a certain monument, as well as the crimes that could be committed according to a certain law. The Commission appropriated the necessary excavation costs in the budget of the next year (**Figure 2**).

A request for permission to contact Prof. Iosef Bala, also a painter, in order to continue the restoration works done on the paintings of the church of Vatra Moldoviței. Drăghiceanu's decision: It is approved to propose Mr Iosef Bala to continue the restoration works in Bukovina, under the obligation to also use graduates of the Beaux Arts school as apprentices (**Figure 3**).

A letter from the Historical Monuments Commission to the Minister of Cults and Arts requesting permission to intervene on the monastery of Negru Vodă where rainwater accumulates and infiltrates into the foundation of the church.

Figure 1.
The historical monuments commission archive, 1905–1948; file 25: Sheet 9.

Figure 2.
The historical monuments commission archive, 1905–1948; file 518: Sheet 8.

Figure 3.
The historical monuments commission archive, 1905–1948; file 518: Sheet 12.

The infiltration had been found during the excavation works of 1924 that the Commission's secretary-director, Mr V. Drăghiceanu, did after water appeared in the church. Report of Drăghiceanu: Rainwater is funnelled by the street leading to the railway station and flows into the monastery's yard because of the elevation difference. Also all of the waters drain off the rooftops, and the garden faucets

of the orphanage stagnate around the church. During the excavation works, we found that it takes several days for the water around the church to drain. Therefore water continued to infiltrate the church flooring. I am kindly asking the Commission to take action in order to have a sewer built (**Figure 4**).

An official letter of the Historical Monuments Commission sent to the minister of the interior—further to the finds discovered in the royal church Curtea de Argeş (the royal tombs contained valuable jewellery)—to request protection of the church from the local police or gendarmerie, during the nights and the days indicated by Commission Secretary Drăghiceanu who is in charge of the excavations. The guards need to be stationed near the church 20 days, up to the time when works are completed (**Figure 5**).

The map of the Royal Court in Argeş (**Figure 6**).

A report of the Secretary-Director Virgiliu Drăghiceanu also features the supporting documents explaining the costs incurred to reinforce the royal residential buildings in Curtea de Argeş (20,000 lei) (**Figure 7**).

A request submitted by Drăghiceanu to have 5280 lei refunded (costs incurred in Curtea de Argeş to support the excavation works executed from September 1922 to January 1923 (**Figure 8**).

Penalties charged on the mayor's office in Făgăraş, which used funds from the Ministry of National Defence to work on the buildings of the Făgăraș fortress in order to accommodate Border Guards' Battalion No. 3 of the Royal Guard Drăghiceanu's decision: The request is to discontinue these works at once and to send a report on the works that have been executed so far. No other works should be carried out unless approved by the Commission (**Figure 9**).

The Commission's Architecture Service announced that the Gothic room restoration works of *Trei Ierarhi* church in Iași had burnt down during WWI because of
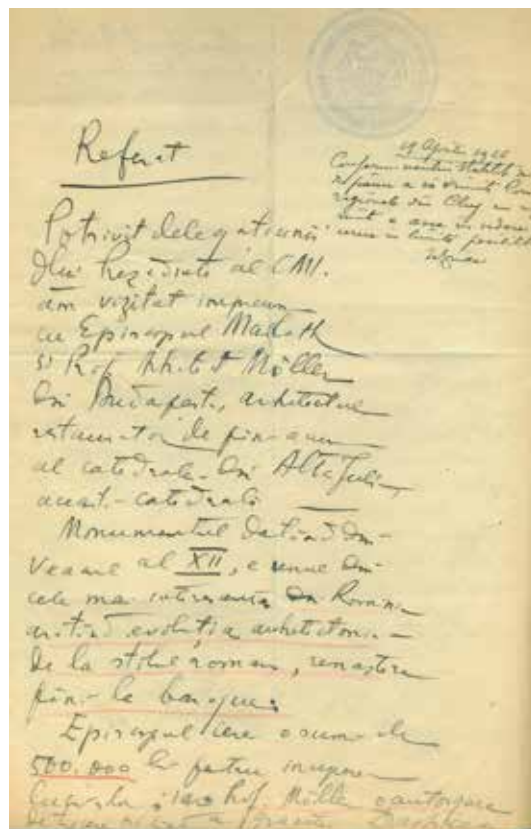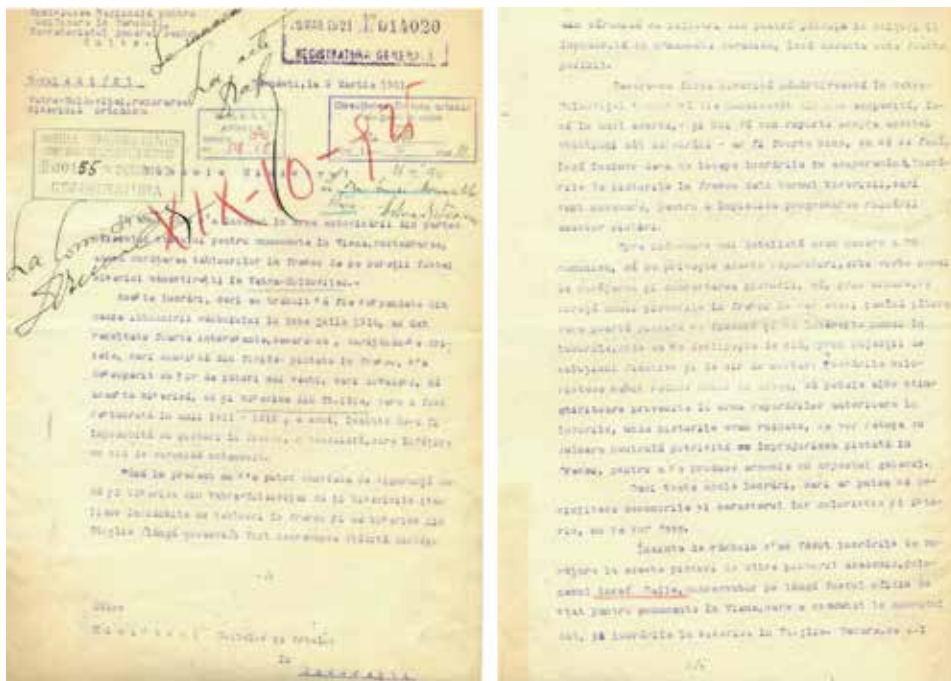

Figure 4.
The historical monuments commission archive, 1905–1948; file 1091: Sheet 1.

Figure 5.
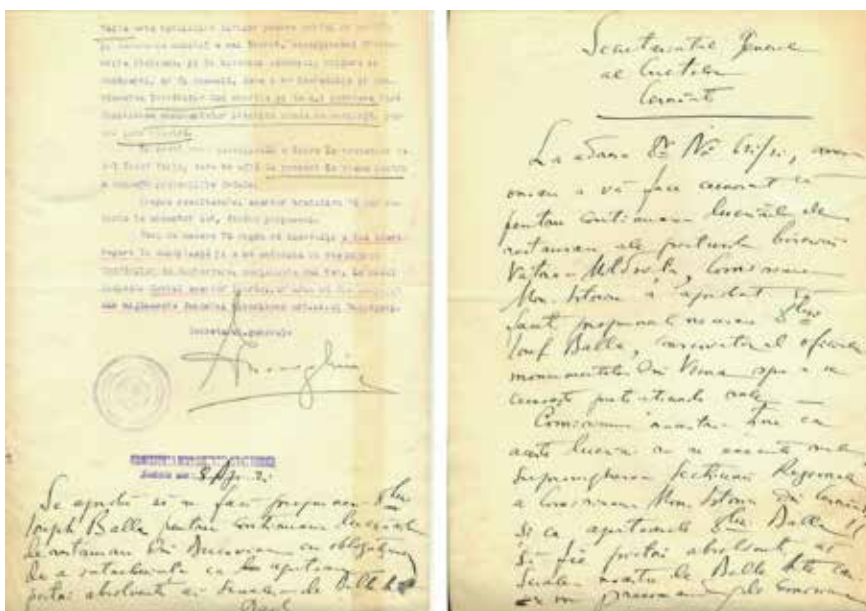*The historical monuments commission archive, 1905–1948; file 1392: Sheet 13.*

Figure 6.
The historical monuments commission archive, 1905–1948; file 1394: Sheet 25.

an employee of the Ministry of Public Works (a benzine tank had caught fire). Drăghiceanu's decision: Mr Ghica is assigned to assess the damages, in the company of a representative of the minister of public works, in order to obtain the necessary restoration funds form the state (**Figure 10**).

Further to the request of the abbess of Tismana Monastery to apply plaster and repair the church and the chapel, Virgiliu Drăghiceanu visited the monastery on a fact-finding mission. Report of Drăghiceanu: With great difficulty, we found the outside claddings which are irregular because of the missing wall decoration belts that would create the horizontal and vertical unity. Yet even so the church is more
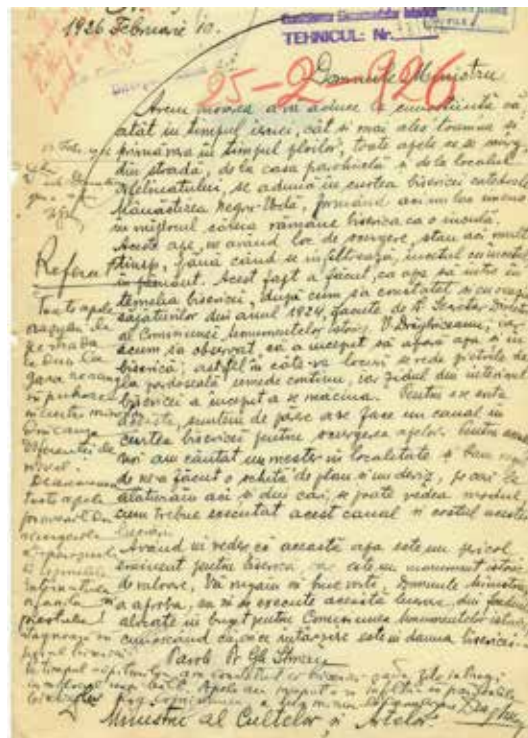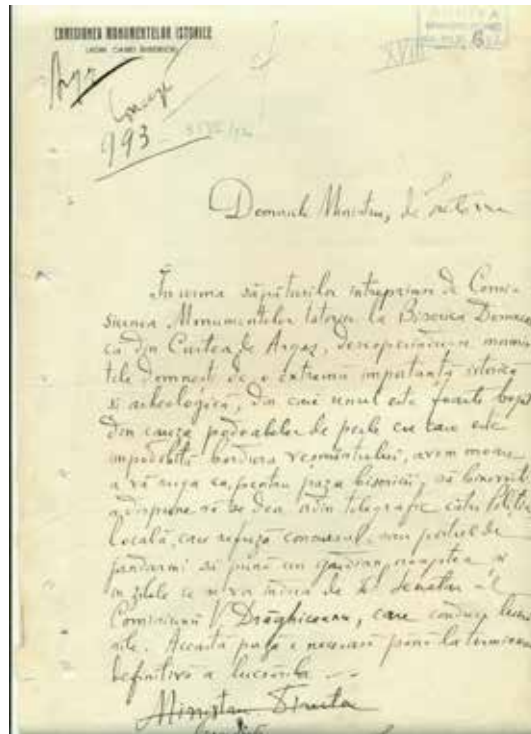
Figure 7.
The historical monuments commission archive, 1905–1948; file 1394: Sheet 46.

Figure 8.
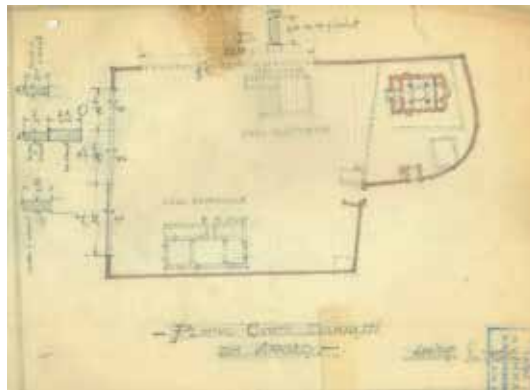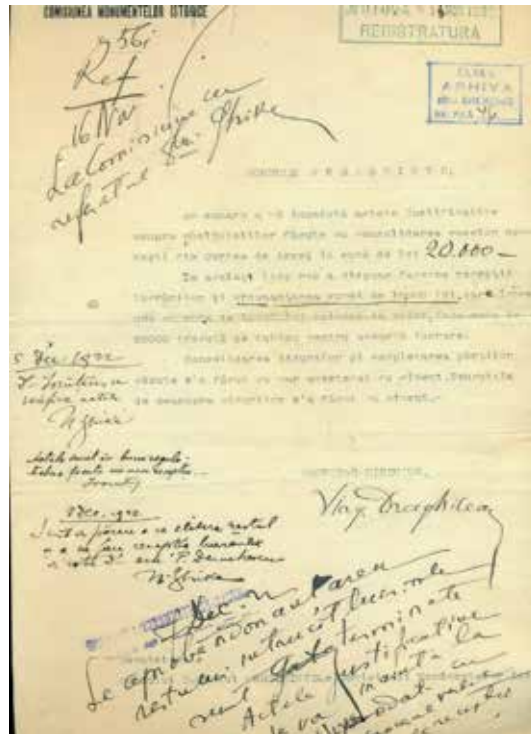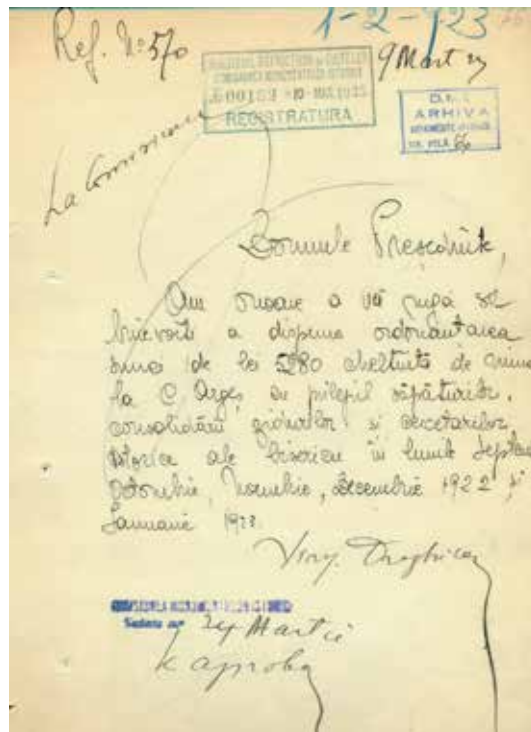*The historical monuments commission archive, 1905–1948; file 1394: Sheet 66.*

Figure 9.
The historical monuments commission archive, 1905–1948; file 1580: Sheet 33.

interesting as it is than coated in plaster, and I believe that its current appearance will help solve other problems that will be revealed by research on the inside areas, when the overlapping painting will be removed. Consequently, my opinion is to refrain from plastering (**Figure 11**).

Commission's report to the Ministry of the Interior on exports of Romanian heritage items. Drăghiceanu's decision: We will request from the Ministry of Interior to stop the exports of antiques, art objects, and Romanian ethnography (**Figure 12**).

The owner of a land perimeter in Târgoviște which also included the St. Nicolae Chapel requested permission to build a house near the chapel. Report of Drăghiceanu: The chapel of Giartolec or Jiartolec—St. Nicolae—in Târgoviște was built in 1877 as a private property but was sold several times. It has been repaired several times and is of no artistic or architectural value. I believe the landowner should be permitted to build a house on its own land near the chapel, provided that he pledges in writing to maintain and preserve the chapel as he has done so far (**Figure 13**).

A citizen of Târgoviște on whose land and excavation works were executed, which revealed annexes of the former royal palace requests damages for his land. Report of Drăghiceanu: In order to dig in the royal bath area that was located on your property and the property of colonel Florian, we agreed with him to pay for his share of 95 sq. m. Since the compensation was low (3000 lei) and in order to avoid a court trial, we may pay this amount from the proceeds of the Bulletin sales (**Figure 14**).

Figure 10.
The historical monuments commission archive, 1905–1948; file 2015: Sheet 6.

Figure 11.
The historical monuments commission archive, 1905–1948; file 3372: Sheet 190.

Figure 12.
The historical monuments commission archive, 1905–1948; file 3381: Sheet 5.

Figure 13.
The historical monuments commission archive, 1905–1948; file 3397: Sheet 117.
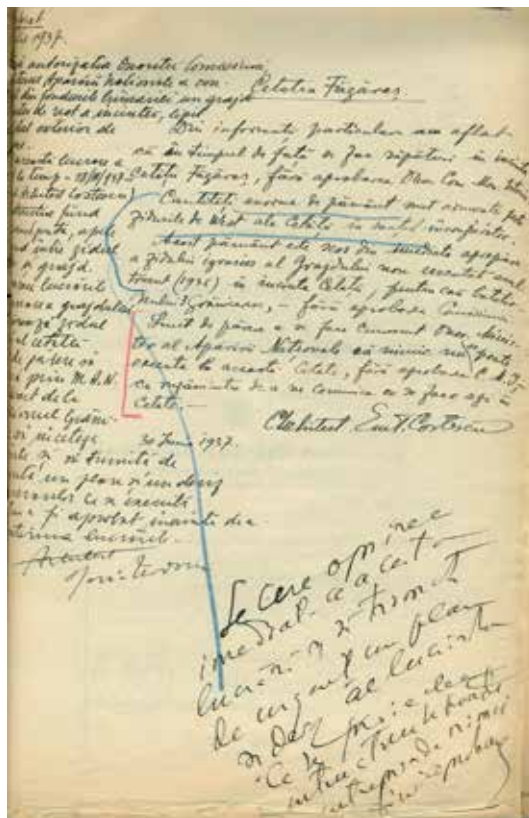
Figure 14.
The historical monuments commission archive, 1905–1948; file 3399: Sheet 1.

Figure 15.
The historical monuments commission archive, 1905–1948; file 572: Sheet 1, sheet 2.

Drăghiceanu wrote to the president of the Commission that on 9 June 1914, he had discovered the tomb of Constantin Brâncoveanu on the premises of St. Gheorghe Nou in Bucharest, founded by Brâncoveanu. He said the tomb had no inscription but that he had found out about its positioning by reading an inscription

on an old icon rushlight that Queen Maria Brâncoveanu had offered to the church. "We have donated this icon rushlight on the day of St. Gheorghe cel nou to bring light upon the resting place of King Constandinu Brâncoveanu Basarab Voevod; it was commissioned by his queen, Maria, who with God's will find her resting place also in this church. 12 July, year 7228 (1720)" (**Figure 15**).

On 22 July 1914, Drăghiceanu thanked the president of the Commission who congratulated him for finding Brâncoveanu's tomb. At the same time, he was quite upset because a person working for the church of St. Gheorghe Nou (the church's cantor) had appropriated the outcome of his work. Therefore, he filed a complaint with the church authorities (**Figure 16**).

Report of Drăghiceanu on matters associated to the discovery of Brâncoveanu's tomb. The cantor of church St. Gheorghe Nou, Ion Ungureanu, appropriated the find of Virgiliu Drăghiceanu and had it published in *Viitorul*, one of the daily newspapers of the time (**Figure 17**).

Report of Drăghiceanu: Description of the activities preceding the discovery of the tomb. On the occasion of Brâncoveanu's bicentennial celebration, Drăghiceanu collected a number of items from churches that Brâncoveanu had founded in order to have them showcased in an exhibition. Once he arrived in that particular church, Drăghiceanu started deciphering the inscriptions painted or carved on the religious icons, tombstones, and iconostasis, and he ultimately started studying the rushlights. There were three of them, and the last one he investigated proved to have been donated by Queen Maria, Constantin Brâncoveanu's wife, in the memory of her husband. The cantor was there and witnessed the discovery of the tomb; so he recounted everything to the reporters of daily *Viitorul* as he would have made the find himself. He considered it necessary to present his point of view in order to preserve his prestige and his authority and credibility. The conservatory of the museums covered by the Historical Monuments Commission (**Figure 18**).
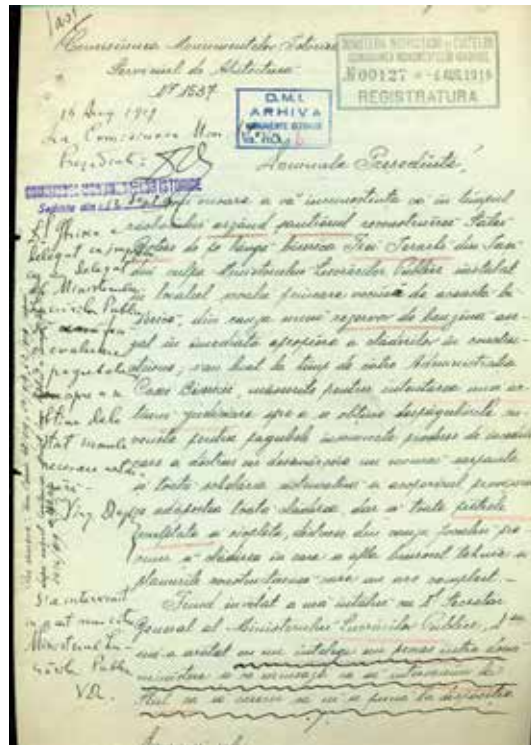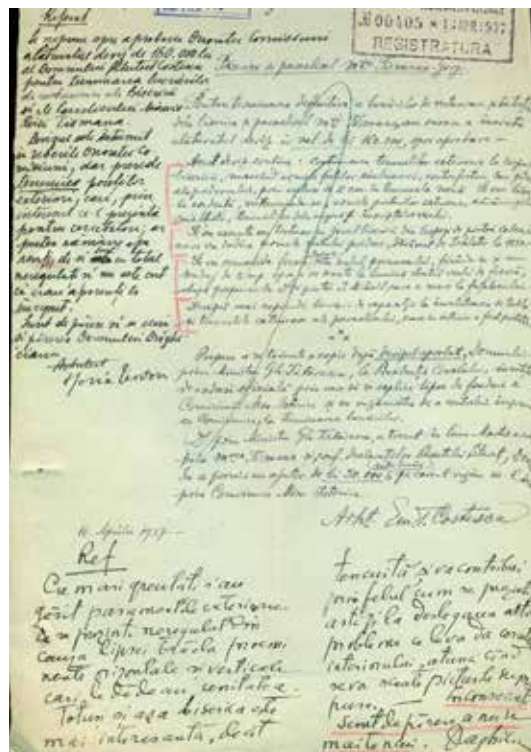

Figure 16.
The historical monuments commission archive, 1905–1948; file 572: Sheet 3.

Figure 17.
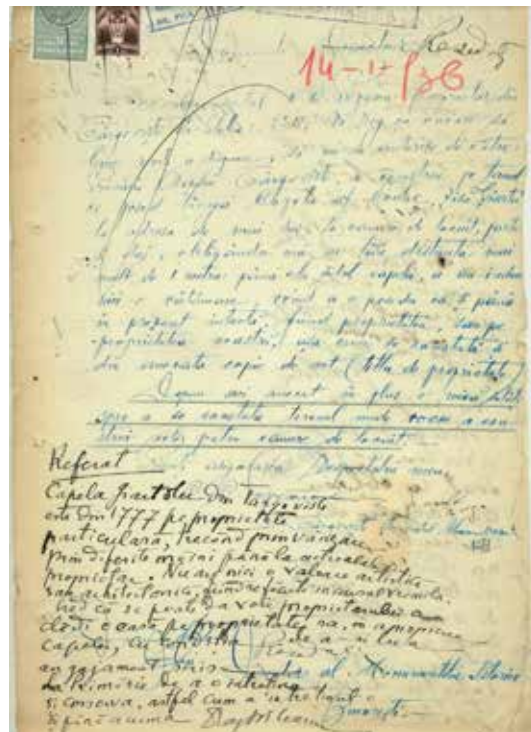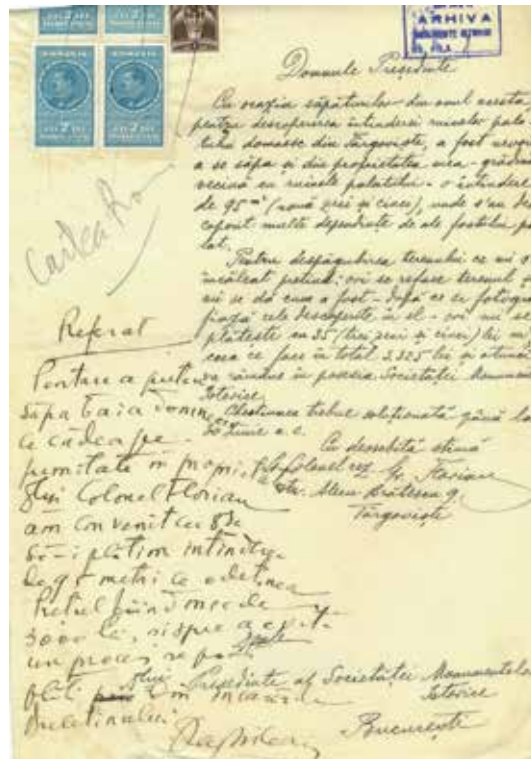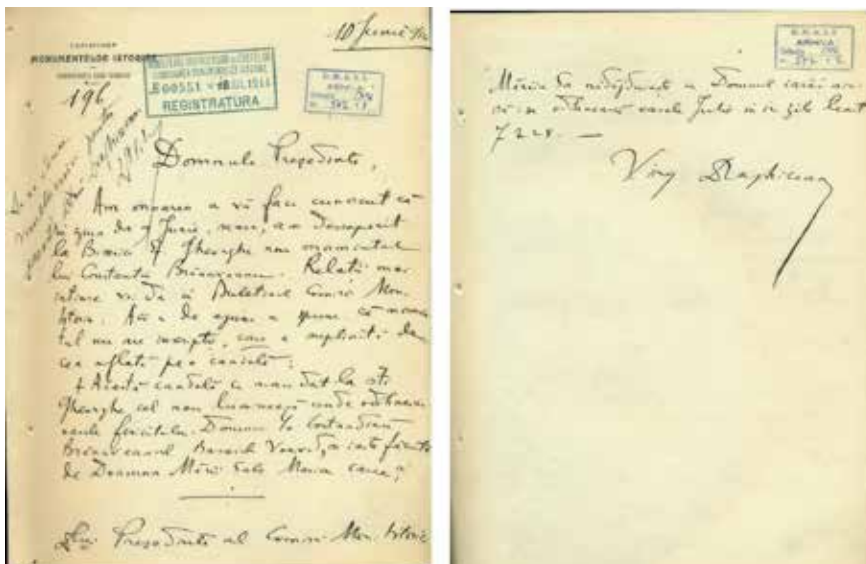*The historical monuments commission archive, 1905–1948; file 572: Sheet 4.*

Figure 18.
The historical monuments commission archive, 1905–1948; file 572: Sheet 5.

The cantor of church St. Gheorghe continued his attacks. So Drăghiceanu had to submit another explanation to the Commission. He provided a comparison between his interpretation of the inscription and the one published by the cantor. The

difference of interpretation was conspicuous, and Drăghiceanu's was obviously the accurate one (**Figure 19**).

After publicly proving that the cantor's account was a fraud, he wished to close the public debate on the matter. Conservationist of the Commission, Virgiliu Drăghiceanu (**Figure 20**).
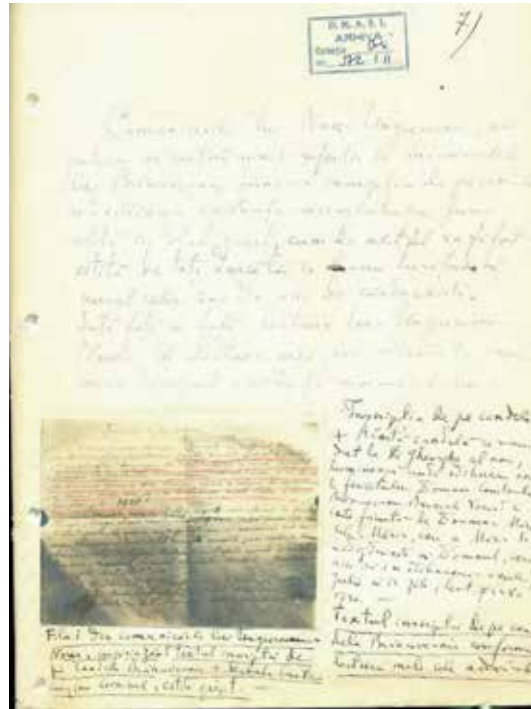
Figure 19.
The historical monuments commission archive, 1905–1948; file 572: Sheet 11.

Figure 20.
The historical monuments commission archive, 1905–1948; file 572: Sheet 14, sheet 15.

Major Ion Cătuneanu of Craiova, Brâncoveanu's sixth level sibling, filed a petition with the Commission asking to receive copies of the exhumation reports and announcing that his family opposed the conservation of Brâncoveanu's otherwise in
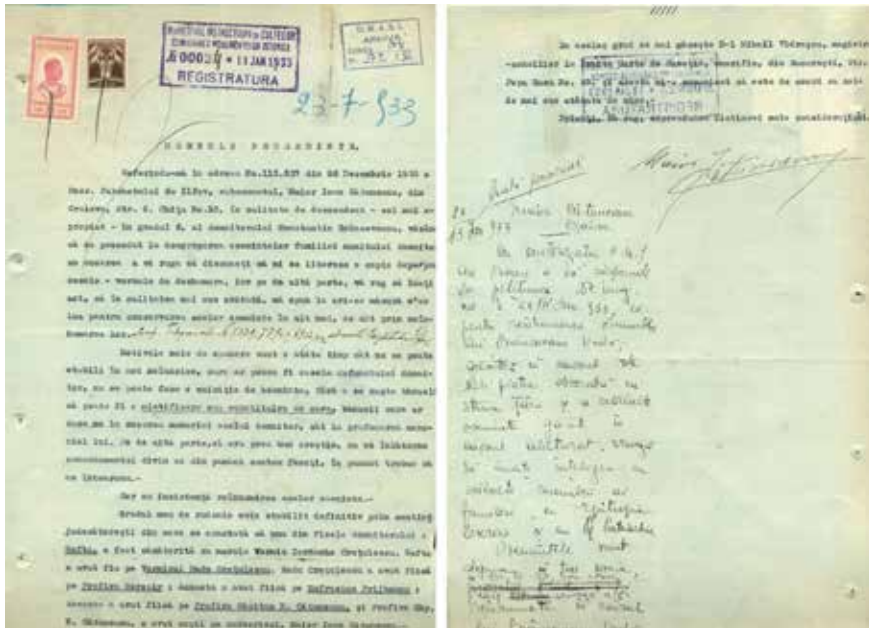
Figure 21.
The historical monuments commission archive, 1905–1948; file 572: Sheet 36, sheet 36 a.
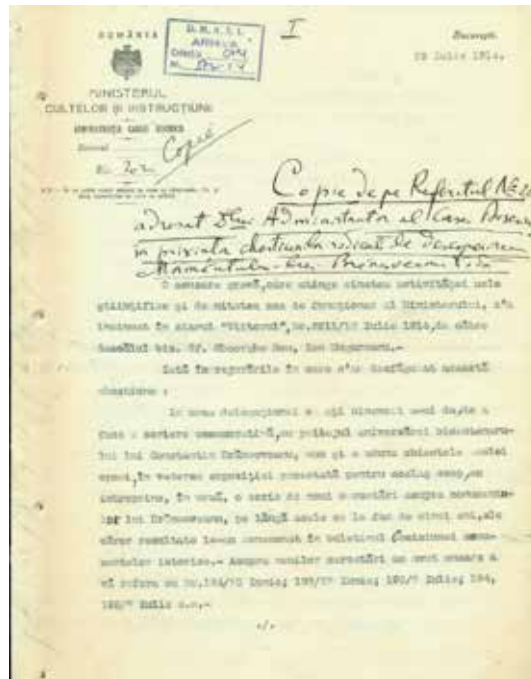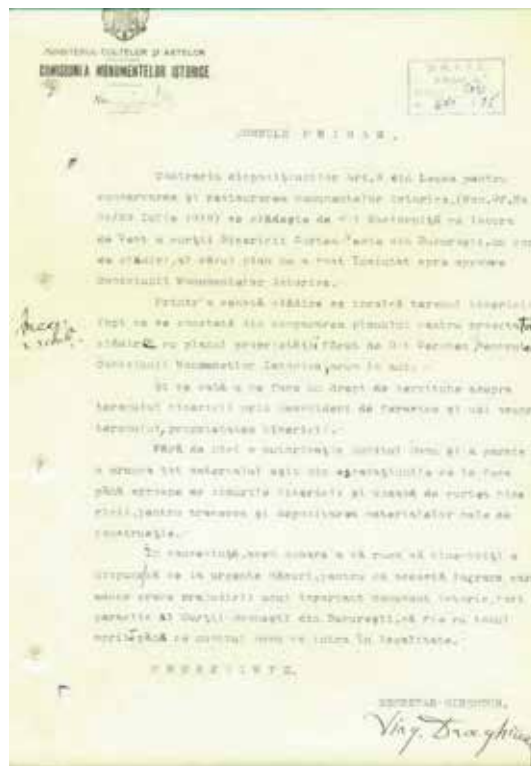

Figure 22.
The historical monuments commission archive, 1905–1948; file 671: Sheet 75.

Figure 23.
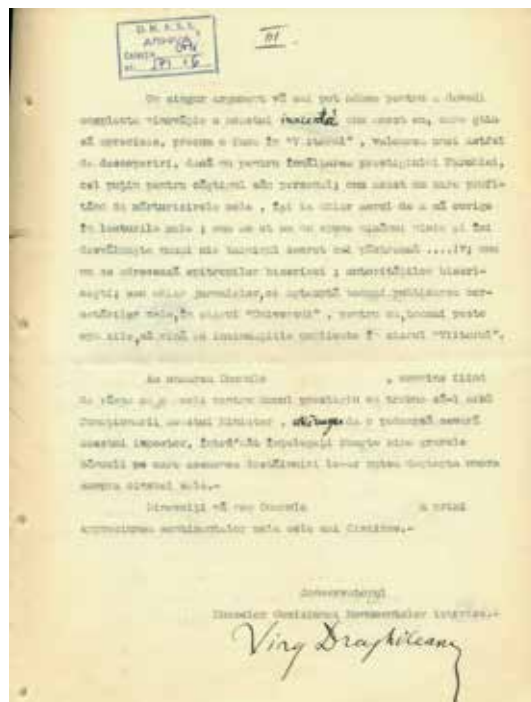*The historical monuments commission archive, 1905–1948; file 684: Sheet 5.*

any other manner than burial and any other activity that would affect the memory of this king that was a good Christian. The answer was that Brâncoveanu would be buried in the same church under a tombstone decorated with the country's coat of arms and that family members could participate in the ceremony ((**Figure 21**).

Secretary-Director Virgiliu Drăghiceanu wrote a petition on behalf of the Commission in order to send it to the mayor of Bucharest, with reference to Mr Mociorniță, the industrialist, who—against the Law on the Preservation and Restoration of Historical Monuments—is building a structure near the church of *Curtea Veche* (Old Royal Palace) in Bucharest, which is a historical monument. The official designs did not match the one actually used in the field. So Drăghiceanu asked the municipality to take the action necessary to save an important historical monument, the former chapel of the Royal Court in Bucharest, and to stop all works (**Figure 22**).

The Administration of *Cotroceni* Royal Palace submitted a petition to the Minister of Cults and Arts requesting permission to paint the outer walls and the porch of the *Cotroceni* church. Drăghiceanu's decision: We agree to have the porch painted in the colours of the facade, except for the pillars and stone frames (**Figure 23**).

4. Virgiliu Drăghiceanu: museographer and curator

Since 1885, numerous Romanian intellectuals have drawn attention to the acts of theft committed at numerous archaeological sites. In this context, the Commission had decided, starting with 1907, to create its own collections, which would constitute the core of an intense museum activity. The professional beginnings of Virgiliu

Drăghiceanu in the service of the Commission are linked to this activity as a museographer. He would become custodian, then head of the Historical-Artistic Collections, a division within the Historical Monuments Commission and of the Administration of the Church House, which would open to the public on 2 November 1909. The collections included objects from the fifteenth to nineteenth centuries, gathered during the study visits throughout the country. The appearance of the Commission's Collections' initiative led to the inventory of all the heritage objects of the places of worship which were classified as historical monuments. In 1910, the general inventory of monuments was resumed, and research was carried out in Oltenia, for the purpose of the general improvement of the collections [16, 17].

Activities connected to the study, preservation, and promotion of heritage items and objectives.

1912. The album "The Neamțu and Secu Treasures" was printed under Drăghiceanu's coordination (file 3851).

The Stavropoleos Church in Bucharest administration asked Drăghiceanu for his assistance in the creation of an inventory of religious objects characterised by historical-artistic value and present in the church museum (File 638).

1913. Drăghiceanu succeeded in developing a detailed description of the Commission's Collections, published in the form of the Catalogue of the Historical Monuments Commission's Collections. The collection was launched on 23 November 1919 and included the following sections: archaeological (the museum and library segments) and archive (photographs, plans, surveys) (File 3851).

1913–1919. Through the "House of Historical Monuments", Romanian art exhibitions were organised abroad; these exhibitions would continue after the war.

1914. As a sign of public appreciation of his qualities regarding the salvage, protection, and conservation of movable heritage, Drăghiceanu received the title of "curator" of the Commission's museum system.

1915. In Fălticeni, Suceava County, the Regional Museum was established, containing various objects from the excavations carried out at the Baia catholic church, with the aid provided by Drăghiceanu (File 1588).

1919. Prahova Prefecture requested Drăghiceanu's assistance for the establishment of a museum. In this context, the Hagi Prodan House in Ploiești was transformed into the Prahova Museum. The first objects belonging to this museum would be religious objects (File 2695).

In Galați, Covurlui County, an eparchial museum is connected to "St. Andrew" Theological Seminary and containing objects found in Bărboși, with the involvement of Drăghiceanu (File 1687).

The collections of the Commission acquired, through Drăghiceanu, 105 photographs representing objects from the Neamțu and Secu monasteries (File 3851).

1920. The Parish of the "Nașterea Maicii Domnului" church in Doicești, Dâmbovița County, founded by Constantin Brâncoveanu, asked for the Commission's Collections' assistance in the recovery of the ornate chair donated to the church by Brâncoveanu, an object that had been on display during the National Exhibition of 1906 and that was kept by the Bucharest Ethnographic Museum Bucharest (File 1493).

The "Trei Ierarhi" church in Iasi required the help of Drăghiceanu for the purpose of founding a museum of the Metropolitan Church of Moldavia (File 2015).

1921. A school museum is set up in Hardali, Caliacra County (today in Bulgaria), with objects discovered in the ruins of the ancient fortress of Abrittus, at the suggestion of Drăghiceanu and Pârvan (File 1909).

As a result of the acts of theft that took place at the Gura Motrului Monastery, Drăghiceanu went to the site to transfer the objects of historical value to the museum of the Commission (File 1878).

Drăghiceanu prepared a detailed report for the recovery of the Romanian heritage objects situated at the Vienna Museum (in accordance with the Treaty of St. Germain). Among the requested items were Ştefan cel Mare's Gospel, Prince Ştefan Bocskay's crown, the Cuciurul Mare treasure (Bucovina), and various military trophies (File 3883).

1924. The commission, through Drăghiceanu, received fragments of mural painting extracted from the "Trei Ierarhi" church in Iaşi, before the restoration coordinated by Lecomte du Noüy (File 2018).

Drăghiceanu contributed for the formation of museums in the "St. George" church and in the Gothic hall of the Cetăţuia Monastery (File 2046). The Byzantinology Exhibition in Bucharest is organised by Drăghiceanu (File 3844).

1925. Drăghiceanu organised the Exhibition of Romanian Church Art in Paris and Geneva, under the patronage of the "Prince Carol" Foundation [18] (File 3846).

1926. The Bucovina Museum made a description of its collections with the contribution of Drăghiceanu, at the request of the museum director, Nicolae Grămadă (File 3242).

Drăghiceanu was a delegate at the Sesquicentennial International Exposition in Philadelphia, United States, representing the Romanian section (File 3845).

1929. The Romanian Art Exhibition in Carol Park was organised by the League of Romanian Women, on the occasion of the 10-year jubilee of the Great Union, with the assistance of Virgiliu Drăghiceanu (File 3847).

The Historical Monuments Commission participated at the Barcelona International Exposition. The Romanian pavilion connected to religious art section included objects with a historical and artistic relevance, from various Romanian churches and monasteries (e.g. an iconostasis from the Arnota Monastery, dated in 1699). The pavilion was organised by Virgiliu Drăghiceanu and Dimitrie Gusti (File 3848).

1930. Drăghiceanu, as a member of the Commission and as a corresponding member of the Romanian Academy, proposed the donation of the tombstone of Prince Ipsilanti, located in the "Mărcuţa" church in Bucharest, to the National Museum of Athens (File 3884).

1931. Byzantine Art Exhibition in Paris was organised by Drăghiceanu (File 3849).

1936. The Commission, through Drăghiceanu's activities, took the necessary steps for the recovery of archaeological objects which were illegally taken by private persons from the mediaeval citadel of Cenad and their transfer to the Banat Museum in Timişoara (File 3368).

1937. Drăghiceanu helped the administration of the "St. Sava" church to buy a building situated on 20 St. Sava Street for the arrangement of a museum (File 2047).

1938. In Târgovişte, Dâmboviţa County, a county history museum was inaugurated but put into public in 1944. The museum was formed by royal decree in 1937, at the request and also due to the tenacity, of Drăghiceanu, for the cultural improvement of his native city (File 3401).

The project for the establishment of a European Institute for the Research of Castles is signed by Virgiliu Drăghiceanu and E. Foundoukidis, the secretary general of the International Commission for Historic Monuments (File 3885).

1939. The Turnu Măgurele City Hall requested Drăghiceanu's assistance to set up a museum with the function of housing the objects discovered in the Turnu mediaeval fortress (File 3503).

A museum is formed with the help of Drăghiceanu for the purpose of preserving the archaeological items discovered during the excavations that took place at the Fortress of Severin and at the Roman thermae and castrum. Initially, the museum was provisionally arranged in the boarding school building of the "Trajan" High School. An appropriate building was constructed in 1940 (File 3505).

1940. Drăghiceanu composed an inventory of the objects that were presented at the Romanian pavilion during the Milan Fair Exhibition (File 3505).

As a curator of the items selected to be preserved by the Commission and by the church house, organiser of permanent and temporary exhibitions, and supporter of the public dissemination of the cultural artefacts connected to Romanian history, Drăghiceanu worked in a methodical and professional manner in all circumstances, succeeding in the process of training a significant number of specialists through his personal example. He managed to complete the available thesaurus of monuments with new items and studies. In his varied activity, the qualities of a museographer were joined by the qualities of a passionate archaeologist, who discovered numerous tombs, inscriptions, and objects that were, until his time, totally or partially ignored. He also facilitated their restoration, preservation, and functional integration among the most valuable elements constitutive of national heritage, which are defining for the relevance of Romanian culture. The exhibition catalogues also demonstrate Drăghiceanu's skills and competence in making such syntheses.

The Paris Exhibition organised by Drăghiceanu in 1925, led, through the value of the exhibited heritage items, to the conferring of distinctions by the French government, including the religious art section presented in the historical room of the Tuileries Palace, once again demonstrating the capabilities of the museographer, but also the recognition enjoyed by the Commission at a European level. The Geneva Exhibition, also organised by Drăghiceanu, was also an excellent opportunity for documentation. In this context, he managed to identify in the history museum and in the Magdalene Temple inscriptions similar to those present on the rings discovered in Curtea de Argeş [19].

The experience, tenacity, and expertise of Drăghiceanu were manifested and were also recognised internally, through his presence in the boards of management of numerous museums in Bucharest and in the country. Permanent preoccupation with being aware of external events and constantly up to date with the European legislation in the area of culture and heritage and also in connection to the constant achievements of European museums made him the optimal person in charge of formulating a Romanian museum law project, inspired by the Italian and Greek legislations.

5. Conclusions

The Historical Monuments Commission has had the essential function of protecting the historical monuments situated on the territory of Romania, demonstrating efficiency, dynamism, and positive authority in the process. The latter attribute was conferred primarily by the work of the prominent personalities that constituted it that were highly specialised and competent in the fields in which they activated. Among them was Virgiliu Drăghiceanu, whose spirit, talent, selflessness, dedication to the preservation of monuments, and last but not least patriotism saved relevant testimonies of the past to be transmitted to future generations [20]. His activities for four decades in the service of monuments, through the fulfilled appointments, were the result of a remarkable will and passion but also of an authentic professionalism and objectivity. The archaeological excavations, the field studies and research, and the published inscriptions demonstrate a constant and sustained study of past documents. The teamwork, the respect for his colleagues and collaborators, and the results he obtained made him noted and appreciated (**Figure 24**).

The present structure of heritage protection and promotion, and the corresponding formulated legislation, is due to the efforts and the work of those who, over a century ago, have composed a large archive that can anytime represent a starting point and an exemplary model for systematic activities directed towards
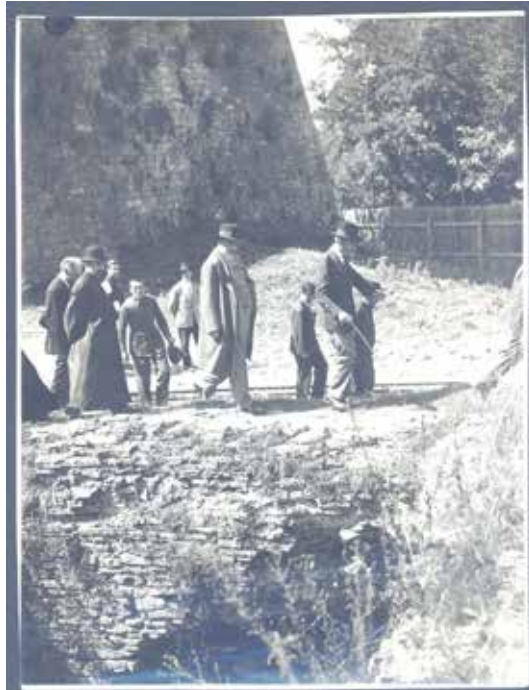
Figure 24.
The National Archives, Virgiliu Drăghiceanu and Nicolae Iorga at Târgoviște.

the preservation, protection, restoration, promotion of cultural heritage, and also the transmission of expertise to future generations. This excellent archive is in the process of digitization, within the operational framework of a large national project.

Acknowledgements

Author details

Florentina Udrea-Manea[1*] and Gheorghe Carutiu[2*]

1 National Institute of Heritage, Bucharest, Romania

2 Ovidius University of Constanta, Romania

*Address all correspondence to: florentina@cimec.ro
and gheorghe.carutiu@yahoo.com

IntechOpen

References

[1] Opriş I. Comisiunea Monumentelor Istorice. Bucureşti: Enciclopedică; 2011. 167 p

[2] Drăghiceanu V. Palatele noastre domneşti. In: conferinţă de arheologie naţională ţinută la şcoala de infanterie, cu 18 ilustraţiuni şi planuri. Bucureşti: Tipografia Universală Iancu Ionescu; 1913. 26 p

[3] Drăghiceanu V. Din istoricul şcoalelor naţionale - Întemeierea şcoalelor din Romanaţi şi Dâmboviţa ţa de către pitarul Mihail Drăghiceanu Profesorul (1832–1861). Bucureşti: Tipografia Gutenberg, J. Göbl; 1914. 32 p

[4] Moisescu C. Târgovişte * Monumente Istorice şi de Artă. Bucureşti: Meridiane; 1979. 250 p

[5] Drăghiceanu V. În amintirea lui Constantin Brâncoveanu 1714–1914. Bucureşti: Institutul de arte grafice Carol Göbl; 1914. 113 p

[6] Drăghiceanu V. Curţile domneşti brâncoveneşti: II - Mogoşoaia. BCMI. 1910;**196**(2):149-164

[7] Drăghiceanu V. Curţile domneşti brâncoveneşti: I - Doiceşti. BCMI. 1909;**145**(3):101-112

[8] Drăghiceanu V. Curţile domneşti brâncoveneşti: III -Potlogi. BCMI. 1911;**200**(13):49-70

[9] Drăghiceanu V. Casa Cantacuzinilor din Măgureni. Jurnalul săpăturilor. BCMI. 1924;**50**(39):12-45

[10] Drăghiceanu V. Curtea Domnească din Argeş. Note istorice şi arheologice. BCMI. 1923;**287**(10–15):9-76

[11] Drăghiceanu V. Jurnalul săpăturilor din Curtea Domnească a Argeşului. BCMI. 1923;**287**(10–15):134-149

[12] Iosipescu S. Comisiunea Monumentelor Istorice-iniţiatoarea cercetărilor de arheologie medievală. Săpăturile de la Curtea de Argeş. Revista Monumentelor Istorice. 1992;**100**(2): 23-34

[13] Drăghiceanu V. Mormântul lui Constantin Brâncoveanu Basarab Voievod; descoperit la 9 iulie 1914. BCMI. 1914;**145**(27):111-126

[14] Cîrstina I, Virgiliu N. Drăghiceanu-câteva consideraţii asupra biografiei şi activităţii sale profesionale. Academia Română: Bucuresti; 2016. Available from: https://www.academia.edu/ 27995971/Virgiliu_N._Dr%C4%83ghicea nu_-c%C3%A2teva_considera%C5% A3ii_asupra_biografiei_%C5%9Fi_ activit%C4%83%C5%A3ii_sale_profe sionale/. [Accessed: 20 October 2019]

[15] Teodorescu VZ, Virgiliu N. Drăghiceanu şi Monumentele Istorice. Revista Monumentelor Istorice. 1992; **100**(2):76-84

[16] Catalogul Colecţiunilor Comisiunii Monumentelor Istorice I, ed. Bucureşti: Casei Bisericii; 1913. XXI + 185 p

[17] Drăghiceanu V. Monumentele Olteniei. BCMI. 1933;**100**(76):49-75

[18] Drăghiceanu V. Monumente reprezentative din vechea artă română, expuse în expoziţiile din Paris şi Geneva în anul 1925. BCMI. 1926;**94**(48):61-69

[19] Drăghiceanu V. Inscripţii asemănătoare celor de pe inelele de la Curtea-de-Argeş. BCMI. 1933;**192**(78): 184

[20] Drăghiceanu V. Curtea de Argeş, Călăuza vizitatorului monumentelor oraşului. Bucureşti: Cultura naţională; 1928. 21 p

Research of the Musical Folklore From Maramureș: Chioar Area

Uță Larisa-Vasilica

Abstract

Through this study we want to "bring to light" a small part of the beautiful folklore of the Chioar Country, one of the four areas of Maramureș County. Before starting a serious research in the area, we wanted to know first the material that was collected and has not been transcribed or published until now. Thus, we manage to exploit a number of 450 songs, belonging to the neocational lyrics from Chioar, existing in the Folklore Archive Institute of the Romanian Academy in Cluj-Napoca, materialized in unique transcripts, to be gathered in a collection of vocal songs. Through the transcripts we have made, we want to highlight, first of all, the stylistic features of the area but also a musical typological classification of the songs.

Keywords: Chioar area, stylistic features, unique repertoire, typological classification

1. The geographical and historical framework of the Chioar area

The Chioar ethnographic area has long attracted the attention of researchers through the beauty of the landscape, the originality and authenticity of popular creation, and the richness of popular culture manifestations. It has been known in the past and in part also today, under the name of Chioar Country, but, in form and function, it does not come close to the other regions bearing the name of "country." Unlike the other 17 "countries" of the Romanian territory, the Chioar area is a geographic-historical entity that is much more difficult to individualize, its genesis and evolution taking place within a complex framework. If for most "countries" we can identify a unit of relief as a primary genetic factor, in this case we are talking about a region that has crystallized around a nucleus of another origin, a fortress, called the Stone Fortress (*Cetatea de Piatră*).[1]

The territory we propose for study is located in the southwest of Maramureș County and is part of the connection unit between the Eastern Carpathians and the Apuseni Mountains, being present in that area of the "hidden mountains" of Transylvania from which the Preluca and Prisaca Massifs appear, between which a lower area enters, namely, the Chioar Hills.

In the territory of what we call "Chioar Country," we can identify the following morphological units: the Gutîi-Igniș Mountains,[2] the Preluca

---

[1] The name comes from the Hungarian language *Kövár*; *kö* means stone, and *vár*, fortress.

[2] The relief is volcanic, with large cones—Igniş (1307 m), Mogoşa (1246 m), or semi-crater like the one of the Gutîi (1443 m), destroyed by an explosive eruption.

Massif,[3] the Prisaca Massif, the limestone Boiu Plateau, the Chioar Hills, the Copalnic Depression, and the Baia Mare Depression. Within them appear smaller units, special in appearance and genesis.

The central area of Chioarului is between the rivers Lăpuș and Someș. The axis of the area would be the Lăpuș River that runs in the direction that goes from south-southeast to north-northwest. Lăpuș River is the longest river in Maramureș County, collecting the waters from the Igniș and Tibleș Mountains and from the Breaza Ridge and the Preluca Massif. It springs from below Văratec Peak, at about 1200 m altitude, and flows into Someș. It has a length of 114 km, which runs mostly through the Chioar area. Someș River, which borders the Chioarului in the western part, crosses the Maramureș County on an area of 50 km [1].

From a geographical point of view, we cannot say that the Chioar area outlines a natural unit with specific features such as those of the Maramureș County (historical Maramureș) or the Country of Hațeg, but the historical, economic, and political conditions are the characteristic features of this territory.

The territory of Chioar has been inhabited since ancient times; the evidence is in the research done by the County Museum of History and Archeology Maramureș together with specialists of the Archeology Institute of Bucharest, which identifies as the points of scientific interest the localities Mesteacăn, Boiu Mare, Prislop, and Văleni. Between 1978 and 1979 in Mesteacăn (Valea Chioarului commune), a locality mentioned in 1424, excavations were made after which materials from the Bronze Age were discovered, more precisely an anthropomorphic statuette and other ceramic objects and remains. Also in the same locality, a Roman coin from the fourth century was discovered, as late as the Roman ceramic (late third to fourth centuries), and for the seventh to ninth centuries, a material made by hand and wheel [2]. The research already started provides sufficient evidence to find that we are not talking about a region where we can associate the terms "colonization" and "coming from elsewhere" but a community that manifests itself through the continuity of human settlements.

In the work of the *Graiul, etnografia și folclorul zonei Chioar*, Gheorghe Pop and Ioan Chiș Șter discuss the existence of a reference document, *Kövár vidékének tàrsadolma* written by Szentgyörgyi Mária, where it is mentioned that most of the localities were formed, their number exceeding 45. Another aspect mentioned in the paper is the documentary attestation of the Chioar area, from the thirteenth century. Since then the whole activity was centered around the Stone Fortress or the Fortress of Chioar (Kövár) that existed in the thirteenth century but is mentioned only in 1319 [3]. Of the fortresses from the thirteenth and fifteenth centuries that played a role in the military organization of Transylvania, the Chioar fortress was one of the most important ([4], p. 281) because it had an exceptional strategic position, so it was unmistakable: "the fortress is situated at over 400 m altitude, on the saddle of a hill surrounded by the water of the Lăpuș river, which realizes at the foot a gorge between rocks. The 600 m covered in length by the fittings of the fortress give the impression of a whole fortified hill, with very steep slopes that are lost in the water of the river, and at the top they continue with huge walls of walls, which form the belts of the fortress" [3].

The official register (cadastre) of 1566 shows that the territory of the Fortress of Chioar was quite large; 67 localities are mentioned "with the passage of time its

---

[3] The Preluca Massif is actually a high horst of 700–800 m, cut off by erosion surfaces (on which the households are scattered, as in the Apuseni Mountains) and deeply fragmented by narrow valleys. The maximum altitude on the northern edge is 810 m, in the Peak of the Flowers.

extent has always varied, the number of villages belonging to it exceeding 80" ([5], pp. 173–174). In 1378 the fortress was donated to the Romanian voivodes Balc and Drag and their brother Ioan, the descendants of Dragoş voivode from Maramureş ([6], p. 164); this family was keeping it until the death of the last descendant in 1555. In a short time Chioar Country became organized in voivodships with a certain number of villages. In the year 1566, there were 12 voivodes in 61 villages, and in 1603 there were 16 voivodes in 81 villages. In the official registers that have been kept, the number of inhabitants is mentioned, as well as the duties they owed to the citadel. In about 61 villages, there were 230 families of nobles, the Chioar area being the area with the most Romanian nobles, after Făgăraş ([7], p. 11).

From November 1599 to September 1600, the fortress and the entire Chioar territory were under the leadership of Mihai Viteazul. In the second half of the seventeenth century, the land came into the possession of the Habsburg Empire, which, starting in 1662, administered it through the Teleki family.[4] Under Austrian rule, the inhabitants of the district were forced to contribute food, money, and labor for the imperial army. The social oppression was doubled by the confessional one, by the insistence of Vienna to impose Catholicism[5]. From here, in various ways, this greedy family will grab everything they can (land, especially), wanting to make Chioar a large area with a unitary structure.

As is well-known, the establishment of the Habsburg regime in Transylvania brought many movements and the privileges of the servants. People who fled from authorities, called "fugitives," are sometimes made up of gangs who keep the authorities under tension. This is also the case of Grigore Pintea with his numerous fortresses of Romanians, who hoped that by the victory of the rebels, they would avoid falling into the "eternal slavery" that they felt the Teleki family was preparing. In 1703 Pintea was killed, and the uprising ended with the peace concluded at Satu Mare in 1711. In order to avoid the regrouping of the anti-Habsburg forces, the Fortress of Chioar was destroyed in 1718, by General Rabutin de Bussy's order.

The inhabitants of Chioar today call it "the city of Racolţa" (a link to the name of Francesc Rákoszi, the rebel). In the memory of the inhabitants, the demolition of the fortress lasted a long time because, it is said that the people took the tile from which the fortress was made to make their baking ovens—among the few that are still preserved today. We will not dwell on the modern history of the Chioar area; we will say only that the people of these regions received with great enthusiasm the historical decisions of 1 December, 1918, to which they sent their representatives.[6] The foundations remained all the traditional ones, strong on which the healthy spirituality of some proud people was built, of a richness of souls and nobility who are no more valuable than other inhabitants of the Romanian lands.

---

[4] In February 1662 Kamény Simon, son of the deceased prince Kamény János, appoints Teleki Mihái as the supreme captain of the Chioar.

[5] Toward the end of the seventeenth century, confessional disorders among the Romanian population from Chioar will also appear. Some accept Catholicism while others do not, the result being the division of villages from an occasional point of view (e.g., Vălenii Şomcutei).

[6] From Chioar area there were important people of the time, who participated in the revolution: Ion Buteanu, the prefect of Iancu, and Ioan Popescu from Coaş, who after participating in the revolutionary events in Chioar, from 1848, moves to Moldova, Bârlad, where it establishes and activates a normal school—now under the name of the Normal School "Alexandru Vlahuţă," one of the oldest pedagogical schools in the country.

2. The level of ethnographic and folkloric research of the area

Scientific research currently has numerous data on the evolution of concerns for Romanian folklore. The stage reached the concerns for the popular heritage and especially the areas that have been researched, still requires some contributions, even more so than for some folklore areas, such as the Chioar area, some collections and representative studies that would help a better understanding and identification of the particularities of this area. Of course, we cannot dispute some concerns for the collection of folklore material from Chioar undertaken by personalities interested in the folklore of Transylvania. On the other hand, the research activity on a region or the development of a particular subject will never cover the entire activity of a community. There will always be a side that will never be known and one that is waiting to be discovered and deciphered from the many documents that have remained manuscript until now. We consider that such an activity would put in a clearer light the general ethnological folkloristic movement and that of areas less known as the one in question.

Leaving aside the indirect testimonies about this area, it seems that the first written notice in a prestigious magazine, about the popular Chilean spiritual production we owe to AP Alexi: 7 texts by Doine *Doine și hore poporale (Din ținutul Cetății de Peatră)* published in *Familia* ([8], p. 164) magazine in 1871. At the end of the nineteenth century, the greatest merits in the field of folklore collection in the Chioar area were attributed to a teacher named Ilie Pop from Șomcuta Mare. He also responded to the requests of Simion Florea Marian (1847–1907),[7] sending a rich material regarding the customs in the area which is present through the collected folklore materials, in numerous periodicals of the time such as *Amicul familiei*, *Șezătoarea*, *Familia*, *Tribuna* (1884–1903) and the *Gutinul* newspaper (published in Baia Mare between 1889 and 1890, intended to inform a wider public). We must mention that in the *Cărțile săteanului român, nr. 7* (1878), Ilie Pop published an article entitled *Cetatea de Peatră*, in which he talks about the name of the fortress and of the Chioar, the Chiorean tradition, recounting the legend of the construction of the fortress heard from some elders.

The one who somehow understands Ilie Pop's concerns about the folklore of the Chioar area is Emil Bran (1864–1941),[8] trained in the cultural environment of the city of Gherla. The contribution regarding this area is reported in the periodicals of the time (in the *Tribuna* magazine, the ballad *Tânguirea nevestei* is published, specifying that it is a "popular literature").

The folklore collectors in the Chioar area prove to be, during this period, with a good sense of the selection of folklore productions, but there are numerous gaps regarding the data on localities and informants, and there are certain interventions in the folklore production text that harm the authentic. However, their merit remains unquestionable regarding the beginnings of the folklore movement in Chioar, which will be developed and amplified in the next century.

---

[7] Renowned folklorist, member of the Romanian Academy, born in Iliești in Suceava. In addition to folklore collections from all the lands inhabited by Romanians, he wrote monographs on holidays, Romanian customs, ornithology, chromatics, etc. Through his work he laid the foundations for the scientific research of folklore and stimulated the wide collection of popular creations by other researchers.

[8] A fost fratele preotului greco-catolic Laurențiu Bran, primul român care a tradus poeziile lui Mihai Eminescu în alte limbi.

In 1920, at the initiative of the teacher Poptefan Pop, with the collaboration of Ilie Pop and Aurel Buteanu, appeared the "sheet" *Chioarul*.[9] The most valuable folklore collections published in this magazine are those of Andrei Grobeiu and Vladimir Diaconiță-Poiană, especially the sinks from their collections and manuscripts (*1070 chiuituri ale Chioarului*). Some attempts (Micle Adelaida, *Contribuții la cunoașterea activității desfășurate de doi dascăli din Țara Chioarului, Ilie Pop și Andrei Grobeiu*) ([8], p. 172) to highlight the material of the collection have classified the siftings collected by the two teachers in the following groups: satirical, erotic, of greed, friendship and social-political character, of course being a questionable division.

In the first half of the twentieth century, several publications intended exclusively for the publication of folklore material, such as *Izvorașul* (1919–1940), *Comoara satelor* (1923–1927), and *Anuarul arhivei de folclor* (1923–1945), which will also include folk material from the Chioar area. The most important contributor to the *Izvorașul* magazine was teacher Costică Iureș from the town of Vima Mare (belonging to the county of Someş). He sends to the magazine five lyrical songs under the title *Doine, cântece*.

Between 1969 and 1970, in the *Rapsodia chioreană* magazine of the High School in Șomcuta Mare (today named "Ioan Buteanu" High School), songs collected by the students of the high school are published. Also here we find the study *Arta populară în lemn din Țara Chioarului* signed by Sabin Șainelic,[10] which brings to light details of the popular architecture found in the area (the reason for the tree of life, the reason for the sun). The popular dances were also absent from the concerns of the researchers of the Chioar area, Gheorghe Baciu and Gavril Ghiur, being the authors of two volumes entitled *Dansuri populare din Țara Lăpușului și Țara Chioaruluii* (1973). Virgil Medan was preoccupied with the Chiorean musical folklore, publishing the work *Cântece epice* (Cluj-Napoca, 1979), where two transcribed variants of the ballad *Pintea Viteazul* are included. The first is collected from Valea Chioarului (p. 221) and the second from Buciumi (p. 223). Both are built on the occasion of revealing the secret of Pintea's death.

In the context of the concerns for the folklore of the Chioar area, a series of studies were carried out under the aegis of the County Center for the Conservation and Promotion of the Traditional Culture of Maramureş (CJCPCT), which resulted in reference works, for example the work of the Janeta Ciocan, *Portul popular din Țara Chioarului*. Other important works are as follows: *Arhitectura bisericilor de lemn din Țara Chioarului* (Sabin Șainelic, 1971); *Dansuri populare din Țara Lăpușului și Țara Chioarului* (Baciu Gheorghe, Ghiur Gavrilă, 1973)[11]; *Instalații populare pentru obținerea uleiului în zonele etnografice Chioar și Lăpuș* (Janeta Ciocan, 1978); *Nobilimea Chioarului* (Valer Hossu, 2003); *Miorița s-a născut în Maramureș* (Ștef, Dorin, 2005)[12]; and *Satele Chioarului la 1405: date istorice, economice, demografice și etimologice pentru anii 1231–2005* (Vasile Radu, 2005). The list of

---

[9] Appeared under heavy financial conditions, the *Chioarul* was printed at Șomcuta Mare, at the typeface "Mercur" where folklore collections also appear.

[10] The researcher who writes the first studies on the Codru and Chioar areas.

[11] The work includes drawings, graphic scoring of dances, illustrative sketches, musical scores, etc.

[12] It contains an anthology of 136 texts of the version *Miorița*—carol, collected from Maramureș (Maramureş County, 63; Chioar Country, 22; Country of Codrului, 28; Country of Lăpușului, 23). The texts were published, with two exceptions, in various collections, anthologies and periodicals, published in Maramureş, in Cluj-Napoca or Bucharest, between 1925 and 2001.

works could continue because the Chioar area still represents an interest for ethno-musicologists and not only as evidenced by the articles published in the *Memoria ethnografică*.[13]

Among the highly individualized areas, with customs, beliefs, and well-preserved habits, there is the Chioar area. Despite the interference with the neighboring areas (Codru, Lăpuș, Maramureș Istoric, Sălaj), this area has retained a series of characteristic elements in archaic form. An important feature of this region is the wheat, which Chis Ioan Șter states in the work *Graiul, etnografia și folclorul zonei Chioar* (1983) that it is almost confused with the Codru area and thus we are entitled to count the Chiorean dialect as belonging to the family of the Someanese dialect. We could say that the area is, rather, a "transition" between Codru (due to the many common elements of the Someșean type) and Lăpuș (against which there is no firm geographical delimitation). However, there are localities that are individualized in terms of dialect. An exception is the locality of Vălenii Șomcutei, where the vowel "ă" is not used properly; in some words it is replaced by the vowel "a" (e.g., *Maicuță când m-ai facutu/Doamne bine ți-o parutu/De părerea ta cea bună/Mi-ai facut fașe de lână/Și procuț di matragună*). An explanation of this fact was not found; it is certain that even today the locality is individualized with this particularity in speech.

With the arrival of the Hungarian colonists in the Depression of Maramureș, from the end of the thirteenth century,[14] there were also influences on the lexicon which were not only due to the political, administrative, or military factor but also to the coexistence of the native population with the groups of colonists, in the last seven centuries. Professor Gheorghe Radu mentions in the book *Observații asupra lexicului subdialectului maramureșean* (1970) that there are numerous Hungarian terms attested in the regionalisms of Maramureș County.

In the field of music (collections and transcriptions of songs, identification of musical peculiarities of the area), we can say that there is no important work to clarify these aspects. For these reasons, the Chioar area represents a territory with many elements in the field of ethnology or ethnomusicology that are waiting to be discovered and enhanced.

3. Inventory and archiving of the musical repertoire

The inventory and archiving of the musical repertoire are two interdependent activities, without which the manifestations of the past would be based only on stories of the indirect witnesses, not on living documents, which surprised the phenomenon in its full unfolding. Both involve a first, chronological and logical approach to the facts which, once recorded, will be kept in optimal conditions to last in time.

The Folklore Archive Institute of the Romanian Academy represents one of the oldest research centers of traditional culture, being established in

---

[13] It is a journal of the CJCPCT published biannually since 2001. The journal publishes original research and reviews of cultural and social anthropology (ethnology, linguistics, traditional medicine) and areas of interference.

[14] The Hungarian settlers arrived in Maramureș and northern Transylvania, being attracted by the rich hunting of the forests in the area, and later they discovered the salt deposits (from the perimeter of Ocna Șugatag-Coștiui), as well as the Baia Mare-Baia Sprie mining basin. For this reason they decided to colonize this region with Germans and Hungarians, to ensure an efficient exploitation of resources.

1930,[15] in Cluj-Napoca, its purpose being to study at a professional level the Romanian folklore, its links with the repertoire of other nationalities from Romania, as well as the cultural relations with the neighboring peoples. The Folklore Archive Institute of the Romanian Academy has a unique immaterial spiritual heritage in Europe, with over 750,000 ethnological and anthropological documents, and it has its own periodical publication, of international circulation, *Anuarul Arhivei de Folclor*, a remarkable scientific production. The institute has become a center of excellence in the institutional network of the Romanian Academy, carrying out some great works of national interest, among them are *Bibliografia generală a etnografiei şi folclorului* (1800–1930), *Ritualurile agrare româneşti*, *Cimiliturile româneşti*, *Proverbe româneşti, maghiare şi săseşti (dicţionar tezaur)*, *Cântecele populare ale maghiarilor din Transilvania*, and *Tipologia dansurilor populare*. Currently, within the institute the *Enciclopedia culturii tradiționale româneşti* is developed, and ethnomusicologists and ethno-choreologists are concerned with monographic research on the most important areas of Transylvania.

University professor Ioan Cuceu, director of the Folklore Archive Institute of the Romanian Academy in Cluj-Napoca, mentioned in a press article that the idea of a research project with the theme *Enciclopedia culturii tradiționale româneşti* was launched in a public session of the Romanian Academy on May 27, 1920, by Ovidiu Densuşianu, who at that time criticized everything that had been done so far in terms of knowledge of traditional culture.

Returning to our research topic on the musical folklore of the Chioar Country, within the Folklore Archive Institute of the Romanian Academy in Cluj-Napoca, I have identified a unique material, which deserves a special attention to be used further. We are talking about a number of 602 vocal songs that we extracted from 17 catalogs, ordered by certain periods, the first catalog being from 1950. Respecting the pattern offered by the catalogs, we made a table in which we included all the extracted songs. With one exception, the table is made according to the model offered by the catalogs. It has ten fields and not nine:

(1) Criterion number; (2) band number; (3) the title; (4) played from; (5) gender; (6) informant; (7) origin; (8) collector; (9) place and date of registration; (10) observations.

From our table we excluded the tenth heading. In the catalogs at the *observations*, data about the song were passed, whether it was transcribed or not. In the table of the institute, in the case of the songs that have not been transcribed, nothing is completed in this section, space is left, and to those that have been transcribed, "Tr" is written. The 602 vocal songs represent a musical material that has not been transcribed or published, so this section is not necessary in the case of our table.

The musical materials can be found both in the original version, the recordings being made on tape recorders, as well as in electronic format, (currently a tape digitizing activity is carried out—this is part of the inventory and archiving process adapted to the technological evolution).

The selected musical material was collected between 1958 and 1980 by important researchers who worked in Baia Mare and Cluj-Napoca such as the following: Virgil Medan, Ioan Chiș Șter, Ileana Szenik, Ioan R. Nicola, Doina Truță, Nicolae Both, Pașca Valer, Florian Elena, Berindan Emilia, Levendula Florica, Covaciu

---

[15] "Cu denumirea Arhiva de Folklor a Academiei Române, institutul a fost înființat, în urma memoriilor alcătuite de Ion Muşlea, pe lângă Muzeul Limbii Române al Universității Regele Ferdinand I din Cluj, în Sesiunea anuală a Academiei Române din mai 1930"—information taken over from the official website of the Folklore Archive Institute of the Romanian Academy—https://arhivadefolclorcluj.ro/despre-institut/istoric.

Lucia, dar și de către studenți pe care aceștia i-au îndrumat: Loliciu Tiberia, Lăscuțiu Corina, Popescu Rodica, Anca Natalia, Marinescu Maria, Arsene Doru, Răciu Sever, Coltău Rodica, Olah Paul, Ilieș Doina, Giurgiu Dana, Hosu Vasile, Istrate Adriana, Jurj Dochița, Sibian Rodica, Pop Sabina, and Govor Mărioara.

The localities investigated are the following: Cavnic, Groși, Cicârlău, Valea Chioarului, Vălenii Șomcutei, Stejera, Iadăra, Buciumi, Buteasa, Șomcuta Mare, Curtuiușu Mare, Hovrila, Durușa, Sârbi, Copalnic Mânăștur, Preluca Veche, Măgureni, Românești, Remetea Chioarului, Coaș, Berința, Cărbunari, Bontăieni, Negreia, Boiu Mare, Cetățele, Plopiș, Chiuzbaia, Codru Butesii, Remeți pe Someș, Remecioara, Finteușu Mare, Prislop, and Șurdești.

The informants from which the material was collected fall into the age category, 8–92 years.

Based on the data entered in the table, making a retrospective of the evolution of the material collection, quantitatively, in this case, most of the songs were collected between 1973 and 1979 (this appreciation is relative because in many cases, information boxes and the date and place of registration are missing).

Drawing on this statistic, we come to the conclusion that, from a musical point of view, the Chioar area has not so far been of great interest to researchers, with special attention being paid to the specific habits or certain crafts. We could not identify a specific reason for this fact, but we are convinced that any area has its specifics that it deserves and must be discovered step by step.

After identifying all the musical materials from Chioar, existing in the 17 catalogs of the Folklore Archive Institute of the Romanian Academy in Cluj-Napoca, I extracted each musical example from the tape recorder.[16] The timings of each existing song within the bands were not mentioned in the catalogs, so it was necessary to identify and listen to each musical example.

Our aim in the present research is to bring to light a unique musical material, which has not been harnessed beyond the collection stage, and to identify certain local styles of the Chioar Country area. Until we reached this level of research, we went through several steps, the first being that of selecting the musical material. After a first hearing of the 601 songs, we divided the musical material into 2 parts:

- One by selection criterion, somewhat instinctively, was the belonging of the song to the area in question. We selected 335 songs from the Chioarului area that will be analyzed.

- A number of 115 songs have the following characteristics: they are well-known songs, belonging to interpreters representing the time; ballads; playing songs in aksak; and rhythm that is not specific to the neocational lyrics of Chioar Country. They have two rhythms within the same song (parlando rubato and divisional or in some cases aksak); ballad texts were adapted to a carol song; they have influences from the south of the country, either they were listened to, learned, and then transmitted by the men who were doing the army in those times in the southern cities or they were received by the media. The peasant of the past (as well as the one of the present), if he liked a song from a certain foreign area, even far away, consciously managed to acquire it, taking also the means of expression specific to the area from which he came; thus, over time it became clear that we did not recognize the belonging of certain songs.

---

[16] Over time, the musical material existing within each band often exceeded 50 minutes.

Here, we are already witnessing a phenomenon in which the archaic song coexists with the new song resulting from the process of transformation and adaptation of traditional folklore to the conditions of modern society. The functionality of these songs is different from the traditional one. This is explained in the first place by the fact that the ideological and artistic horizon of the folklore creator—the anonymous peasant—is considerably enlarged by the contacts he has within the new village with the external factors from the urban environment.

The rest of the songs (152) could not be the object of our research because, besides the audition criterion, there were also cases in which different technical problems appeared, for example, the same recording was encountered at different levels and informants, creating the feeling that we have a song recorded in two variants, when in fact we are talking about one and the same. In the table a song with a certain quota was passed, but on the band corresponding to the quota, that song did not appear; this is the situation in which the recording had problems, and we could not transcribe the respective song musically.

I have encountered other situations, but these did not represent an impediment with regard to the musical transcription: cases in which the informants' data were wrong, which resulted from the recording hearing, where the informant provides data about him (name, place of origin, age); in some songs the informer or the collector was not passed, sometimes the title—often I made additions to the table following the information provided by the one who sang during the recording.

After selecting the material proposed for analysis, it was introduced in another table in which we made certain corrections or completions, such as name of informant and age, name of collector, name of song, or locality from which it was collected. All additions were made according to the data that resulted from the hearing of the material.

We wanted to point out how important all these details are which in turn contribute to shaping the identity of a repertoire. Often these data are an important point in the research process, and if they do not exist, we are in a position not to consider a material that might be interesting.

4. Methodology of classification of melodic types

In the process of evolution of folk creations, the classification has developed in close interaction with the theoretical results of musical folklore. The methods of musical classification applied so far to the music of different ethnic groups are distinguished by the morphological element pursued and by the hierarchy of structural features. We will briefly list the main methods and their characteristics [9].

1. The lexical classification (dictionary-type ordering) consistently follows one of the morphological elements: the melody (the cadences, the ambitus), the metrical rhythmic structure of the verse, or the rhythm. These methods have benefits when archiving is discussed. In this case we only consider the closest variants; it gives no clue as to the song.

2. The method that takes into account all the morphological elements (melody, rhythm, verse, form) is that of grammatical classification. In the evolution of the research, this method overlaps with the descriptive stage, which is due to the fundamental theoretical knowledge regarding folklore. The research at this stage is able to characterize the genres and highlight the particularities of the area.

3. The typological classification follows the grouping of the melodies into related categories, the models being constructed on a melodic and rhythmic level. In this case, a balance will be established between the two morphological elements, but the melodic element will prevail. Most of the typological classifications were conceived on the basis of the melodic criterion, comprising only vocal creations, (for instrumental music a sub-rhythmic classification and melodic subsidiary are elaborated). In the typological classifications based on the melodic element, there are various points of view regarding the hierarchy. As a whole, it is all about giving priority to the general features that will gradually evolve toward the particular features (timing system, architectural structure, etc.).

The songs belonging to the neocational lyrics are classified into three categories, old style songs, modern style songs, and vocal playing songs. Within each category, songs are classified musically, bringing together songs with common characteristics and melodic types. In each case I first separated the minor songs from the major ones, and then, I ordered them according to the number of melodic lines (with two melodic lines, minor and major; with three melodic lines, minor and major; with four melodic lines, minor and major; and with five melodic lines, minor and major lines). I took each copy separately, and, depending on the number of melodic lines, I made a diagram of the form, which also includes the main lines. These shape schemes present, from a geometric point of view, a certain general melodic profile. It is shaped by the relation of three or more points (depending on how many melodic lines we have) linked by an imaginary line: the starting point, the climax, and the end point.

In some situations the climax may be missing, resulting in a unilinear or recti-linear profile, this being the simplest: ⎿__2__3_⏌.

• When the climax coincides with the initial point, a descending melodic profile results.
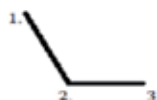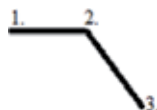
• When the climax coincides with the end point, an ascending melodic profile results.
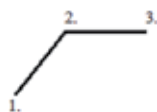
If the climax is located at the middle, at a distance approximately equal to the initial and final point, then a vaulted, ascending or descending melodic profile results.

The establishment of the melodic profile is indicative because there are various intermediate variants; when they are combined, a variety of models result—the unilinear profile is neutral to the other two. Take as an example the profile called zigzag or combined vault (combination between upward and downward arching). In this case we are talking about songs with four or more melodic lines.

Once we analyzed each song and identified the melodic profile, I made an order of them starting from songs with two melodic lines and to the most complex case, in which the number of melodic lines varies between four and five (improvisational form).

The musical classification thus follows the sequence:

1. Uniliniar

	m			M	
A	B	C;	A	B	C
VII	VII	1	1	1	1

2. Boltit

	m			M	
A	B	C;	A	B	C
VII	3	1	V	5	1

3. Boltit combinat

	m			M	
A	B	CD;	A	B	CD
4	5	3 1	3	2	6 1
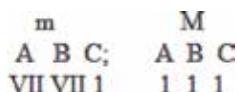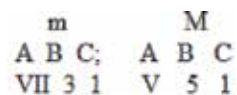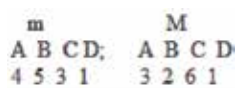
I have also encountered cases where the final was in the second stage. In this case I wrote only the number of melodic lines and the number corresponding to the cadence of each:

A	B	C	A	B	C	D
2	1	2;	7	3	5	2;
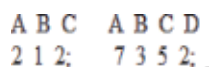
Regarding modern style songs and playing songs, identifying also a short refrain, a support refrain, positioned at the beginning, middle, or end of the song, we agreed that in the melodic profile scheme, next to the melodic line that has the refrain, we put a symbol ("+"); the position of this symbol will be in front of the letter corresponding to the melodic line if the refrain is also in front of the respective line and vice versa, after the letter corresponding to the melodic line if it is after it:

```
     m          M                    m                        m
  A+  B+    A+  B  C    A  A  B  C+        +A  +Acadential  B  Bcadential
  VII  1:   5  V  1:    1  1  4  1;         1     1            VII  1
```

This symbol ("+") is only used in cases where the refrain represents a complement, that is, the support refrain. When it is a stand-alone refrain, we use the following spelling:

```
            m                      M
     A  Brefren  Crefren;    A  B  C  Drefren
     3    3         1        V  V  1  1
```

There were also cases in which both situations were present, proper refrain and support refrain:

```
         m                        m
  A+  A+  B  C  Drefren;    A  B+  C  D  E+refren
  5   5   4  8  1           VII 5  4  1  1
```

Having as an important reference the musical typological classification, we made a numbering of the songs according to it. In the case of songs that had several variants, we proceeded as Béla Bartók (1881–1945). In the case of variants, it does not change the order number of the song but keeps it, adding a small print letter, starting with "a" (e.g., 187a, 187b, 187c … 187, etc., depending on how many variants we have). This numbering offers a good visibility of the songs belonging to the same melodic type.

5. Specific aspects of the transcription of the songs in the Chioar area

At the level of the musical language, despite the fact that we have not found sources that talk about the particularities of the Chioar area, we consider that the musical material we submit to the study (335 songs from the neocasual lyrics, of which 84 are variants) is a representative source, in which we can identify a number of elements that outline the specificity of the area. The repertoire of the neocational lyric contains the most alive genres of folklore, being subjected as such to a continuous preface, in order to be in step with the life and feelings of the people, the melodic types materializing in countless variants. The broad sphere of the neocational lyric is defined only on the basis of the literary and functional criterion. Taking into account the musical criterion, we distinguish three genres: the doina, the song itself, and the vocal song of play.

I made the transcript of the musical material in such a way that the score would play as accurately as possible the sound reality, be easy to decipher, and not create a barrier to the one who has the interest to decipher it and the song would illustrate the idea that was wanted to be transmitted with his help.

Each copy in the collection was transcribed at least twice, so the musical material was learned much faster, and when I met several variants of a song, I could make the correspondence between them much easier.

In the case of each song, the transcript corresponds to the first verse, except in cases where the beginning is unclear or has an incomplete form, in which case the second or third verse was transcribed (a fact marked by the number 2 or 3 next to the first melodic line). I have also encountered some examples of songs in which the performance has an improvisational character, the variations targeting both the rhythmic-melodic parameter and the formal aspect, these songs being transcribed entirely. All the transcribed musical material is present on a CD in MP3 format, the order of the songs on the compact disc being the same as the one in the work.

The own song, a genre rich in themes and ideas with countless variants, is a fundamental material in the research of musical folklore. Especially confessional and intimate, the song expresses varied feelings and ideas, depending on the nature of each individual or the spiritual state that they externalize through the art of sounds. To the common name of the *song* in the scientific terminology was added by Constantin Brăiloiu the *own* explanation, to distinguish it from the occasional songs, integrated to some habits, particularly functional and thematic. Permanent renewal explains the very large number of melodic types and variants existing in the repertoire. Within the musical material I researched, I came across songs that have one to eleven variants.

Some songs have common melodic types with other areas. An example in this sense is the modern style song *S-o dus badea-n cătănie* which is sung on another text and slightly melodically varied and from the Alba area:

Example 1 from the archive of the Cluj Folklore Institute:

Șurdești, MM.

Pop Maria, Pop Mărioara.

Cul. Istrate A., 1978; *Tr.* Uță L.

Examples 2 and 3 from Ioan Bocșa, *Muzică vocală tradițională din Munții Apuseni* [10]:

4. Pe din jos de Orăștie

Cetea, Galda de Jos, AB
Crișan Eleonora, 69

Pe din jos de O-răș-ti - e, Vin doi frați din că-tă-ni - e,

Doi-na măi, cân-t-o măi, Ei, hai, doi-na măi.

AB190 *Cul.* Bocșa I., studenți, 2012; *Tr.* Stan A.

160. De după deal, răsare luna

De du-pă deal, ră - sa-re lu - na, De du-pă deal, ră - sa-re lu - na,

Doi - na, mă, doi - na, mă, Ei, hei, doi - na, mă.

AB081 *Cul.* Bocşa I., studenţi, 2010; *Tr.* Reche R.

After the transcription stage, the material was classified into three broad categories: old style songs[17] (in 179 songs out of which 56 are variants), songs of modern style (in 95 songs of which 16 are variants), and songs playing vocals (in 61 songs, of which 12 are variants).

The old style song is characterized by the execution *parlando rubato*. Depending on the style of zonal interpretation—sometimes depending on the vocal capabilities of the performer—the melody is richly ornamented. In the Chioar Country, the songs are not very ornate, and they have a much more melodic outline. The most common are the anterior or posterior grace note and the lower or upper mordent; we do not find a loaded ornamental pallet. The song itself is widespread in an individual interpretation, a way preferred by the lyrical categories. Some creations, long crystallized and entered into the consciousness of the community, can also be interpreted as a group. And in this case, I met songs, performed especially by a group of women. I noticed that there is a person within the group who is somewhat imposing, both in terms of the interpretation and the smooth running of the song text. In these cases, the women sang with a loud, penetrating "metallic" emission, and in the individual singing, they were much more gracious.

Many of the melodic types we encounter are based on formulas specific to the melodic recitative. We give as an example the first melodic line in two songs: *Munte, munte brad crengos* and *Cucule pasăre blândă*.

Example 4 from the archive of the Cluj Folklore Institute:
Buteasa, MM.
Bodea Ion, 51.

Şi, Mun-te, mun-te brad cren-gos,

Cul. Şter C.I., 1975; *Tr.* Uţă L.
Example 5 from the archive of the Cluj Folklore Institute:
Remecioara, MM.
Filimon Leontina.

m, Cu-cu-le pa-să-re blân-dă,

Cul. Şter C.I., 1976; *Tr.* Uţă L.

If we sit and analyze, these general features are the resemblance to the doina; the essential difference consists of the character of the architectural structure: the free, improvised form in the doina, fixed (strophic) in the catalog itself.

Unlike the old style song, the rhythm of the modern style song, as a result of the transformation tendency, is an exclusively *divisive* one. In the last two centuries, a new style, called "modern" (Constantin Brăiloiu), also appears within the regional frameworks and on the basis of the national fund, following the important changes in people's lives: the gradual disaggregation of the closed peasant economy and patriarchal life., large population changes, either in search of work, or to escape exploitation, intense village-town or seasonal commuting, military service, the importance of the fighters in the life of the villages and their heterogeneous repertoire, etc.

The new style is imposed by its great accessibility; wide and fast circulation; uneven development on a regional level (it seems that the first new style songs appeared in the sub-Carpathian area); the exuberant, dynamic character, achieved through fast movement and regular rhythm (close to the measured rhythm); the simplification of the melody by giving up the melismatic richness; varied melodic contour; and large interval breaks.

Other features are as follows: developing the melodic verse by adding new melodic lines or repetition and adding to the traditional metric pattern some interjections; short melodic drawings sung on refrain syllables, at the beginning or the end of the melodic line; amplifying the sound material and the ambitus; new relationships between the final cadence and the inner cadences; the appearance of the major-minor tones; the tonal structure; the sensible formulas of ascending cadences; the preference for the songs with a single functional center; and the presence of the refrain in the end or inside the musical discourse.

Regarding the vocal dance music, in Chioar there are also songs performed vocally, on tetrapodic lyrics, usually appearing beside the text and shouting with satirical character. As a way of execution, often the rhythm (in most cases punctuated) is exceeded by the importance of the words, the performer giving priority to them, within the dances being close melodic variants. In the vocal dance song, the words are only a pretext for singing in the rhythm of the dance, and whole verses are often being replaced with the syllables of a refrain, *la, la, la,* or *na, na, na:*

Example 6 from the archive of the Cluj Folklore Institute:
Coaș, MM.
Petrică Elvira, 36 a.

Cul. Răciu S., 1975; *Tr.* Uță L.

6. Conclusion

We notice that the song does not lose its syllabic character even though it is slightly ornamented (with supports, mordents). Following the transcripts made according to the system adopted and practiced by the researchers of the Folklore Archive Institute in Cluj-Napoca, we identified these small differences with the folklore of other areas. From a sonic point of view, we can say that the folklore in the Chioar Country is largely similar to that of certain areas of Transylvania: Codru, Lăpuș, Sălaj, Cluj, Someș, Bistrița, and Alba. Collapsed as a number in the past, playing songs today represents, thanks to professional singers, an important chapter to be written in our folklore, as this genre is preferred in the transmission of new folklore ideas. It is our duty to look as far as possible on the authenticity of musical folklore as a legacy of the past and to give it to the next generation in a form that corresponds to reality.

Author details

Uță Larisa-Vasilica
National Academy of Music "Gheorghe Dima", Cluj-Napoca, Romania

*Address all correspondence to: larisa_uta@yahoo.com

References

[1] Poșca G, Moldovan C. Județul Maramureș, București. 1980. pp. 54-55

[2] Iuga Maria G. Cercetarea arheologică de la Mesteacăn. Article published in May 1980, în ziarul "Pentru socialism"

[3] Ursu V, Ursu T. Cetatea Chioarului vatră de piatră, de neam, de istorie, articol publicat în mai, 1980, în ziarul "Pentru socialism"

[4] României I. Editura Academiei Române din R.P.R., București. Vol. II. 1962

[5] Prodan D. Iobăgia în Transilvania. Vol. II. București: Editura Academiei Române; 1968

[6] Iosepescu S. Constatări de istorie militară medievală în bazinul Someșului Mijlociu, în "Marmația" 5–6, Baia Mare, 1979–1981

[7] Meteș Ș. Cercetări și sentințe judecătorești privitoare la românii din ținutul Cetății de piatră (Chioar) în sec. al XVII-lea (1661). București: 1946

[8] Pop G, Ioan Chiș Șter G. Etnografia și Folclorul Zonei Chioar, Baia Mare. 1983

[9] Iștoc L. Catalogul tipologic al cântecelor propriu-zise din Transilvania, Teză de doctorat, Prof. univ. Dr. Ileana Szenik, Academia de Muzică "Gheorghe Dima" din Cluj-Napoca. 1997

[10] Bocșa I. Muzică Vocală Tradițională din Munții Apuseni—Bazinul Arieșului și Văile Aiud, Geoagiu, Galda, Fundația Culturală TerrArmonia. 2013

Section 4

Biotechnology

A Survey of Physical Parameters and Natural Radioactivity in the Wooden Church of "Archangels Mihail and Gavril," Draghia

Ancuța Ţenter, Marin Coteţiu, Alexandra Cucoş,

Bety Burghele, Kinga Szacsvai and Verginica Schroder

Abstract

The aim of this chapter is to present information about the current environmental survey conducted in a wooden church in Draghia, Maramures County, Romania. The wooden church "Archangels Michael and Gavril" was built in 1706 and is registered as a category A historical monument in the national heritage. A mural painting of popular bills, in a precarious state of preservation, can be observed inside the church. A study was performed to analyze the correlation between the indoor/outdoor climatic parameters and degree of degradation in mural paintings. Additionally, an indoor radon screening was carried out in order to assess the potential exposure for workers and public. One of the most important environmental problems is the global climate change and its impact on the historical monuments in their natural space of conservation. The obtained results highlight how dangerous the climate can be in the long term regarding the state of conservation of the mural paintings inside the wooden church located in a natural environment.

Keywords: church, paintings, national heritage, physical parameters, natural radioactivity

1. Introduction

The preservation and promotion of the existing cultural values are important issues in order to preserve the inherited physical and spiritual richness and to transmit it to future generations.

The preservation of wooden churches was not perceived throughout history with troubled times, with the same importance as today.

It is now understood as a moral duty to preserve this cultural and spiritual treasure, to be passed on to future generations. According to the new philosophy of heritage, the concept of conservation was imposed, which implies a scientific approach based on research. Risk factors on heritage objects have been exposed by different specialized studies [1].

The environment can present multiple factors causing heritage degradation, such as geographic, climatic, and biological factors. The interdisciplinary research

helps the restaurateurs to know the general state of conservation from the perspective of the physical, chemical, and biological parameters which generated the current state. This knowledge is a necessity for the correct evaluation of the operations to be performed in the future: cleaning, consolidation, structural stabilization, hydrous, and chromatic [2].

The modern society is facing a rapid evolution technology with the price of high environment pollution. Additionally, climate change has become a priority on the list of the Sustainable Development Agenda of European countries [3].

Romania has a rich cultural heritage through the places of worship located throughout the country represented by wooden churches built over the centuries of Christianity. This fact is being favored by the political conditions specific to each period, as well as the accessibility of the construction materials and low cost [4, 5].

The wooden architecture represents one of the most magnificent examples of built heritage almost all over the world. They occupy an important place in the traditional building in Russia, North and Eastern Europe [6]. Unfortunately, all historical monuments can be affected by different factors under natural environmental conditions, i.e., aging of the materials, lack of maintenance, inadequate use, or natural hazards [7]. A better understanding of the structural behavior of these buildings is a crucial step to prevent social, cultural, and economic losses [4].

This study aims to be the first in a larger project focusing on monitoring the physical parameters of temperature, humidity, and natural radioactivity, inside wooden churches or walls with interior murals painting that are in an advanced state of degradation. The study was conducted in the wooden church of "Archangels Mihail and Gavril" in the village of Draghia in the Lapuș Country.

Determining the relative humidity (rH) of the air inside the church is the first step in the study—humidity is one of the most important causes of degradation being suffered by churches historical monument, especially those lacking waterproof insulation [8].

An essential condition is to know the history of the church, its characteristics, the geographical position, the previous restorations and consolidations, and the current degradation state. The action of degradation factors is cumulative and the consequence is not necessarily immediate, but over time, they can cause significant losses.

2. Historical and geographical area description of Lapuș Country

Over time, in the geographical area of Romania where the Romanian population lives or lived, several historical regions have emerged, which throughout history have belonged in whole or in part to the voivodeships founded in the tenth century (for Transylvania) and the fourteenth century (Moldova, the Romanian Country, and Dobrogea), either to the neighboring states. The boundaries and the names of these regions also known as "countries" evolved over time. Some or all of them have, temporarily or more permanently, constituted the territory of Romania.

Prior to the establishment of the traditional regions, there were Romanian countries (founded in the post-Roman period, in the early Middle Ages), called by historians the popular Romania and by the foreign chroniclers of Vlahii, some constituted in the form of cnese, others as simple rural communities, such as the lands of Crasne, Lăpuș, Gurghiului, Moți, Almaș, Făgărașului, and Bârsei (in Transylvania).

Transylvania or Ardeal (in Latin Transylvania or Transsylvania, in Hungarian Erdély, in German Siebenbürgen, in the Saxon dialect of Siweberjen, in Turkish Erdelistan) is a historical and geographical region located within the Carpathian

Figure 1.
Map Lăpuş Country.

Arch, one of the historical regions of Romania. Over time, it was part of Dacia, the Roman Empire, the Kingdom of Hungary, and the Austrian Empire. For about 170 years, between 1526 and 1699, it was autonomous, under the sovereignty of the Ottoman Empire, under the name of the Principality of Transylvania. In this capacity, it played a significant role in the 30-year war, on the part of the Protestant coalition. With the imperial victories on the anti-Ottoman front, Transylvania came under Habsburg administration, but formally retained its statehood until 1867, being governed by governors appointed by Vienna.

Transylvania is an important province of the Romanian political space, with a history that is strongly reflected through its multicultural particularities and the material evidence of its inhabitants. In time, heterogeneity, both ethnical (Romanians, Ukrainians, Hungarians, Germans, Jewish, etc.) and confessional (Orthodox, Catholics, Protestants, Neoprotestants, etc.), materialized into religious edifices [9, 10].

The northern area of Transylvania is the land of Maramureş, Lăpuş, Chioar, and Codrului, where we found over 100 wooden churches built since the seventeenth century (**Figure 1**) [11].

All wooden churches (main map) belong entirely to the Orthodox and Greek-Catholic confessions. Among these, there are eight remarkable churches included in the UNESCO world heritage list [12–16]. Built of wood, they continue to exist today thanks to the skill of the craftsmen and to the historical monument status enjoyed by 33 of the edifices (LMI, 2015) [17].

The land of Lapuş is the land of wood, tradition, and monasteries. In this region of Maramures, the time seems to have remained in place, and people have kept the centuries-old traditions. In the area of Lăpuşului, the remains of the authentic dowry still remain, from the ancestral architecture to the style, shape, and size of the households. Here you can admire the old wooden houses, with narrow porches (logs), supported by ornate oak pillars, glued with clay on the floor, shaded by garlands of vines, the large courtyards, and before, to the oilfield, the small kindergartens, flowers, shaded by plum, pear, or cherry [18].

3. Presentation of wooden church "Archangels Mihail and Gavril," Draghia

Drăghia is a small village in the land of Lăpuş, in Maramureş County. The first mention of the village dates from 1393 with the Hungarian name of Dragusfalva

[19]. Its name is mentioned in the document attesting that members of the Bánffy family of Losonc split between them certain holdings, among which Dragusfalva, on the 13th of October 1392, in Gilău [20].

In this village, one of the many wooden churches of the Lapuș Country built in 1706 is located, according to the Latin inscription above the entrance: Anno 1706 D. 14 obrys. According to the Orthodox tradition, the church was under the patronage of Saints Archangels Mihail and Gavril, and today, it is part of the Lăpuș Deanery, belonging to the Romanian Orthodox Diocese of Maramureș and Sătmar. It is made of oak wood, a very common building material in this geographical area.

The church is 12.40 m long, 4.45 m wide, 7.50 m high at the ridge, and 15.50 m high at the tower's spire. The base and the walls are all made of oak beams placed on a dry laid stone foundation [21] (**Figure 2**).

The entrance to the church is 161 cm high and 85 cm wide, forcing most people to bow in reverence while entering. The door was painted on the outside with the Archangel Mihail, but unfortunately it has faded to the point where one can barely make out a shade of the Archangel.

The building plan is similar to others found throughout the area; the church being divided into a narthex, nave, and altar [22]. The narthex has a polygonal shape, covered with a straight ceiling, above which the bell tower is situated. The ceiling is painted with cherubs, and the walls are painted with images of the Myrrhbearers, and of wise and foolish virgins from the Gospel of Mathew. The narthex was where the women would attend mass (**Figure 3**).

According to the requirements of the Orthodox church construction, the nave is rectangular, with a large dome and separated from the rest of the area by a wall with a door [23]. This wooden door is painted on with two saints (**Figure 4**).

The lower half of the door is painted with the tree of life in a pot. The door frame is engraved with area-specific symbols and historical times rosette with six petals, honeycombs, and wolf teeth. The opening is provided with slightly turned columns

Figure 2.
The church "Archangels Mihail and Gavril," Draghia.

Figure 3.
Holy women with cups in their hands.

Figure 4.
The door with two saints.

of different shapes that have been painted white [24]. Between the nave and the altar is the iconostasis. The altar is in a polygonal apse with domes.

Inside the church, the painting is tempera on canvas and wood and covers the whole interior. The painters applied the strips of hemp cloth glued with animal glue to the gaps between the beams and planks to create a continuous dyeing environment.

The painting in the nave is badly damaged, many scenes being unrecognizable, only a few color spots left. Among the visible images are the stairs of Jacob, the Holy Trinity, Elijah riding to heaven in his chariot of fire, and the four evangelists. The paintings on the iconostasis, which were somewhat sheltered, can be fully identified. As an example, the 12 Apostles are depicted with Jesus as a high priest in their

midst, and at the top of the iconostasis is a wooden cross painted with crucified Jesus. Portraits of the six Old Testament prophets are painted on the frame of a semicircular opening above the iconostasis, and on both sides of the cross are painted the sun and the moon.

4. Assessment of the conservation status of the mural painting in the church of "Archangels Mihail and Gavril," Draghia

Due to the inclement weather, the precarious conditions of the periods of the two World Wars, and the different social and environmental factors, the painting inside of the church is in an advanced state of degradation. In 2006–2007, the architecture of the church was consolidated and restored, on which occasion the shingle covering, which served as a roof, specific to the Transylvania area was rebuilt. The roof was damaged by rain and perforated in many places of wood-peckers. During the consolidation works, some planks from the vault of the nave were considered by the builder to be much degraded. It is possible that those splinters may have kept vague traces of the paint layer.

Tannins from the wood support and solubilized organic substances were migrated in the pictorial layer in the infiltration zones (**Figure 5**).

Due to the large variations in temperature between day and night, there have been volumetric changes of the wood support, which have caused cracks and detachments at the level of the pictorial layer on extended surfaces. This phenom-enon is observed especially on the south side of the church, which is much more strongly heated by the sun's rays compared to the other sides. Due to the unfavor-able conditions of microclimate and against the background of some flaws in the technique of painting execution, there is an accentuated dustiness of the painting layer, produced as a result of the degradation of the binder and the loss of cohesion between the constituent materials of the painting layer. Visually, there is a chalky appearance of the surface.

As a result of the degradation of the binder, combined with the volumetric changes of the wood substrate under the action of absorption and loss of humidity, the adhesion of the pictorial layer on the substrate also occurred, resulting in evolutionary detachments, the exfoliation being mainly in the form of roof slabs or scales and isolated alveolar forms.

These degradations were highlighted by direct visual examination and with magnifying glass, in shining light. There are massive losses of pictorial layer, up to the support, due to the wear caused by deletion and involuntary hit of the surface (**Figure 6**).

Figure 5.
Semicap altar—degradation caused by humidity infiltration.

Figure 6.
Section from the north wall.

The partial detachments of the textile strips (initially bonded to the joints to create a continuous field for painting) led to exfoliation and loss of paint layer on the respective surfaces. Many such textile strips were completely detached from the support, along with the pictorial layer, and were lost.

5. Statistical analyses of microclimate parameters: temperature and relative humidity

The microclimatic regime inside the church is influenced by the characteristic climate of the latitude and the specific geographical position of the Lapuş Country. Lapuş Country, due to its Nordic position, presents a temperate continental climate with western and Scandinavian-Baltic ocean influences from the north, having a cooler character. Air masses bring abundant snow from the north in winter, and cold rain in spring and autumn. In order to have a better understanding of the changes in the microclimate values inside the church, two stages of temperature and relative air humidity monitoring have been carried out. To this end, different temperature and humidity monitoring systems were installed inside the church to establish an average, and to obtain a high accuracy of the measured values. Passive and active monitoring systems for natural radioactivity (i.e., radon) were installed alongside climatic monitors. The church not being connected to the electrical network, limited the types of equipment used and the time span of measurements. The specific characteristics of monitored environment, i.e., wooden construction, placed directly on stone vaults, without being plastered on the outside and inside walls, and having no heating during the cold periods were taken into consideration for data analysis. Meteorological data were acquired from a local weather station.

The first monitoring stage was chosen during winter (February 2019). A Radon Scout (SARAD GmbH, Germany) was placed inside the church and set to record data every 60 minutes. During this period, a minimum value of −5.5°C and a maximum of 8.5°C were recorded, with an average value of 1.73°C (**Figure** 7). The
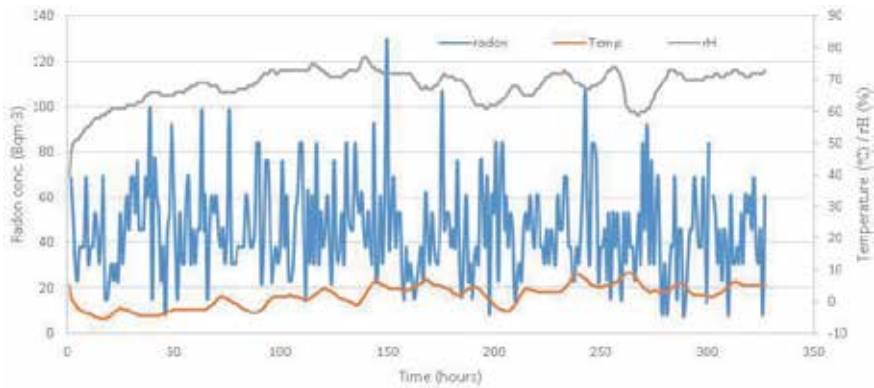
Figure 7.
Time series distribution of radon and physical parameters in the wooden church of "Archangels Mihail and Gavril," February 2019.
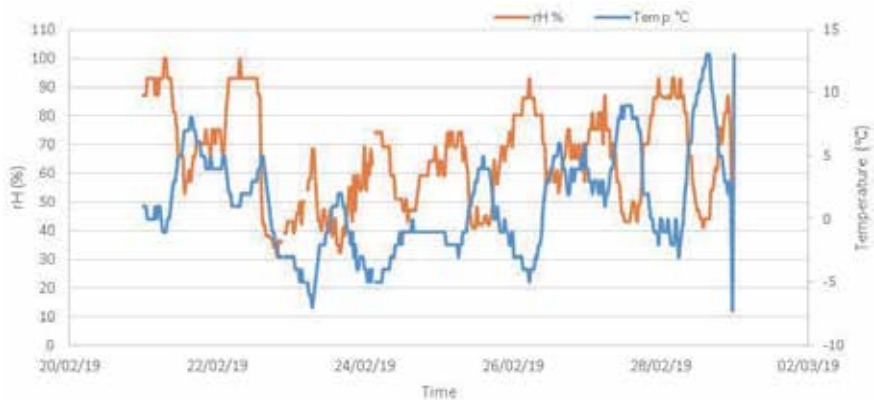

Figure 8.
Weather conditions in the area at the time of study (February 2019).

average relative humidity of the recorded air was 67.95%, which was well above the recommended of 50–60% [25].

The data provided by the Baia Mare weather station for the time interval of interest showed the following outdoor conditions: an average temperature of 1.27°C, with a minimum of −7°C and a maximum of 13°C (**Figure 8**). This fact explains the naturally low temperatures recorded inside the church, which is not equipped with a heating system.

The high values of relative humidity of the indoor air, prompted a second stage of measurements, carried out for 30 consecutive days in September–October 2019. The autumn of 2019 presented unusually warm and dry conditions.

During the second measuring campaign, indoor temperature was recorded using two portable data loggers placed in the two rooms of the church. These data loggers were set to record indoor temperature every 5 min in order to assess the temperature fluctuations with great accuracy. The short-term temperature sampling was used to identify the minimums and maximums of temperature during the 30 days of measurements (**Figure 9**). These extreme values are paramount in assessing the impact of the indoor microclimate on the preservation of wood painting.

Overall, an inside average temperature of 13°C was recorded during the monitoring period. However, the temperature inside the wooden church ranged between 1°C and a maximum of 33.44°C. A 36 h window (23.09.–24.09) showed a
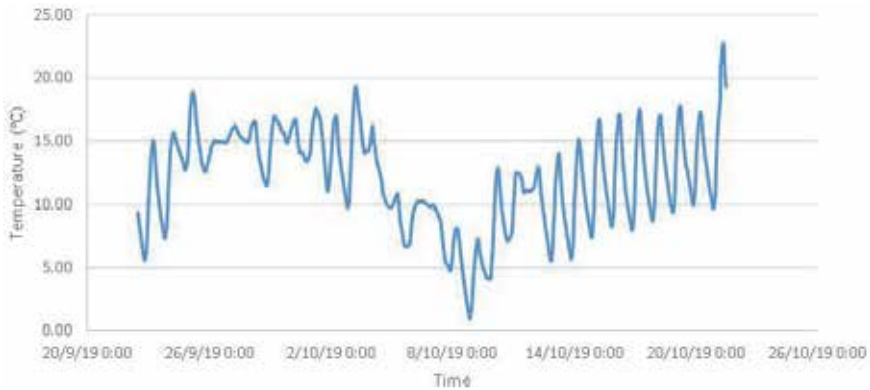
Figure 9.
Time series of indoor temperature during the second measuring campaign (September–October 2019).
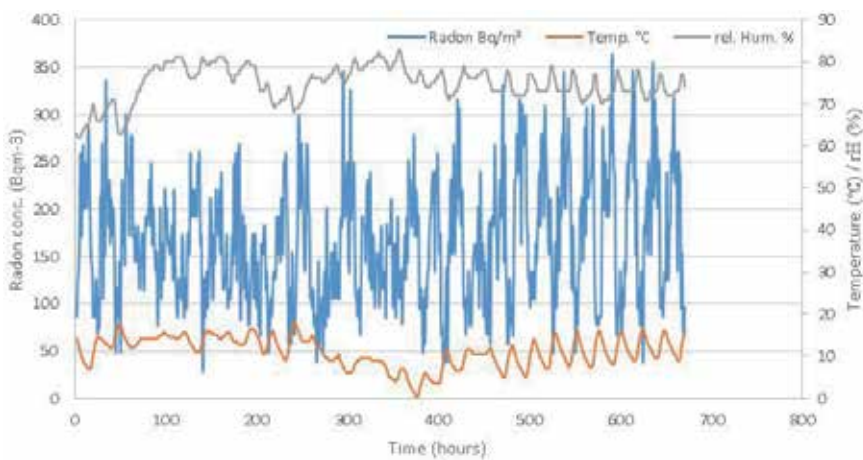

Figure 10.
Time series distribution of radon and physical parameters in the wooden church of "Archangels Mihail and Gavril," September–October 2019.

temperature difference of 11°C indoors. These increases and decreases in temperature at such short intervals, which occur quite frequently during the monitored period, are not the most suitable conditions for the state of conservation of the painting. They produce expansions and contractions of the material, causing ruptures and cracks in the oil on the canvas. These frequent repetitions cause the material to become excessively friable [26].

Alongside temperature data loggers, a Radon Scout was installed to record hour-by-hour data of radon, temperature and rH indoors. During this period, a minimum value of 0.5°C and a maximum value of 18°C were recorded, leading to an average value of 12°C (**Figure 10**).

The data provided by the Baia Mare weather station for the time interval of the second measuring campaign showed an average temperature of 13°C, with a minimum of −4°C and a maximum of 27°C. On the other hand, the values of the relative humidity of the outdoor air had very high values during this period, with an average of 73%, which may have caused and maintained the high humidity inside the church (**Figure 11**).

In order to have a more complete overview and to identify the areas with high risk of degradation, during the second campaign, we carried out humidity measurements at different points of the church, both outside and inside [4]. A manually
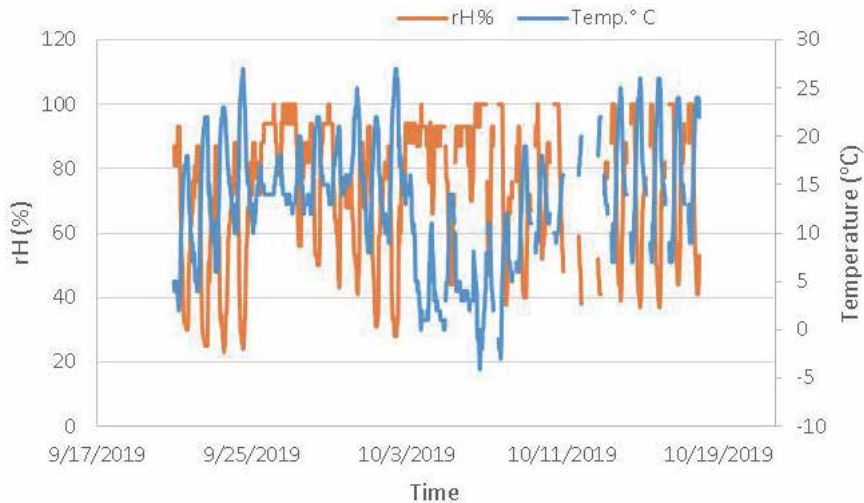
Figure 11.
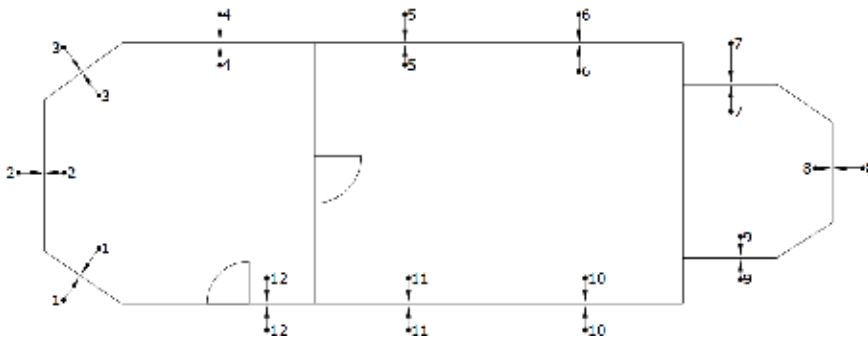*Weather conditions in the area at the time of study (September–October 2019).*

Figure 12.
Drawing plan of the wooden church with markings of the 12 indoor and outdoor sampling points.

operated particle measuring device (Trotec GmbH, Germany) was used to record important climate data such as the relative humidity and the air temperature. The measurements were performed every day between 19 and 19.30 p.m. The 12 points on the outside and inside the church were set at the ground level (**Figure 12**). The recorded data allowed the observation of relevant variations in the values of rH, between the outer and the inner points of the wood surface.

The highest average values (80.30, 80.90, and 80.30%) were recorded in sampling points 10, 11, and 12, behind the door of the church. This may explain the state of advanced degradation, the painting being almost completely obliterated, more so than in other areas inside the church (**Figures 13** and **14**).

It is well known that the most important and difficult conservation method is the constant maintenance of the indoor climate of the heritage building by attaining the most favorable temperature and humidity conditions. Taking into account the construction characteristics of the church and research data, it is mandatory to undertake fast solutions in order to stop the advancement of the degradation.

The outdoor climatic changes increase the preservation issues inside the wooden church, causing a constant indoor microclimate fluctuation, making the task of keeping the mural painting in optimal conditions in the long term a very difficult one. Under these conditions, a recommendation would be to install a portable air

Figure 13.
Degradation state of paintings near sampling point 10, 11, and 12.
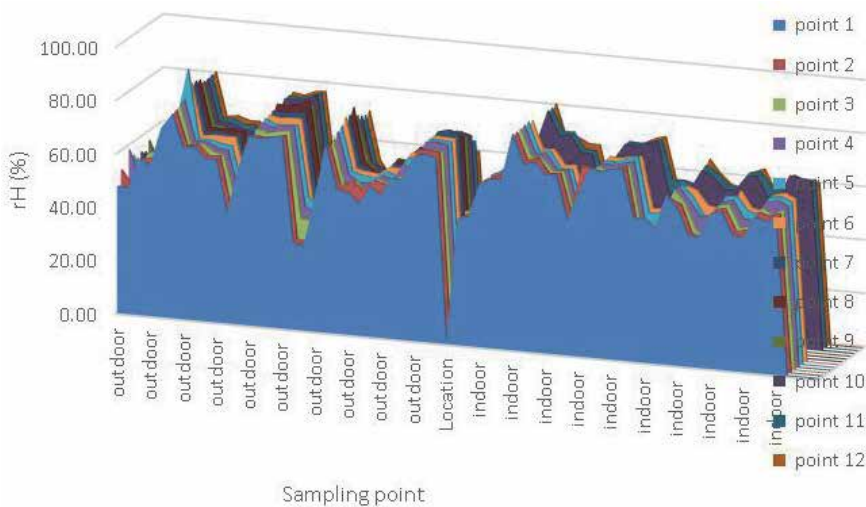
Figure 14.
Indoor/outdoor variations of relative humidity.

dehumidifier with a setting function allowing the relative humidity of the indoor air to be decreased between 50 and 60%.

6. Study on natural radioactivity by measuring the radon concentration inside the church

Exposure to radon in homes and workplaces is now recognized as the most important natural factor in causing lung cancer [27–31]. The international organizations that aim at protecting the public and the environment from exposure to radiation (UNSCEAR, WHO, IAEA, IRPA, and ICRP) are recently paying an increased interest to radon exposure and radiation protection measures [31, 32]. Based on Articles 35-36 of the Euratom Treaty, the most important objective of EU Member States is to monitor and report the radioactivity of the environment [33]. On the basis of international regulations, the problem of radon was assumed in Romania through the national legislation (HG nr. 526/2018, art.23) clearly stating

that radon concentration is to be determined, irrespective of the priority area, in buildings with public access [34].

The church under discussion is included in the Historical Monuments List, under the code LMI: MM-II-m-A-04569, and this inclusion was approved by the Directorate of Historical Monuments from the Department of Worship, no. 14301-1514 from the 5th of September 1967. The site is a public access building, visited by tourists and religious followers. In the summer of 2019, a group of 50 pilgrims led by a monk, attended the Holy Mass at the church on the hill. In the last few years, the church has been visited by a high number of visitors attracted by this part of country, rich in tradition and culture. Under these circumstances, we considered it necessary to evaluate the natural radioactivity, by radon measurements, of the "Archangels Mihail and Gavril" wooden church.

Active radon measurements carried out during the two separates campaigns yielded indoor radon activity concentrations ranging from 29 to 364 Bq m^{-3}. During the first campaign, one of the windows could not be closed properly; this allowed a high air exchange rate that led to the dilution of indoor radon to an average value of 46 Bq m^{-3}. By the time the second campaign took place, the faulty window was restored. The average value of 166 Bq m^{-3} was recorded during the second monitoring campaign. The indoor radon time series for the two seasons [35] monitored were represented in **Figures** 7 and **10**.

At the time of the second campaign, passive radon detectors were installed along the active monitoring system. Indoor passive radon measurements were performed by using CR-39 track detectors exposed for 1 month, in all three rooms of the wooden church (**Figure 15**), according to the NRPB Measurement Protocol [36].

Following the laboratory analyzes performed at the Constantin Cosma Radon Laboratory of Babeş-Bolyai University, an average concentration of 107 Bq m^{-3} was obtained for the monitored period. Taking into consideration the seasonal correction factors implemented through national regulations, the annual indoor radon activity concentration for the investigated public building was calculated to be 140 Bq m^{-3},

Figure 15.
CR-39 detector.

well within the limits allowed by both the European Union, WHO, and by the Romania law regarding the exposure of the population in public spaces [37–39].

7. Conclusion

In the short-term analysis, the results of 30 days of continuous monitoring showed that environmental climate changes can have an influence on the interior conservation status of the studied church.

Future work should focus on the implementation of long-term measurements, deepening these techniques as well as performing chemical and biological analyzes at the mural painting level.

Taking into account these aspects, a short-term recommendation would be to install a portable air dehumidifier with a setting function allowing the relative humidity of the air to be brought in between 50 and 60%.

Acknowledgements

Conflict of interest

None of the authors have any competing interests in the manuscript.

Author details

Ancuța Țenter[1*], Marin Cotețiu[2], Alexandra Cucoş[1], Bety Burghele[1], Kinga Szacsvai[1] and Verginica Schroder[3]

1 Applied Environmental Research Centre, Faculty of Environmental Science and Engineering, Babeş-Bolyai University, Cluj-Napoca, Romania

2 Faculty of Orthodox Theology, Babeş-Bolyai University, Cluj-Napoca, Romania

3 Department of Cellular and Molecular Biology, Ovidius University, Constanța, Romania

*Address all correspondence to: ancuta.radutenter@gmail.com

IntechOpen

References

[1] Constantin M. The restauration of the iconostasis of Tismana monastery (2013–2015). The influence of microclimate parameters variation on the Restauration interventions. In: Restauration Book 2017. Editura ACS; 2017. pp. 130-157

[2] Paolo M, Laura M, Paul P. La conservation des peintures murales. Bologne: Editrice Compositori; 1977

[3] 2030 Agenda for Sustainable Development. Available from: https://www.mae.ro/node/35919

[4] Aguilar R, Marques R, Sovero K, Martel C, Trujillano F, Boroschek R. Investigations on the structural behaviour of archaeological heritage in Peru: From survey to seismic assessment. Engineering Structures. 2015;**95**:94-111

[5] Karanikoloudis G, Lourenço PB. Structural assessment and seismic vulnerability of earthen historic structures. Application of sophisticated numerical and simple analytical models. Engineering Structures. 2018;**160**: 488-509

[6] Tomaszek T. Authenticity and significance in wooden buildings—The problems of conservation of orthodox churches from Poland. Procedia—Social and Behavioral Sciences. 2016;**225**: 337-347

[7] Zonno G, Aguilar R, Boroschek R, Lourenço PB. Analysis of the long and short-term effects of temperature and humidity on the structural properties of adobe buildings using continuous monitoring. Engineering Structures. 2019;**196**:109299

[8] Stefanita G. Aspects regarding the reconstruction of some stages of restoring the painting from Icoanei Church in Bucharest. In: Restauration

Book 2017. Bucuresti: Editura ACS; 2017. pp. 184-195

[9] Cocean P. The land—A typical geographical region of Romania. In: Revue Roumaine de Geograhie. Editura Academiei: București; 1997. pp. 41-50

[10] Stahl PH, Petrescu P. Arhitectura de Lemn a Maramureșului [Wooden Architecture of Maramureș]. RPR: București Arhit; 1958

[11] Map County of Lapus. Available from: https://teofil-ivanciuc.weebly.com/diferen355a-dintre-bdquo354ara-maramure351uluirdquo-351i-bd quojude355ul-maramure351rdquo.html#

[12] Man G. Wooden Churches from Maramureș. Baia Mare: Editura Proema; 2005

[13] Patterson J. Wooden Churches of the Carpathians, A Comparative Study. New York, NY: East European Monographs; 2001

[14] Porumb M. Biserici de lemn din Maramureș [Wooden churches from Maramureș]. București: Editura Academiei Române; 2005

[15] Bârcă A, Dinescu D. The Wooden Architecture of Maramureș. București: Humanitas; 1997

[16] Godea I. Monumente de arhitectură populară din nord-vestul României, biserici de lemn [Popular architectural monuments from the north-west of Romania, wooden churches]. Vol. 1. Oradea: Editura Muzeului Țării Crișurilor, Oradea; 1972

[17] Nagy F, Ladislaus AM. Documenta Historiam Valachorum. In: Hungaria Illustrantia, Usque Ad Annum 1400 P. Christum. Budapest: Études Sur L'europe Centre-Orientale; 1941. p. 465

[18] Available from: http://euiubescmara mures.ro/blog/tinut-magic-pe-unde-c olinda-odinioara-pintea-viteazul-tara-la pusului.html

[19] Suciu C. Dicționar istoric al localităților din Transilvania, vol. I. 1967–1968. p. 210

[20] Nagy F, Ladislaus AM. Documenta Historiam Valachorum In Hungaria Illustrantia. In: Usque Ad Annum 1400 P. Christum. Budapest: Études Sur L'europe Centre-Orientale; 1941. p. 465

[21] Coteţiu M. Proiect de Conservare-Restaurare a Picturii Murale Din Satul Drăghia; 2011

[22] Plan of the Holy Archangels Church from Drăghia. Digital Image of Building Plan. Direcția Judeţeană pentru Cultură Maramureş. Available from: https://la pus.culturamm.ro/biserica-de-lemn-sf intii-arhangheli-mihail-si-gavril-din-d raghia/ [Accessed: 05 November 2019]

[23] Man G. Biserici de lemn din Maramureş. Baia Mare: Ed. Proema; 2005

[24] Pamfil B, Maria B. Biserici de lemn din Țara Lăpuşului. Baia Mare: Ed. Eurotip; 2017. p. 87

[25] Camuffo D. Microclimate for Cultural Heritage: Measurement, Risk Assessment, Conservation, Restoration, and Maintenance of Indoor and Outdoor Monuments. 2nd ed. New York: Elsevier; 2019;(26)

[26] Aurel M. Conservarea Preventiva a Bunurilor Culturale. IV ed. Târgovişte: Editura Cetatea de Scaun; 2010. p. 86

[27] United Nations. Scientific Committee on the Effects of Atomic Radiation. Sources and Effects of Ionizing Radiation: Sources. United Nations Publications; 2000

[28] World Health Organization. WHO Handbook on Indoor Radon: A Public Health Perspective. World Health Organization; 2009

[29] Darby S, Hill D, Deo H, Auvinen A, Barros-Dios JM, Baysson H, et al. Residential radon and lung cancer—Detailed results of a collaborative analysis of individual data on 7148 persons with lung cancer and 14 208 persons without lung cancer from 13 epidemiologic studies in Europe. Scandinavian Journal of Work, Environment & Health. 2006:1-84

[30] Clement CH, Tirmarche M, Harrison J, Laurier D, Paquet F, Blanchardon E, et al. Lung cancer risk from radon and progeny and statement on radon. Annals of the ICRP. 2010;**40**: 1-64

[31] EU. Council Directive 2013/59/ Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation. Official Journal of European Union. 2014

[32] Bochicchio F. Protection from radon exposure at home and at work in the directive 2013/59/Euratom. Radiation Protection Dosimetry. 2014;**160**:8-13

[33] Burghele B, Ţenter A, Cucoş A, Dicu T, Moldovan M, Papp B, et al. The FIRST large-scale mapping of radon concentration in soil gas and water in Romania. Science of the Total Environment. 2019;**669**:887-892

[34] HG nr. 526/2018. National Radon Action Plan published in the Official Gazette of Romania. Nr. 645/25. VII.2018

[35] Miles J. Temporal variation of radon levels in houses and implications for radon measurement strategies. Radiation Protection Dosimetry. 2001; **93**:369-375

[36] Cucoş A, Papp B, Dicu T, Moldovan M, Burghele DB, Moraru IT, et al.

Residential, soil and water radon surveys in north-western part of Romania. Journal of Environmental Radioactivity. 2017;**166**:412-416

[37] Council Directive 2013/59/Euratom European Council. Council directive 2013/59/Euratom. Official Journal of the European Union. 2014;**57**(L13):1-73

[38] World Health Organization. In: Zeeb, Hajo, Shannoun, Ferid, editors. Handbook on Indoor Radon, A Public Health Perspective. Geneva, Switzerland: World Health Organization; 2009. p. 110

[39] Available from: http://www.monitoruljuridic.ro/act/hot-r-re-nr-526-din-12-iulie-2018-pentru-aprobarea-planului-na-ional-de-ac-iune-la-radon-emitent-guvernul-203132.html

Technical - Experimental Methods Used in Artworks' Expertise

Verginica Schröder, Daniela Turcanu-Carutiu, Adina Honcea, Rodica-Mariana Ion, Sorin Grigore and Loreley-Dana Jianu

Abstract

The works of art analyzed in this research study are part of the Ovidius University Gallery collection that ensures the permanent visibility of the research results consisting in the experimental synergistic method as well as the innovative materials intended for restoration and conservation. We are sure that after the scientific investigation, the authentication and restoration of these works of art will increase their value. The synergistic methodology, to which we refer, can be defined as a sum of methods and procedures in the trans- and interdisciplinary field, which introduces the notion of "health" in the field of restoration artworks, changing the paradigm of approach as a whole, analyzing pigments, supports and all the specific painting materials. Nondestructive analytical procedures will be implemented to develop and optimize the conditions for identifying the individual types of biological impact present in works of art and of case studies on real samples. In the research activity, we used the different techniques to investigate and characterize traditional organic binders used in works of art, to see the effect on the consolidation and durability of materials, to test their functionality and usefulness while validating a viable laboratory model in relation to the natural system.

Keywords: works of art, synergistic method, biological impact, restoration, integrity

1. Introduction

The paintings submitted for scientific research in order to find the best conservation solutions are at an alarming stage of deterioration, some even in advanced stages. This study focuses on four works of art that each have specific problems different from one another, therefore requiring a differentiated treatment, personalized after an accurate diagnosis is given.

The works in the collection that are the object of the scientific investigation are the following: *Girl with the child*, painted by Vladimir Yegorovich Makovsky, belongs to the Russian School of painting from the nineteenth century; *A miracle of Jesus* attributed to author, Laurent de la Hyre, French School from the seventeenth century; *Adoration of the Shepherds* unknown author, French School from the eighteenth century; and *Shepherd boy with sheep in the forest of the castle*, attributed to author, Wendel Dietterlin, German School from the sixteenth century.

Masterpieces are currently of the Etta Ionescu Art Gallery of the Ovidius University of Constanta and belonged to Mr. Catalin Lazureanu, the last descendant of a large family of art collectors. The son lacking adequate space to keep in good

condition the works of art inherited from his mother Etta, who lost much of the property during the communist period, stored them in small improvised spaces, in boxes, in packages dosed in different spaces of an apartment, in Constanta city.

This study was intended, also, to find new hypotheses regarding authenticity of the paintings, attribute the artworks to the author or one to the school of painting.

For this purpose, were used studies of art history and museology, technical methods, such as: analytical documentation, photographing ultraviolet radiation in the dark room by auto exposure and auto-focus, analyses with Vilber Lourmat Quantum program, Image Master™ technology.

Fluorescence of natural products is an interesting characteristic of many components with application in most fields of biology [1] and the methods of art diagnosis such as the analysis and studies in expertise and conservation [2–4].

Through this UV photography analysis technique, the conservators can carry out identifications and evaluations related to the particularity of pigments [4], the integrity of pigment at surface layers.

You can also assess the age differences of the painted surfaces and identify the restoration areas. This analysis shows that based on the contrast intensity, it is possible to implement an automatic segmentation of the UV image of a retouched painting [5].

The UV radiation interacts with the apparent layer, and the technique has proven to be a nondestructive technique for first evaluation and diagnostic expertise of artworks. UV fluorescence can indeed be used for a preliminary identification of pigments. Some of them are easily distinguished, for example the titanium and zinc white pigments can be recognized with UVR because they display a strong UV absorbance band [6]. In addition, the method is recognized as a useful tool in *in situ* analysis of recently restored wall paintings [7].

Also, this fluorescent property of natural pigments starts a new trend in contemporary art such as the fluorescent painting or the conservation problems of these works [8].

The optical and fluorescence microscopy techniques were used for evaluation of microstructural aspects of painting canvas and the state of degradation and biological activity on the painted surfaces with implications for choosing the conservation method [9].

Also, a combined strategy including the air biological contamination and the isolation of microorganisms from the works of art surfaces were evaluated to determine their biodeterioration potential on canvas and painting pigments.

The biodegradation of oil paintings is a complex process involving multiple phenomena and dynamic interactions between microorganisms and the substrate. Visible phenomena include: the pigmentation of surfaces, the degradation of colors, the penetration into the material, and the modification of its resistance.

Microorganisms induce successive colonization of painted surfaces. These phenomena are accompanied by the presence of specific metabolism compounds (organic or inorganic acids), or enzymes from the extracellular matrix [9], synthesized according to the type of substrate (lipases, esterases, proteases, cellulases, etc.). The isolation and identification of microorganisms, especially of the fungi type, that have cellulolytic action responsible for biodegradation of works of art with natural substrate are of great importance in understanding their degradation [10].

As a result, the details regarding the communities of microorganisms associated with a certain type of painted substrate are of major importance before beginning the process of manipulation (transport, relocation) or restoration.

Another necessary aspect for a good evaluation and intervention in stopping the degradation process and counteracting its effects is the identification of the abiotic-microclimate environment conditions that favor the installation and development of the microorganisms responsible for biodegradation.

2. The evaluation of works of art in order to identify their biodegradation state

2.1 Description of the studied artworks

Vladimir Yegorovich Makovsky was an important Russian painter. His paintings depict a lyrical, idyllic image of the characters in the compositional scenes, *Girl with the child* (**Figure 1**) being an example in this sense, painted by the artist at the age of 45.

Figure 1.
Title of artwork, Girl with the child, *author Vladimir Yegorovich Makovsky (1846-1920), Signed В. Маковский, dated 1891, oil/canvas, size 70 x 115 cm (cod of painting P17).*

V. E. Makovsky was born in Moscow to the family of a famous artist, one of the founders of the Moscow School of Music, and Eduard I. Makovsky. Ever since child-hood, the boy (and his brother, later also a famous painter Konstantin E. Makovsky) had been surrounded by an artistic atmosphere, constantly seeing famous masters visiting his father's house, hearing their arguments, and talking about art, he was imbued with thoughts about his high purpose and, therefore, very early on he felt his calling [11].

Makovsky took the first painting lessons from V. A. Tropinin and at 15, under his leadership, he painted the painting *A Boy Who Sells Kvass* (1861). In 1861–1866, Makovsky studied at Moscow School of painting, sculpture and architecture, where he received good professional training under the guidance of artists E. S. Sorokin and S. K. Zaryanko.

The painter is very famous for his portraits of beautiful young girls and scenes from the rural area, which he masterfully painted, in an almost impressionistic style, with a rather high-speed brush, in visible coughs.

The painting is that of a very young girl dressed in simple clothes from the country and with a diaper on her head, with smooth skin, with red cheeks, and with bare feet on dry and dusty bread. The little girl holds a child in her arms, who is supposed to be her brother. The tones are warm, the scene is very beautiful repre-senting a moment of a hot summer day. To suggest this, the painter used the colors red, white, and yellow ocher in contrast to the very dark green, almost black, of the tree in the background.

Nevertheless, the work of art has been kept in better condition than the other works of the collection, considering that it is 129 years old.

The painting surface shows cuts, cracks, erasures, and losses of pigments in some places. The work is painted in oil on canvas, large dimensions 70 × 115 cm, and is signed В. Маковский with brown on the lower left.

Instrumental methods used here and in all the cases that will follow were: photo-graphing ultraviolet radiation (254 nm, 365 nm) in the dark room by auto exposure and auto-focus, analyzed with Vilber Lourmat Quantum program, Image Master™ technology.

Results from the photograph in the ultraviolet light analysis not only showed that the signature and the paint layer are original (**Figure 2**), but also showed clearly the places of some restoration interventions. The darker areas show the places where made interventions of restoration (**Figure 3**).

During this study, it was found that the work belongs to В. Маковский and not to К. Е. Маковский as initially believed.

Figure 2.
The ultraviolet light analysis for the signature В. Маковский.

Figure 3.
The ultraviolet light analysis to the painting Girl with the child.

The subject in the painting entitled A *miracle of Jesus* represents the healing of Peter's mother-in-law recorded in Holy Scripture (**Figure 4**).

The painting surface shows cracks, erasures, and losses of pigments in some places. The work is painted in oil on canvas, large dimensions 86.5 × 72 cm, and is signed L. de Hyre with dark brown in the center down.

The author is the French painter Laurent de Hyre (27.02.1606–28.12.1656), born in Paris, belonging to the early French Baroque. The painter was influenced by Italian painting through the artworks of Italian painters who came to Paris, especially Primaticcio's works. For this reason, his painting was initially attributed to the Italian style, erroneously, when the signature was not known. During the in-depth study with the optical equipment and analysis with ultraviolet light, the signature was discovered, which with the naked eye is not visible, due to the age of the painting surface. It is very interesting that although he loved Italian painting, there are no witnesses to prove that the artist was in Italy, ever [12].

The composition presents the moment when Jesus after speaking in the Synagogue in Capernaum goes to the house of Peter where on a bed the woman was lying with a high fever. Jesus touches her hand reducing her to a new life, she rises, blesses Him, and begins to serve those around her. The figures are well outlined

Figure 4.
Title of artwork, A miracle of Jesus, *attributed to Laurent de la Hyre, French School, around 1635, oil/canvas, size 86.5 x 72 cm (cod of painting P10).*

in a clear-dark compositional space that induces dramatic mystery with a strong emotional impact and an energetic contrast between the brightly lit areas and others shaded in shades with predominantly brown chromatic tones of a pathetic religious interest. The influence of the Italian painting can be seen in the lively color and the delicacy with which the characters build, being unique in the French painting from the Baroque period culminating with Simon Vuet. He formed his own style from an early age, emphasizing the beauty of the colors but also their symbolism within the chromatic composition.

In the photos in the ultraviolet light are observed dark traces of restoration, and clear signature (**Figure 5**).

Hyre's paintings are in the Louvre Museum in Paris, Strasbourg, Ruen, and Le Mars. In 1635 he painted the painting of Saint Peter healing the sick, which is

Figure 5.
The ultraviolet light analysis for the signature L de la Hyre.

Figure 6.
The ultraviolet light analysis to the painting A miracle of Jesus.

displayed at the Louvre, Hyre having a preference for the religious theme, in the center of his attention is Saints Peter and Paul, the story being important in his compositions. In 1648, La Hyre became a founding member of the French Royal Academy of Painting and Sculpture, being elected one of the 12 elders who had management positions in the Academy [13].

The religious composition *Adoration of the Shepherds* (**Figure 7**) has as characters figures inspired by daily life: Holy Virgin, pastors and other characters, which makes us consider that the painting was painted at the eighteenth century, compared to the artwork *A miracle of Jesus* (**Figure 6**) whose Baroque characters are inspired by Rome and Ancient Greece, attributed to the seventeenth century, the early period.

Figure 7.
Title of artwork, Adoration of the Shepherds, *unknown author, French School, around 1770, oil/canvas, size 98.5 x 76 cm (cod of painting P13).*

The painting belongs stylistically to the French Academy in Rome, where most of the painters who painted between 1750 and 1800 Jean Baptiste Marie Pierre and his disciples Louis Durameau or Etienne de Vallee Poussin although the French borrowed the Italian way given a common feature that distinguishes them from Italian painters, in the mannerisms with which they approach the compositions representing the "Adoration of the shepherds," the angels hold a drapery that writes Vervum Caro Factum Est, disposed in the same way above the Virgin Mary, keeping reminiscent of the Rococo French manner. The French Academy in Rome offered to young French artists, by a scholarship, the opportunity to see and copy the masterpieces of antiquity or the Renaissance with which they returned to Paris [14].

Approaching the Italian style meant that the initial expertise was mistaken as belonging to the Italian school, especially since the work has no signature. The optical analyses with ultraviolet light showed the restoration areas (**Figure 8**).

The painting titled *Shepherd boy with sheep in the forest of the castle,* attributed to Wendel Dietterlin, presents an idyllic scene of a young shepherd with a bag at his neck, who sits on a stone, at the bank of a river, with a stick in his hand (**Figure 9**). The river divided into two parts the composition of the landscape at sunset. At the distance are the sheep on the other side of the river, over a dense forest and at the top of a hill is a castle. This poetic configuration shows us an idyllic scene with a shepherd resting near the sheep on the riverbank, under the castle on the coast.

Wendel Dietterlin (1550–1599) worked in Strasbourg although he was born in Pfullendorf in Wüttenberg into a family of artists, called Grapp, whose children were still painters. To be distinguished from one of the children bearing the same name he is known as Wendel Dietterlin the Elder. Most of his paintings have been lost, randomly found in different private houses or at auction houses. Few of his painting are clearly signed with both names, a clear example would be "Lazar's Resurrection," dated 1587. He is known more as a designer, engraver, and author of the Treaty of Ornament in Architecture. In Pfullendorf is the castle of Sigmaringen dating from the eleventh century and which served as an inspiration in his artistic works [15].

In some of his engravings, Wendel Dietterlin signs with Wendelinus, who is found in the work *Shepherd with sheep* in the castle forest. The WENDELINUS

Figure 8.
The ultraviolet light analysis to the painting Adoration of the Shepherds.

Figure 9.
Title of artwork, Shepherd boy with sheep in the forest of the castle, *attributed to Wendel Dietterlin, German School, around 1580, oil/canvas, 59 x 47 cm (cod of painting P7).*

signature is placed under the foot of one of the subjects and follows a low form, in the dark area of the painting, which makes it difficult to see (**Figure 10**). For this reason, at the initial expertise the signature was not observed, and the landscape was wrongly attributed to the Italian school, which was prolific in landscapes with castle as genre in the sixteenth century as the Flemish. The work, executed in a mannerist style, was studied with optical magnifying devices and subjected to the analysis of the whole surface in ultraviolet light where the signature and the restoration areas were noted. The work has been attributed to the author following the results of the investigations so far (**Figure 11**).

Figure 10.
The ultraviolet light analysis for the signature WENDELINUS.

Figure 11.
The ultraviolet light analysis to the painting Shepherd boy with sheep in the forest of the castle.

All these artworks, which represent main topics for scientific analysis, present conservation interventions made by unauthorized persons. Due to those amateur actions, we can see deformations of the painting support, of the canvas, and traces of varnishes applied unevenly on the painting surface that represent the principal cause of the damage. These bad human interventions led to irreversible chemical phenomena that attacked the original pigments and to the loss of the initial color brightness. Being original paintings, they also keep untouched places that can be the subject of scientific study, without being affected by previous restorations. These virgin surfaces represent a special advantage for dating and authentication. Luckily, these works were painted with very good pigments on natural fiber, linen, or hemp. These superior materials used had the quality of helping the paintings to have a longer life. The processes that have started over time are of a chemical and biological nature. This study aims to find a modern solution to stop harmful actions and repair as much as possible what has been degraded.

2.2 The state of degradation and biological activity on the painted surfaces

For the maintenance and conservation of the collection of paintings from the Ovidius University Gallery, a scheme of periodic evaluation of the conditions regarding the microbial load was designed in order to establish the initial decontamination and maintenance measures by air conditioning.

The expertise consists in applying some analysis techniques that include the following stages:

1. Storage of artworks in the quarantine space

2. Evaluation of airborne microbial impact

3. Evaluation of the state of degradation/integrity of the support materials (canvas, wooden frames)

4. Examination of biological presence/activity on the painted surfaces

2.2.1 Analysis techniques and sampling

For the analysis, four old paintings have been selected, described in Section 2.1, with areas showing modifications of the varnish layer and the color layer.

For each painting, five points were identified for sampling, four of which were on the painted side and the fifth was on the material surface of the canvas (the back side of the painting), see **Table 1**. The sampling was performed using noninvasive techniques, by delicate abrasion using a sterile cotton swab, on a surface, then removing this to a Petri dish with the culture medium.

In order to identify if there is a source of contamination from the airborne microorganisms' culture media, plates were exposed in the areas of interest for 15 minutes (Ae 1, Ae 2, Ae 3, Ae 4 samplings).

As a medium of bacteria isolation, Glucose Nutrient Agar, Columbia Blood Agar were used, and Sabouraud Chloramphenicol Agar were used for microfungal colonies isolation.

The samples were kept at 24–25°C in Benckmark My Temp digital incubator, and colonies growth was evaluated after 3–5 days. For identifications, colonies morphological details and gram stains were used. Also, automat instrument ViteK 2 BioMerieux was used for automat identification and antibiotic susceptibility testing.

The number of colonies forming unit (CFU) from air, by sedimentary methods on Petri dishes was according to EN ISO 1469-1 [16], and Pasquarella methods [17, 18] was adapted using the formula to Dorohoi, 2000 [19].

$$\text{Microbial CFU/m}^3 \text{ in the air (IMA)} = n \times 10^4/S \cdot \text{з}$$

where n is the colonies number, S is the plate surface area (cm^2), and з is the time coefficient.

The light and epifluorescence microscopy techniques were used for morphological details identification.

Samples for biological analyses for the evaluation of canvas structures and painted surfaces characteristics were collected from a surface of 16 cm^2 using a sterile cotton swab, from each painting, and 5-mm^2 canvas samples were also taken and analyzed under a stereomicroscope and epifluorescence microscope.

The assessment of the microbiological contamination of the canvas was done by isolation on simple agar culture plates.

No.	Samples (biological analyses cods)	Features
1.	P17 Rd 1	Red pigment
2.	P17 Wh 2	White pigment
3.	P17 Bk 3	Black pigment near the wooden frame (bottom right)
4.	P17 Bk 4	Black pigment near the wooden frame (top right)
5.	P17 Tx 5	At the back of the canvas
6.	P10 Rd. 1	Scarlet pigment
7.	P10 Wh 2	White-gray pigment
8.	P10 Bk 3	Black pigment—near the wooden frame (bottom right)
9.	P10 Bk 4	Black pigment near the wooden frame (top left)
10.	P10 Tx 5	At the back of the canvas
11.	P13 Rd 1	Red pigment
12.	P13 Wh 2	White-gray pigment
13.	P13 Bk 3	Matte black pigment
14.	P13 Br 4	Dark brown pigment
15.	P13 Tx 5	The back of the canvas
16.	P7 Wh 1	White, light blue pigment
17.	P7 Bu 2	Blue pigment
18.	P7 Gr 3	Green pigment with traces of depigmentation
19.	P7 Bk 4	Black pigment
20.	P7 Tx 5	The back of the canvas
21.	Ae 1	Sample 1, centrally located in small room (1-m distance from painting pieces)
22.	Ae 2	Sample 2, exhibition, large room (0.5- to 1-m distance from painting pieces)
23.	Ae 3	Sample 3, exhibition hall, centrally located on the tourist route
24.	Ae 4	Sample 4, small room, near the wall area (1-m distance)

Table 1.
Codification of biological samples and the characteristics of the sampling surfaces.

2.2.2 Indoor airborne microbial exposure assessment

The air microbiota is influenced by a number of factors: altitude, season, human agglomerated, degree of ventilation, temperature, and relative humidity.

Indoor airborne microbial quantifications are a significant parameter to evaluated healthcare-associated infections. Also, the microbial monitoring accounted for microclimate quality and helped to identify critical situations that require corrective intervention [20]. The level of temperature and relative humidity are favorable conditions for interspecific changes and to the vector spread [19, 21].

Bacterial and fungal contamination was identified at all airborne microorganism's assessment points. The most diverse contamination was found in the small room where the paintings in the collection were stored for evaluation. The large number of bacterial colonies belonging to the same species of gram + bacilli was found in sample Ae3, (**Figure 12**), the colonies having invaded the entire surface of the culture plate.

2.2.3 The assessment of the support material (canvas) of the paintings

The study assesses the quality of the initial materials from which the fabrics were made, the arrangement and the quality of the working technique (fabric, treatment/canvas preparation).

The degree of degradation, the vulnerability of the material resistance depending on the thickness and the quality of the microfilaments, and the sensitization by the biological action were noted.

After the microscopic examination of the fibers, it was found that the fabrics contain fibers of different sizes in their structure (**Figures 13a–d**).
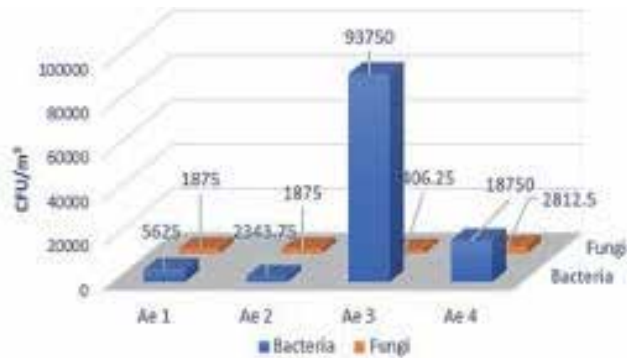

Figure 12.
Microbial isolated stains after 15 minutes exposure of cultures plates to airborne microorganisms in the exhibition area.
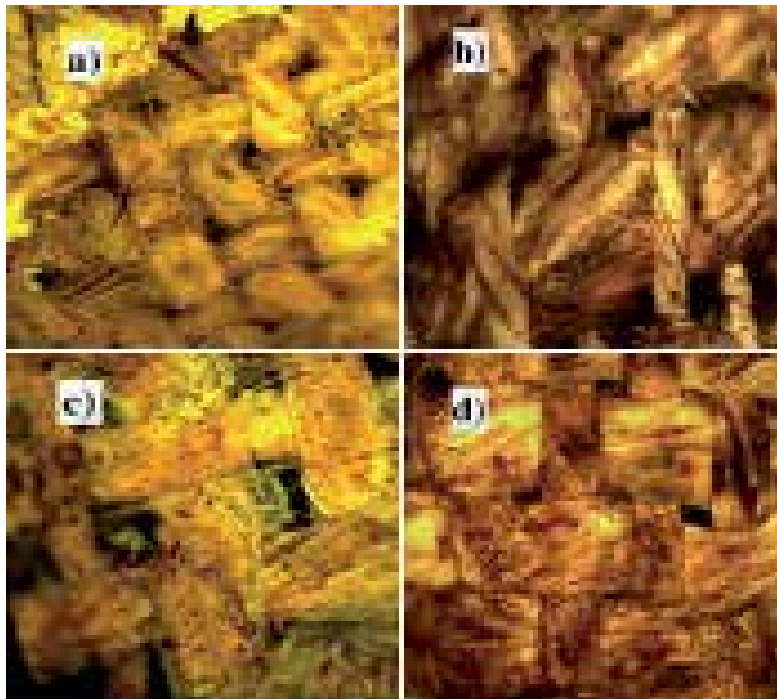

Figure 13.
Fabric images: a) P17, b) P10, c) P13, d) P7; epifluorescence microscopic examination (x 400 magnification).

Samples	General aspects of painting canvas	Count of isolated microorganisms
P 17 Tx 5	Compact fabric, without inter-nodular spaces; uniformly arranged, fine, equal thickness, rounded filaments	21 bacterial colonies (3 species)
P 10 Tx 5	Uneven fabric with inter-nodular spaces and irregularities; filaments of variable thicknesses and shapes, with lamellar appearance	14 bacterial colonies (4 species)
P 13 Tx 5	Large mesh fabric, uneven; coarse filaments with knots	6 bacterial colonies (4 species)
P 7 Tx 5	Fabric with filaments of different thickness, wrinkled, with degraded appearance	2 fungal colonies

Table 2.
Micro-structural details of fabrics correlated with the level of microbiological contamination.

Particular aspects such as knotted filaments, and the wrinkled or degraded appearance of the textile micro-structures/fibers, have been observed (**Table 2**).

Microbiological contamination is dissimilar as most bacterial colonies (21 and 14, respectively) were isolated from canvas surfaces P17 Tx 5 and P10 Tx 5, including hemolytic forms. Microbiological contamination with bacteria is more limited in P13 Tx 5. Also, in P7-Tx5, fungal strains with very fast growth capacity such as filamentous ascomycetes were isolated (**Figure 13** and **Table 2**).

The variances that appear regarding the identified colonies are due to the fact that, in such situations, the purity of the fibers, the primer level of animal origin, and the organic or inorganic pigments used influence the process of contamination.

Cellulose filaments with higher purity compared to those with lignin content are more vulnerable to bacteria, a fact confirmed by the larger number of colonies isolated from P17 Tx 5 compared to the other samples.

2.2.4 Painted surfaces

The assessment of the state of the painted areas in relation to biodegradation took into account the identification by means of the technique of isolation of the microorganisms by culturing techniques and the comparison of the manner in which the areas of the canvas colored with different pigments were contaminated. Thus, the analyzed surfaces were colored with red, white, light blue, green, and black brown pigment. The working hypothesis is the possibility of a difference of contamination correlated with the origin/structure/chemical component of the analyzed pigment. The presence of heavy metals in certain pigments could ensure a resistance of the painted layer [22].

Also, the microorganisms present on the painted surface were assessed by comparison with those isolated from the air microflora in order to determine if this microflora is the main source of contamination or if these paintings have acquired particularities regarding the biodegradation activity due to the substrate or the previous conservation environment.

The identification of the types of microorganisms would allow to establish the methods of decontamination taking into account the following aspects:

the chemical composition of the oils used;
species that produce biodegradation;
the response of species of microorganisms to biocides;
growth speed.

The results of the assessment of contamination of painted objects reveal the following aspects:

- In the large exhibition space (Ae 3), there are some differences between the isolated strains of the air and those isolated from the painted surfaces, a single species of the genus *Aspergillus* having been identified on the painted surfaces as well.

- The direct exchange between the environment microflora and the painting microflora was evident through the analysis of the air a few centimeters away from the painted surface (Ae 2) where in the environmental sample the same fungal species were found (*Aspergillus*, *Penicillium*, *Ascomycetes*) and one very common species of bacteria from the group *Aeromonas* sp. was present on the wall painting as well.

  The microflora samples collected from the small precinct (Ae 1, Ae 4), with a varied number of paintings with different types of substrates, highlight a large number of common species in the air samples with those found on the painted surfaces that were analyzed.

- The bacterial forms dominate the painted samples as regards the number of colonies as well as the number of species: *Aeromonas* sp., *Corynebacterium* sp., *Micrococcus* sp., and *Bacillus* sp. The species of the genus *Bacillus* present in our samples are indicated in the literature as predominant, competing species of other bacterial types, frequently isolated from oil painted surfaces. Some *Bacillus* strains show a high level of tolerance to the oils used in the paintings [22].

- The presence of bacteria on the painted surfaces indicates significant differences between the areas with pigments of different paintings as well as from one surface to another on the same painting or the same pigment (**Figures 14a–d**).
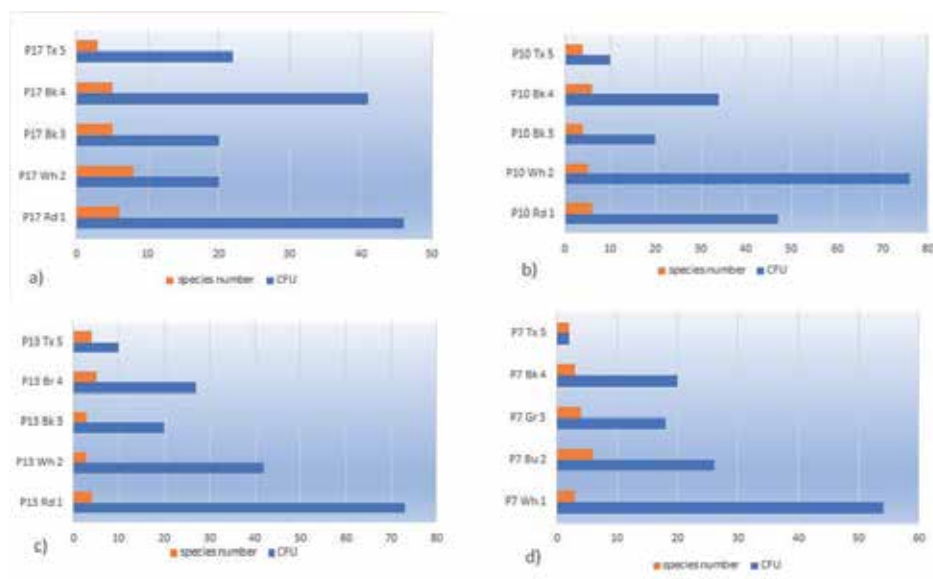

Figure 14.
Microbial diversity and the comparative number of colonies (CFU/cm²) and species isolated on the painting surfaces with different pigment substrates; Rd (red), Wh (white), Bk (black/brown), Gr (green), Bu(blue) and the convas (Tx 5) samples; a) P17 painting, b) P10 painting, c) P13painting, d) P7 painting.

The identification of bacteria on the surfaces of the analyzed paintings, as the dominant forms and the absence of these in the air samples, denotes the presence of organic materials on the surface of the paintings, which maintain bacterial activity. Most likely, this microbial load came from the previous storage of the art collection in noncompliant spaces and from a layer of dust that favored these deposits.

Our observations allow us to ascertain that the exchanges between the painted works and the aeroflora can be favored by the position of the painting in relation to the areas with high tourist traffic, in relation to the distance from the floor and to the variations of the conditions of temperature and humidity.

Depositing the paintings in a crowded manner in small enclosures with insufficient ventilation, without air conditioning, favors contamination between paintings; thus 8 bacterial and 3 fungal species were identified as being shared among the analyzed paintings, out of a total of 14 isolated morphotypes.

The identified fungal strains include *Penicillium* sp. and *Aspergillus* sp., which are known in the literature [23] as factors in the deterioration of the layers painted with oil or of the areas of the paintings treated with adhesives. The growth of these hyphae on the support material (canvas) on which the painting is applied favors the friability and the loss of the painted layers.

Bacteria associated with painted surfaces can form a characteristic biofilm depending on the age of the painting and the working technique (the nature and condition of the painted surface, the degree of maintenance, etc.).

The smaller number of species identified on the canvas (back side) compared to painted surfaces allows important valuations regarding the state of prior preservation of the analyzed paintings.

The presence of colored spores and the production of specific metabolites can produce pigmentation induced by organic acids, which generate major changes in the painted structure, which cannot be repaired.

3. Conclusions

The instrumental and experimental methods of analyzing the works of art belonging to the sixteenth, seventeenth, eighteenth, and nineteenth centuries, to different schools of painting namely Russian, German, and French, purchased from the art collector Catalin Lazureanu, through ARHEOCONS project and recently exhibited in the "Etta Ionescu" Art Gallery of the Ovidius University of Constanta, hosted by the National Military Museum "King Ferdinand I" in Constanta, have been used to establish the following aspects: attribution to the school or the author, the age of the paintings, the preservation mode, the quality and condition of the painted or support materials, the effects of biological contamination, and the severity of biodegradation.

The original provenance and the previous conservation mode have put their mark on the works of art. Identified species, *Aeromonas* sp., *Corynebacterium* sp., and *Micrococcus* sp., as well as the identification of hemolytic forms suggest contact with the dusty spaces of the deposits. The dust particles can not only act physically or chemically but also be sources of infection of the works of art with fungal spores, bacteria, and insect eggs. Microorganisms can reach the art objects, colonizing them, as they have as source of food the organic particles that enter the components of dust and, are favorable for development in an atmosphere with relatively high humidity.

The study allowed new hypotheses on the authenticity of the paintings, to attribute the works to the author or to the school of painting, to identify the

environmental factors, from the exhibition space that can create the risk conditions for the analyzed paintings. The results can be associated with the intervention methods for expertise as well as those related to conservation and/or restoration.

Following the study, it can be seen that all paintings require special conditions for conservation. The degradation process can be stopped by measures correlated with limiting the microbiological loading of the air and the painted or supporting components, repositioning the paintings in the exhibition areas without risk of contamination, cleaning the paintings, and restoring the damaged areas.

The study was approached according to clinical health methods analyses, results, personalized treatment, and principles that the ARHEOCONS project follows regarding the cultural heritage expertise.

Acknowledgements

Conflict of interest

The authors declare no conflict of interest.

Thanks

Special thanks for consulting to Mr. Costel Coroban.

Author details

Verginica Schröder[1*], Daniela Turcanu-Carutiu[2], Adina Honcea[3],
Rodica-Mariana Ion[4,5], Sorin Grigore[6] and Loreley-Dana Jianu[1]

1 Department of Cellular and Molecular Biology, Ovidius University, Constanta,
Romania

2 Faculty of Arts, Center of Artworks Expertise by Advanced Instrumental Methods
(CEOAMIA), Institute of Science, Culture and Spirituality, Ovidius University,
Constanta, Romania

3 Department of Microbiology and Immunology, Ovidius University, Constanta,
Romania

4 ICECHIM, Group of Evaluation and Conservation of Cultural Heritage,
Bucharest, Romania

5 Materials Engineering Department, Valahia University, Târgovişte, Romania

6 Synevo Laboratory, Microbiology Department, Constanta, Romania

*Address all correspondence to: verginica.schroder@univ-ovidius.ro;
virgischroder@yahoo.com

IntechOpen

References

[1] Duval R, Duplais C. Fluorescent natural products as probes and tracers in biology. Natural Product Reports. 2017;**34**:161-193. DOI: 10.1039/C6NP00111D

[2] Isacco E, Darrah J. The ultraviolet-infrared method of analysis, a scientific approach to the study of Indian miniatures. Artibus Asiae. 1993;**53**(3-4):470-491. DOI: 10.2307/3250528

[3] René de la Rie E. Fluorescence of paint and varnish layers (part I). Studies in Conservation. 1982;**27**(1):1-7. DOI: 10.1179/sic.1982.27.1.1

[4] Comelli D, Nevin A, Brambilla A, Osticioli I, Valentini G, Toniolo L, et al. On the discovery of an unusual luminescent pigment in van Gogh's painting, les Bretonnes et le pardon de Pont Aven. Applied Physics A. 2012;**106**(1):25-34. DOI: 10.1007/s00339-011-6665-9

[5] Cosentino A. Practical notes on ultraviolet technical photography for art examination. Conservar Património. 2015;**2**:53-62. DOI: 10.14568/cp2015006

[6] Cosentino A. FORS spectral database of historical pigments in different binders. e-Conservation Journal. 2014;**2**:57-68. Available from: http://e-conservation.org/issue-2/36-FORS-spectral-database

[7] Comelli D, Valentini G, Nevin A, Farina A, Toniolo L, Cubeddu R. A portable UV-fluorescence multispectral imaging system for the analysis of painted surfaces. The Review of Scientific Instruments. 2008;**79**(8):086112. DOI: 10.1063/1.2969257

[8] De Winter S. Conservation problems with paintings containing fluorescent layers of paint. In: CeROArt (online). EGG 1. Micheroux, Belgique; 2010. p. 1659. DOI: 10.4000/ceroart.1659

[9] López-Miras MM, Martín-Sánchez I, Yebra-Rodríguez Á, Romero-Noguera J, Bolívar-Galiano F, et al. Contribution of the microbial communities detected on an oil painting on canvas to its biodeterioration. PLoS One. 2013;**8**(11):e80198. DOI: 10.1371/journal.pone.0080198

[10] Coronado-Ruiz C, Avendaño R, Escudero-Leyva E, et al. Two new cellulolytic fungal species isolated from a 19th-century art collection. Scientific Reports. 2018;**8**(1):7492. DOI: 10.1038/s41598-018-24934-7

[11] Fiala V. Russian Painting of the 18th and 19th Centuries, Translated by Jean Layton. Prague: Artia; 1981. p. 18

[12] von Sandrart J. In: Dietterlin W, editor, StockauAcademia nobilissimæ artis pictoriæ. Albertina, Wien, Österreich; 1583. pp. 302-304

[13] Rosenberg P, Thuillier J. Laurent de La Hyre 1606-1656. Man, and Work (Exhibition Catalog 1989-1990 Museums in Grenoble, Rennes and Bordeaux). Geneva: Skira; 1988. p. 18

[14] Michel C. Charles - Nicolas Cochin et l'art des Lumières, École française de Rome; 1993. pp. 547-615. (Contains Pierre's letter on the causes of decadence in the art of France)

[15] Lesur N, Aaron O. Jean-Baptiste Marie Pierre 1714-1789. In: Premier peintre du roi. Paris: Arthena; 2009. pp. 10-15-450-500

[16] EN ISO 14698−1. Cleanrooms and Associated Controlled Environments—Biocontamination Control Part 1: General Principles and Methods. 2003

[17] Pasquarella C, Pitzurra O, Savino A. The index of microbial air

contamination. The Journal of Hospital Infection. 2000;**46**(4):241-256. DOI: 10.1053/jhin.2000.0820

[18] Pasquarella C, Balocco C, Pasquariello G, Petrone G, Saccani E, Manotti P, et al. A multidisciplinary approach to the study of cultural heritage environments: Experience at the Palatina Lybrary in Parma. Science of the Total Environment. 2015;**536**:557-567. DOI: 10.1016/j. scitotenv.2015.07.105-0048-9697

[19] Dorohoi D-O, Melniciuc PN, Nicolescu C. In: Vasiliana, editor. Tehnici de investigare a obiectelor de Patrimoniu. Iasi; 2000. p. 210

[20] Napoli C, Marcotrigiano V, Montagna MT. Air sampling procedures to evaluate microbial contamination: A comparison between active and passive methods in operating theatres. BMC Public Health. 2012;**12**:594. DOI: 10.1186/1471-2458-12-594

[21] Cambrea SC, Petcu LC, Iliescu DM. Relations of environmental factors and evolution of Boutonneuse fever in the county of Constanta – Romania. Journal of Environmental Protection and Ecology. 2018;**19**(2):914-922

[22] Phulpoto H, Qazi MA, Mangi S, Ahmed S, Kanhar NA. Biodegradation of oil-based paint by *Bacillus* species monocultures isolated from the paint warehouses. International Journal of Environmental Science and Technology. 2016;**13**:125-134. DOI: 10.1007/s13762-015-0851-9

[23] Tiano P. Biodegradation of cultural heritage: Decay mechanisms and control methods. In: Proceedings of the ARIADNE 9. Historic Materials and Their Diagnostics. Institute of Theoretical and Applied Mechanics of the Academy of Sciences of the Czech Republic Prague; 4-10 February 2002. p. 1-37. Available from: http://www.itam.cas.cz/ARCCHIP/w09/w09_tiano.pdf

Biotechnology and Cultural Heritage Conservation

Franco Palla

Abstract

The deterioration of cultural asset is induced by biological, chemical, and physical factors, influenced by anthropogenic activity and environmental conditions. In this study, the contribution of biotechnology is emphasized to define the conservation strategy, for a marble Fountain (Two Dragons, XV century) located in Palermo city center, based on an integrated approach and eco-friendly procedures. Biotechnological protocols are preliminarily applied as an integrated approach, based on microscopy observation, *in vitro* culture and genomic DNA analysis to recognize and characterize microbial communities. Several biological systems have been identified: green algae (*Chlorella*) and cyanobacteria (*Cyanobium, Oscillatoria*); bacteria (*Arthrobacter*, *Bacillus, Micrococcus, Paracoccus*); fungi (*Alternaria*, *Aspergillus, Penicillium, Phoma*, *Fusarium*, *Cladosporium*). In order to address biological colonization, the commercial Tea Tree Oil (*Melaleuca alternifolia*) and laboratory-distilled (*Calamintha nepeta* and *Allium sativum*) EOs, have been assayed by *in vitro Agar disc diffusion*, *Well-plates diffusion*, and *Micro-dilution* methods; the result allows to define the most appropriate EOs concentration to use. In a *green conservation* prospective, this study highlighted that EOs can potentially replace the traditional biocides, but the activity must be preliminary evaluated by centring the choose specifically on each microbial taxon identified.

Keywords: stonework deterioration, integrated approach, biocides, essential oil, green conservation.

1. Introduction

The biological colonization of stone artifact is basically related to the mineral components and bio-receptivity of the constitutive material, the presence of particulate on the surface, the environmental condition, and the availability of nutrients [1–3]. Generally, for outdoor Fountains, the biodeterioration is mainly induced by microalgae and cyanobacteria [4], but other biological agents such as bacteria, fungi, mosses, and lichens were frequently revealed [5, 6]. Moreover, the biological colonization is enhanced by the occurrence of water that cooperate in deterioration processes [7], acting mechanically and chemically, producing visible effects on stonework surface (cracking, detachment, crusts formation, and chromatic alterations) allowing to structural damage and loss of material [8–10].

Fungi (such as *Alternaria*, *Cladosporium*, *Epicoccum*, *Aureobasidium*, *Phoma*) have a significant biodeteriorative action and may penetrate into the stone surface, causing the bio-pitting; fungi colonies can be in close association with lichens [11, 12].

Autotrophic (photolithotrophs and chemolithotrophs) and heterotrophic bacteria have also been isolated from stonework and since many of these microorganisms contain pigments (β-carotene, α-bacterioruberin, and derivatives) and salinixanthin in their cell membranes, their proliferation can produce typical rosy stains on the stone surface [10, 13, 14].

Furthermore, the deterioration is also the direct result of atmospheric pollution due to soot, grease, dust, etc., implying the deposition of suspended particles on the stonework surface, enhancing the SO_2 deposition, a very reactive compound with a significant corrosive effect on marble surface [15, 16]; especially for outdoor monument, anthropogenic factors must be also considered [17].

To control biodeteriogen growth of powerful biocides, as well as water-repellents, with a broad spectrum of action are usually utilized against green and brown algae, bacteria, yeasts, lichens, molds, and micro-fungi [18–21].

In the last decades, integrated approaches (based on microscopy, *in vitro* culture and molecular biology analysis) have been applied to reveal and identify the greater number of microorganisms involved in the deterioration processes of cultural assets [22–31].

In this case study, in order to define adequate conservative strategies, the identification and evaluation of biological colonization of the Two Dragons fountain (sculptured by Nunzio La Mattina, XV century) were carried out, providing needful information to choose the appropriate biocide both for active compound and concentration.

Recently, non-toxic natural compounds (essential oils, EOs), in order to replace the chemical compounds, have been utilized to control artworks biological colonization and to inhibit re-colonization events [32–37].

The aim of this work has been the revealing of microbial communities on the stonework surface, evaluating the antimicrobial activity of traditional (Benzalkonium chloride) and green biocides (*Melaleuca alternifolia* – TTOil, *Calamintha nepeta* and *Allium sativum* EOs) *vs* the identified microbial taxa [38–41].

The results of *in vitro* assays and controlled step by step application on stonework samples, prompt us to hypothesize the EOs as valid alternative to traditional biocides, in respecting human health and environment, according to modern restoration procedures.

2. Material and methods

2.1 Sampling

Samples were collected from different Fountain areas, affected by chromatic alterations, deposits, exfoliations, incrustation, or biological patinas, by sterile swabs moistened with NaCl-Tween solution (0.9% Sodium Chloride, 0.02% Tween-80, Polyoxyethylene sorbitan monooleate) or sterile scalpel **Figure 1**.

2.2 *In vitro* microbial culture

Nutritive media specific for bacteria or fungi colonies (Nutrient or Sabouraud agar, *Difco*) were inoculated by the swab collected samples, incubating at 30°C for 18–48 hours.

2.3 Morphological analysis

Morphological profiles of algae and bryophytes were revealed by stereomicroscope (Wild Heerbrugg) and digital microscope (DinoLite) observations. After

Figure 1.
Stonework altered areas, sampling performed by sterile swab o scalpel: (A) dark-rust red area;
(B) light – green calcareous deposit; (C) dark-green area.

Lugol's iodine staining, the reproductive structures of isolated fungal colonies were also distinguished by Optical Microscope (Leica). Coccoid bacteria have also been noticed by Scanning Electronic Microscope (Leica Cambridge – Leo 400), after coating (Agar-Auto-Sputter – Coater B7341) by gold particles (13 nm).

2.4 Molecular biology investigation

Patina sample of approximately 200 mg, collected by sterile scalpel, undergone to three freezing (−80°C) and thawing (+ 55°C) cycles, in presence of 500 μl – 1X TE Buffer (10 mM Tris-HCl pH 8.0/1 mM EDTA), to achieve the lysis of microbial cells; genomic DNA was extracted by *QI Amp DNA stool Kit* (Qiagen), partially modified (+ Proteinase K (5 mg/ml) and incubation at 65°C for 4 hours). Instead, from *in vitro* isolated microbial colony, the *Genomic DNA Purification Kit* (Fermentas) has been appropriate.

Genomic DNAs were utilized as template molecules in Polymerase Chain Reaction (PCR), in order to amplify bacterial or fungal target sequences, specifically, the Internal Transcribed Sequences (ITS) 16-23S rRNA for bacterial and ITS 18-26S rRNA for fungal species [25, 26, 40]. Each PCR reaction solution consisted of: microbial Genomic DNA as template; 10 μM Primer Forward; 10 μM Primer Reverse; 3.0 mM dNTP mix; 1X Reaction Buffer including $MgCl_2$; 0.5Us Taq DNA polymerase (Sigma).

PCR products were resolved by electrophoresis on 2.5% agarose gels (1X TAE – Tris-HCl/Acetate/EDTA, in 1X SYBER-safe DNA gel stain) and related aliquots were sequenced by Eurofins MWG-Operon sequencing service (Germany).

Referring to genomic databases (EMBL-Germany, NIH-USA), the sequences were analyzed (percentage of similarity) by BLAST analyzer [42].

2.5 Commercial (CB) and natural (EOs) biocides

The antimicrobial activity of: (i) commercial EOs, *Melaleuca alternifolia* (Maiden and Betche) Cheel -Tea Tree Oil; (ii) laboratory distilled EOs (*Calamintha nepeta* (L.) Savi, *Allium sativum* L.; (iii) B*enzalkonium chloride* commercial biocides (CB), was tested by outlined *in vitro* assays [36–38].

The microbial taxa were *Bacillus subtilis*, *Micrococcus luteus*, *Penicillium chrysogenum*, *Aspergillus* spp.

2.6 Antimicrobial activity assays

Three *in vitro* methods, *Agar disc diffusion*, *Well-plates diffusion*, and *Microdilution* in micro-titer plates [38, 43, 44] were performed:

- *Agar disc diffusion*: paper disc (4 mm in diameter) was placed onto the surface of Nutrient or Sabouraud agar (90 mm Petri dish), previously wetted with 10 µl of CBs (25, 50%) or EOs (12.5, 25, 50, 100%) The agar surface has been previously seeded by microbial cells (bacterial cells = 1×10^6 CFU/ ml or fungal suspension = 1×10^4 conidia/ml) and incubated for 18–48 h at 30 ± 1°C. Confluent microbial growth was observed and the diameter (mm) of growth-inhibition-halo measured (> 6 mm = sensible; < 6 mm = resistant); CB was Benzalkonium chloride (25, 50%). Each test was performed in triplicate.

- *Well plate diffusion*: the microbial inoculum was uniformly spread on Nutrient or Sabouraud agar surface, then holes of 4 mm in diameter were punched aseptically [38] and 10 µl aliquots (12.5, 25, 50, 100%) of each essential oil solutions loaded. After 18/48 h of incubation at 30 ± 1°C, the diameter (mm) of growth inhibition halos were measured. Each test was performed in triplicate.

- *Micro-dilution*: was performed in 96-wells micro-titer, in order to define the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC), distinguishing between biocide or biostatic action [39]. In each well, 30 µl of plant extracts (6.25, 12.5, 25, 50, 100%)/ liquid nutritive medium and an equal volume of microbial suspension were added; to facilitate the dispersion of the oil in the medium solution, 1% of Tween 80 (not toxic for microbial cells) was added. Benzalkonium chloride (0.2%, vol/ vol) was utilized as CB. Microbial growth, after 18 h of incubation at 30°C was evaluated by estimating the optical density at 500–600 nm. The MIC value was measured as the lowest concentration corresponding to any visible microbial growth, after incubation at 30°C. The MBC and MFC were determined as the lowest concentration of antimicrobial agent able to kill the 99.5% of the original inoculum, evaluating on antimicrobial-free sub-culture [45].

3. Results

Green algae as *Chlorella* (**Figure** 2) and cyanobacteria as *Cyanobium and Oscillatoria* genera were revealed in fountain samples, classified as biodeteriogen and also as first pioneering of stone substrates colonization. Particularly, algae can
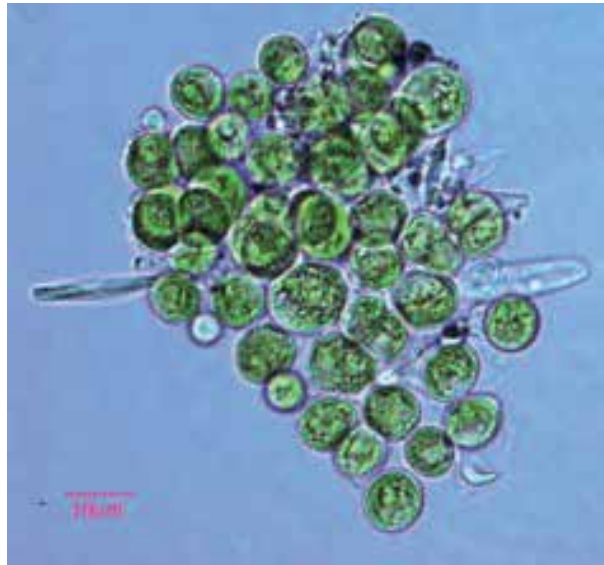
Figure 2.
Chlorella *green algae, optical microscope images; bar = 10 micromillimeters.*

induce carbonate precipitation on stone substrates and their metabolic processes also generate organic acids (aspartic, citric, glutamic, glycolic, oxalic, and uric) promoting the dissolution of same minerals [3, 46, 47]. Cyanobacteria, algae, and lichens contribute to the weathering of stone in humid as well as in semiarid and arid environments [48–50]. Furthermore, cell compounds such as chlorophyll, carotenoid, and melanin may generate chromatic alteration from yellow, orange, and red to brown [10, 13, 51].

Bacterial and fungal diversity was also distinguished, bacteria or fungi genera mainly belonging to *Arthrobacter, Bacillus*, *Micrococcus* or *Alternaria, Fusarium*, *Cladosporium*, *Penicillium*, and *Aspergillus*, respectively (**Figures 3**–**5**). Moreover, bacteria of the *Bacillus* genus are able to produce crystalline aggregates and precipitates (carbonate and phosphate), which can form insoluble complexes with pigments, producing different spots on stonework surface [52, 53]. Fungi, in relationship to their metabolic activities, are able to produce efflorescence and patina, breaking and cracking processes, contributing to chemical-physical alteration of the constitutive materials [54, 55]. Fungi also represents an important group of deteriogen systems for stonework exposed to the environment, due to the release of acids compounds during hyphae development or in the apical growth zones, able to penetrate inside the stone surface [56, 57].

Finally, biological systems referable to *Mosses* [58] were revealed in a green patina, **Figure 1C**, with a detrimental action related to the keeping of moisture, the production of carbonic acid and, after their death, the indirect damages by enriching and increasing the humus content of stone surfaces, supporting the consequent growth of plant species [59].

In order to inhibit biological colonization, traditional (benzalkonium chloride) or green (*Melaleuca alternifolia*, *Calamintha nepeta*, and *Allium sativum* EOs) biocides have been tested.

In **Figure 6**, the inhibition activity of *Melaleuca alternifolia* (TTOil) *vs. Bacillus subtilis* (A) or *Micrococcus luteus* (B) has been evaluated by the *Well plate diffusion* method; the size of inhibition halos is related to the essential oil concentration.
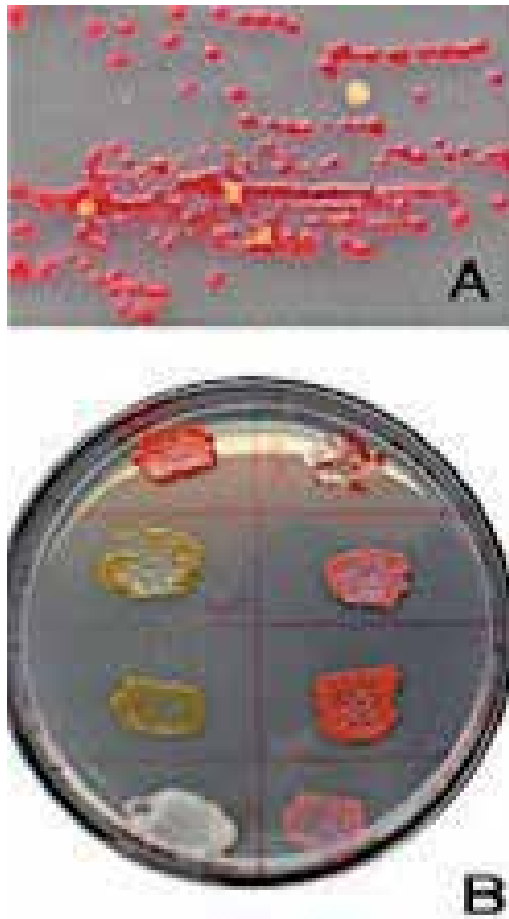
Figure 3.
Morphological profile of pigmented bacterial cells isolated from the sampled areas on nutrient agar: (A) Micrococcus *sp. colonies; (B) different bacterial colonies;* Bacillus *sp. colonies agar; plates incubated at 30°C for 18 h.*
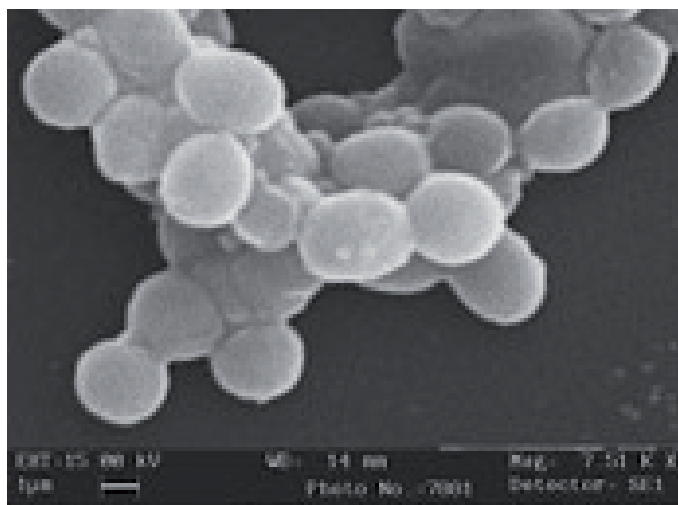
Figure 4.
SEM micrograph of Coccoid bacterial cell; bar = 1 micromillimeter.
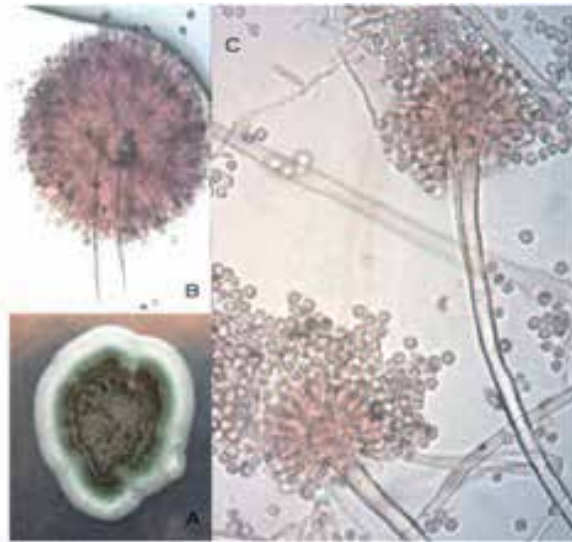
Figure 5.
Morphological profile of Aspergillus *sp. colony isolated on Sabouraud agar (A), related fungal spore and reproductive structure stained by Lugol's iodine reactive (B–C); optical microscopy (40× magnification).*
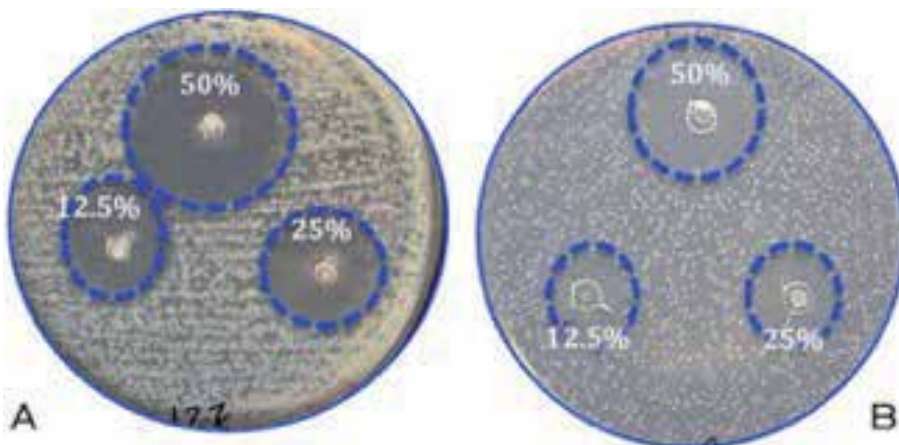
Figure 6.
Well plate diffusion *method. Antimicrobial activity of* Melaleuca alternifolia *(TTOil)* vs. Bacillus subtilis *(A) or* Micrococcus luteus *(B). The inhibition halos show a different antimicrobial activity related to the EO concentration.*

The antimicrobial activity has been also performed using the three EOs or CB at different concentration (12.5, 25.0, and 50.0%) *vs* microbial taxa identified in the stonework colonized areas; the results have been summarized in **Table 1**. Particularly, a relevant inhibition on bacterial growth was performed by *M. alternifolia* and *A. sativum* EOs against *B. subtilis* and *M. roseus*, so strong that the halo inhibition was equal to the petri dish diameter.

Minimum Inhibitory Concentration (MIC) *vs* bacterial colonies has been evaluated by the *Microdilution method*. Particularly, biocidal activity *vs M. luteus* and *B. subtilis* has been showed by *M. alternifolia* and *C. nepeta* EOs; while *A. sativum* EO showed both biocidal and biostatic activity *vs M. luteus* and biocidal activity against *B. subtilis* (**Table 2**); the MIC related to benzalkonium chloride was also performed.

Microbial taxa		Essential oils (EOs)			Classical biocide (CB)
	(%)	*Melaleuca alternifolia*	*Calamintha nepeta*	*Allium sativum*	*Benzalkonium chloride*
Bacillus subtilis	50.0	*	7.0	*	9.2
	25.0	8.4	6.5	9.2	7.0
	12.5	5.0	3	5.5	4.0
Micrococcus roseus	50.00	*	8	*	9.0
	25.0	8.0	6	9.0	7.0
	12.5	2	2	4	4.0
Penicillium chrysogenum	50.0	8.2	5.0	10	4.0
	25.0	6.5	3.8	7.0	3.0
	12.5	5.0	2.5	4.2	≥1
Aspergillus spp.	50.0	6.8	5.0	10	3.0
	25.0	6.0	3.0	6.9	2.0
	12.5	3.8	2.5	4.0	≥1

Total inhibition of microbial growth.

Table 1.
Well plates diffusion *method: Measurement of microbial growth inhibition as halo diameter (mm): Diameter ≥ 9 mm. (sensible strain); 6–9 mm. (relative sensible strain); ≤ 6 mm (resistant strain).*

EOs or CB	*Micrococcus luteus* (%)	*Bacillus subtilis* (%)
Tea tree oil	0.6	0.6
Calamintha nepeta	1.56	1.56
Allium sativum	100	100
Benzalkonium chloride	0.0031	0.0031

Table 2.
Minimum inhibitory concentration (MIC) %, of EOs and CB vs. bacterial taxa.

4. Conclusions

The results showed that the fountains are differently colonized by several biological systems (**Table 3**).

Particularly for the dark-greenish area, *Mosses* [58] were also revealed, enhancing the bio-detrimental action due to the keeping of moisture, the production of carbonic acid and, after their death, enriching and increasing the humus content helping a following growth of plants on the stonework surface.

The identified colonizers were utilized to test the antimicrobial activity of three EOs *Melaleuca alternifolia*, *Calamintha nepeta*, and *Allium sativum,* in order to test natural product as alternative biocide. In **Figure 7**, the growth inhibition activity, measured by both *Agar disc* and *Well plate* diffusion methods of the three EOs was performed in parallel to a commercial biocide benzalkonium chloride.

The results of this study confirm the need of a fuller identification of microbial colonizers in order to perform an adequate biocidal treatment, focalizing the attention on *green alternatives.*

The innocuousness of essential oils in respecting of human health and environment protection, prompt us to hypothesize the use of these plant products as

Area	Algae	Bacteria	Fungi	Mosses
A. Dark-rust red	*Chlorella* sp. *Cyanobium* sp.	*Micrococcus* sp.	*Aspergillus* sp. *Cladosporium* sp. *Fusarium* sp.	–
B. Light-green calcareous deposit	*Chlorella* sp.	*Bacillus* sp. *Arthrobacter* sp.	–	–
C. Dark-greenish	*Chlorella* sp. *Oscillatoria* sp. *Cyanobium* sp.	Bacillus sp. Micrococcus sp.	*Alternaria* sp. *Aspergillus* sp. *Penicillium* sp	*Bryophyta* class Bryopsida

Table 3.
Microbial taxa colonizing stonework areas showed in **Figure 1**.
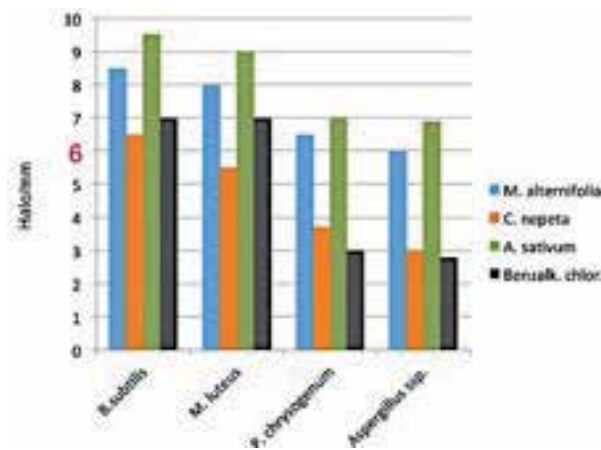
Figure 7.
Evaluation of the growth inhibition activity of the three EOs and the CB, against two identified bacterial and fungal taxa. Histograms represent the medium value obtained performing both Agar disc *and* Well plate diffusion *methods for each sample, in triplicate*.

natural biocides, although more studies on permanence and durability on artifacts surfaces are needed.

The antimicrobial efficiency of these and other vegetal biocompatible extracts is on-going in our laboratory in order to set up *green strategies* to control the biodeteriogen growth and colonization on cultural assets.

Acknowledgements

Conflict of interest

The authors declare no conflict of interest.

Author details

Franco Palla
Laboratory of Biology and Biotechnology for Cultural Heritage (LaBBCH),
University of Palermo-Department of Biological, Chemical and Pharmaceutical
Sciences and Technologies (STEBICEF), Palermo, Italy

*Address all correspondence to: franco.palla@unipa.it

IntechOpen

References

[1] Crispim CA, Gaylarde PM, Gaylarde CC. Algal and cyanobacterial biofilms on calcareous historic buildings. Current Microbiology. 2003;**46**:79-82

[2] Miller AZ, Sanmartín P, Pereira-Pardo L, Dionísio A, Saiz-Jimenez C, Macedo MF, et al. Bioreceptivity of building stones: A review. Science of The Total Environment. 2012;**426**:e1-e12

[3] Manso S, De Muynck W, Segura I, Aguado A, Steppe K, Boon N, et al. Bioreceptivity evaluation of cementitious materials designed to stimulate biological growth. Science of The Total Environment. 2014;**481**:e232-e241

[4] Zurita YP, Cultrone G, Castillo PS, Sebastián E, Bolívar FC. Microalgae associated with deteriorated stonework of the fountain of Bibatauín in Granada, Spain. International Biodeterioration & Biodegradation. 2005;**5**(1):55-61

[5] Schiavon N. Biodeterioration of calcareous and granitic building stones in urban environments. In: Siegesmund S, Weiss T, Vollbrecht A, editors. Natural Stone, Weathering Phenomena, Conservation Strategies and Case Studies. Vol. 205. London: Geological Society Special Publications; 2002. pp. 195-205

[6] Wilson MJ. Weathering of rocks by lichens with special reference to stonework: A review. In: Mitchell DJ, Searle DE, editors. Stone Deterioration in Polluted Urban Environments. Land Reconstruction and Management Series 3. Enfield: NH Science Publishers; 2004. pp. 51-60

[7] Sarró MI, García AM, Rivalta VM, Moreno DA, Arroyo I. Biodeterioration of the lions fountain at the Alhambra Palace, Granada (Spain). Building and Environment. 2006;**41**:1811-1820

[8] Salvadori O, Municchia AC. The role of fungi and lichens in the biodeterioration of stone monuments. The Open Conference Proceedings Journal. 2016;**7**(1):39-54

[9] Scheerer S, Ortega-Morales O, Gaylarde C. Microbial deterioration of stone monuments—An updated overview. In: Laskin AL, Saraslani S, Gadd G, editors. Advances in Microbiology. Vol. 66. London: Elsevier; 2009. pp. 97-139

[10] Krumbein WE. Patina and cultural heritage – a geomicrobiologist's prospective – How microbes change surfaces. In: Proceedings of the 5th European Commission Conference on Cultural Heritage Research: A Pan European Challenge; Cracow; 2003. pp. 1-9

[11] Sterflinger K, Prillinger H. Molecular taxonomy and biodiversity of rock fungal communities in an urban environment (Vienna, Austria). Antonie van Leeuwenhoek. 2001;**80**:275-286

[12] Isola D, Zucconi L, Onofri S, Caneva G, De Hoog GS, Selbmann L. Extremotolerant rock inhabiting black fungi from Italian monumental sites. Fungal Diversity. 2016;**76**(1):1-22

[13] Palla F, Tartamella E. Chromatic alteration on marble surfaces analyzed by molecular biology tools. Conservation Science in Cultural Heritage. 2007;**7**:11-121

[14] Tescari M, Frangipani E, Caneva G, Casanova Municchia AL, Sodo A, Visca P. Arthrobacter agilis and rosy discoloration in "Terme del Foro" (Pompei, Italy). International Biodeterioration and Biodegradation. 2018;**130**:48-54

[15] Zanardini E, Abbruscato P, Ghedini N, Realini M, Sorlini C.

Influence of atmospheric pollutants on the biodeterioration of stone. International Biodeterioration & Biodegradation. 2000;**45**:35-42

[16] Böke H, Göktürk H, Caner-Saltik EN. Effect of some surfactants on SO_2-marble reaction materials. Materials Letters. 2002;**57**:935-939

[17] Spiridon P, Sandu I, Stratulat L. The conscious deterioration and degradation of the cultural heritage. International Journal of Conservation Science. 2017;**8**(1):81-88

[18] Marshall BM, McMurry LM. Biocides and resistance. In: White DG, Alekshun MN, McDermott PF, editors. Frontiers in Antimicrobial Resistance: Tribute to Stuart B. Levy. Washington D.C.: ASM Press; 2005. pp. 174-190

[19] Martin-Sanchez PM, Nováková A, Bastian F, Alabouvette C, Saiz-Jimenez C.Use of biocides for the control of fungal outbreaks in subterranean environments: The case of the Lascaux Cave in France. Environmental Science & Technology. 2012;**46**(7):3762-3770

[20] Rashkov GD, Dobrikova AG, Pouneva ID, Misra AN, Apostolova EL. Sensitivity of Chlorella vulgaris to herbicides. Possibility of using it as a biological receptor in biosensors. Sensors and Actuators B: Chemical. 2012;**161**:e151-e155

[21] Nugari MP, Pietrini AM. Trevi fountain: An evaluation of inhibition effect of water-repellents on cyanobacteria and algae. International Biodeterioration and Biodegradation. 1997;**40**(2-4):247-253

[22] Gonzáles JM, Saiz-Jiménez C. Application of molecular nucleic acid-based techniques for the study of microbial communities in monuments and artworks. International Microbiology. 2005;**8**(3):189-194

[23] Palla F, Billeci N, Mancuso FP, Pellegrino L, Lorusso LC. Microscopy and molecular biology techniques for the study of biocenosis diversity in semi-confined environments. Conservation Science in Cultural Heritage. 2010;**10**:185-194

[24] Palla F. Characterization of microbial communities in pest colonized books by molecular biology tools. Journal of Entomological and Acarological Research. 2011;**43**(2):61-67

[25] Palla F. Analytical techniques: Analysis of microbial colonization. In: Fabbri B, editor. Science and Conservation in Museum Collection. Firenze: Nardini; 2012. pp. 459-470

[26] Palla F, Mancuso FP, Billeci N. Multiple approaches to identify bacteria in archaeological waterlogged wood. Journal of Cultural Heritage. 2013;**14**:e61-e64

[27] Ettenauer J, Piñar G, Sterflinger K, Gonzalez-Muñoz MT, Jroundi F. Molecular monitoring of the microbial dynamics occurring on historical limestone buildings during and after the *in situ* application of different bioconsolidation treatments. Science of The Total Environment. 2011;**409**:5337-5352

[28] Piñar G, Garcia-Valles M, Gimeno-Torrente D, Fernandez-Turiel JL, Ettenauer J, Sterflinger K. Microscopic, chemical, and molecular-biological investigation of the decayed medieval stained window glasses of two Catalonian churches. International Biodeterioration and Biodegradation. 2013;**84**(100):388-400

[29] Otlewska A, Adamiak J, Gutarowska B. Application of molecular techniques for the assessment of microorganism diversity on cultural heritage objects. Acta Biochimica Polonica. 2014;**61**(2):217-225

[30] Pasquarella C, Balocco C, Pasquariello G, Petrone G, Saccani E, Manotti P, et al. A multidisciplinary approach to the study of cultural heritage environments: Experience at the Palatina library in Parma. Science of The Total Environment. 2015;**536**:557-567

[31] Palla F, Barresi G. Biotechnology and Conservation of Cultural Heritage. Switzerland: Springer International Publishing; 2017

[32] Borrego S, Valdés O, Vivar I, Lavin P, Guiamet P, Battistoni P, et al. Essential oils of plants as biocides against microorganisms isolated from Cuban and Argentine documentary heritage. ISRN Microbiology. 2012;**2012**:1-6

[33] Sakr AA, Ghaly MF, Abdel-Haliem M. The efficacy of specific essential oils on yeasts isolated from the royal tomb paintings at Tanis, Egypt. International Journal of Conservation Science. 2012;**3**(2):87-92

[34] Walentowska J, Foksowicz-Flaczyk J. Thyme essential oil for antimicrobial protection of natural textiles. International Biodeterioration & Biodegradation. 2013;**84**:407-411

[35] Noshyutta W, Osman E, Mansour M. An investigation of the biological fungicidal activity of some essential oils used as preservatives for a 19th century Egyptian Coptic cellulosic manuscript. International Journal of Conservation Science. 2016;**7**(1):41-56

[36] Rotolo V, Barresi G, Di Carlo E, Giordano A, Lombardo G, Crimi E, et al. Plant extracts as green potential strategies to control the biodeterioration of cultural heritage. International Journal of Conservation Science. 2016;**7**(2):839-846

[37] Barresi G, Di Carlo E, Palla F. Biocides. In: Palla F, Barresi G, editors. Biotechnology and Conservation of Cultural Heritage. Switzerland: Springer International Publishing; 2017. pp. 49-65

[38] Balouiri M, Sadiki M, Ibnsouda SK. Methods for *in vitro* evaluating antimicrobial activity: A review. Journal of Pharmaceutical Analysis. 2016;**6**:71-79

[39] Salem MZM, Zidan YE, Mansour MMA, El Hadidi NMN. Antifungal activities of two essential oils used in treatment of three commercial woods deteriorated by five common mold fungi. International Biodeterioration and Biodegradation. 2016;**106**:88-96

[40] Cardinale M, Brusetti L, Quatrini P, Borin S, Puglia AM, Rizzi A, et al. Comparison of different primer sets for use in automated ribosomal intergenic spacer analysis of complex bacterial communities. Applied and Environmental Microbiology. 2004;**70**(10):6147-6156

[41] Domig KJ, Mayrhofer S, Zitz U, Mair C, Petersson A, Amtmann E, et al. Antibiotic susceptibility testing of *Bifidobacterium thermophilum* and *Bifidobacterium pseudolongum* strains: Broth microdilution vs. agar disc diffusion assay. International Journal of Food Microbiology. 2007;**120**:191-195

[42] Altshul SF, Girsh W, Miller W, Myers EW, Lipman DJ. Basic local aligment search tool. Journal of Molecular Biology. 1990;**215**:403-410. DOI: 10.1016/S0022-2836(05)80360-2

[43] Stupar M, Ljaljević-Grbić M, Džamić A, Unković N, Ristić M, Jelikić A, et al. Antifungal activity of selected essential oils and biocide benzalkonium chloride against the fungi isolated from cultural heritage objects. South African Journal of Botany. 2014;**93**:118-124

[44] Rotolo V, De Caro ML, Giordano A, Palla F. Solunto archaeological park

in Sicily: Life under tesserae. Flora Mediterranea. 2018;**28**:233-245. DOI: 10.7320/FlMedit28.233

[45] Kouokam JC, Jahns T, Becker H. Antimicrobial activity of the essential oil and some isolated sulphur-rich compounds from *Scorodophloeus zenkeri*. Planta Medica. 2002;**68**(12):1082-1087

[46] Urzì C, De Leo F. Evaluation of the efficiency of water-repellent and biocide against microbial colonization of mortars. International Biodeterioration and Biodegradation. 2007;**60**:25-34

[47] Caneva G, Nugari MP, Salvadori O. Plant Biology for Cultural Heritage. Los Angeles: Getty Conservation Institute; 2008

[48] Lamenti G, Tomaselli L, Tiano P. Cyanobacteria and biodeterioration of monumental stones. In: Saiz-Jimenez C, editor. Molecular Biology and Cultural Heritage. Lisse: Sweets & Zeitlinger; 2003. pp. 73-78

[49] Cutler NA, Viles HA, Ahmad S, McCabe S, Smith BJ. Algal greening and the conservation of stone heritage structures. Science of The Total Environment. 2013;**442**:152-164

[50] Lamprinou V, Mammali M, Katsifas EA, Pantazidou AI, Karagouni AD. Phenotypic and molecular biological characterization of cyanobacteria from marble surfaces of treated and untreated sites of Propylaea (Acropolis, Athens). Geomicrobiology Journal. 2013;**30**:371-378

[51] Konkol N, McNamara C. Enzymatic decoloration of bacterial pigmented from culturally significant marble. Journal of Cultural Heritage. 2009;**10**:362-366

[52] Zammit G, Sanchez-Moral S, Albertano P. Bacterially mediated mineralization processes lead to

biodeterioration of artworks in Maltese catacombs. Science of The Total Environment. 2011;**409**:2773-2782

[53] Lópezmoreno A, Sepúlvedasánchez JD, Borgne SL. Calcium carbonate precipitation by heterotrophic bacteria isolated from biofilms formed on deteriorated ignimbrite stones: Influence of calcium on EPS production and biofilm formation by these isolates. Biofouling. 2014;**30**:547-560

[54] Bolívar FC, Sanchez-Castillo PM. Biomineralization processes in the fountains of the La Alhambra, Granada, Spain. International Biodeterioration and Biodegradation. 1997;**40**:205-215

[55] Imperi F, Caneva G, Cancellieri L, Ricci MA, Sodo A, Visca P. The bacterial etiology of rosy discoloration of ancient wall paintings. Environmental Microbiology. 2007;**9**(11):2894-2290

[56] Zhang KX, Fu XY, Chen JQ, Li SY. Geological research on protection of stone cultural relics: Feilaifeng Cliffside sculptures. Bulletin of Science and Technology. 2016;**32**:224-227

[57] Li T, Hu Y, Zhang B, Yang X. Role of fungi in the formation of patinas on Feilaifeng Limestone, China. Microbial Ecology. 2017;**76**(2):352-361

[58] Cortini Pedrotti C. New checklist of the mosses of Italy. Flora Mediterranea. 2001;**11**:23-107

[59] Dakal TC, Cameotra SS. Microbially induced deterioration of architectural heritages: Routes and mechanisms involved. Environmental Sciences Europe. 2012;**24**(1):1-13

Section 5

Artificial Intelligence

Chapter 14

Automation of the Expertise of the Roman Mosaic Arts in Constanta: Analytical and Statistical Models for a Fuzzy Inference-Based System

Silviu Ioniță and Daniela Țurcanu-Caruțiu

Abstract

The biggest problem faced by the specialists in the field of cultural heritage is the identification of the original elements for their separation from the large mass of the mosaic components that come from completions of the different restoration works. This chapter deals with analytical models for statistical evaluation of the morphological and chromatic characteristics that represent suitable metrics for making decisions in the field of cultural heritage. A classifier model based on fuzzy logical inference, which integrates discrete and statistical characteristics of the mosaic components, is presented. The classification will be done in a space of conventional measures (metrics) for identifying and separating the mosaic components. The exemplification of the method is made on the Roman Mosaic of Constanta, a historical monument that is currently in an advanced stage of deterioration and which requires urgent restoration-conservation interventions. This artifact dates from the third or fourth century, (possibly under the emperor Constantine the Great, 306–337); it is a pavement that has decorative elements specific to this marine area, part of a large construction that took place, in antiquity on three terraces, located on the Black Sea on the docks of the old Port Tomis.

Keywords: automatic reasoning, expertise, mosaic artifacts, artificial intelligence

1. Introduction

The mosaic represents a category of monumental art in which the decorative technique of assembling small pieces of ceramic materials, glass, natural stone, etc. is used by gluing them together with a suitable adhesive. The mosaic has a strong visual effect of esthetic nature and is characterized by a high resistance to wear and moisture. Thus, mosaics are an artifact commonly found in archeology specific to many cultures and civilizations since ancient times. As a decorative art and for monumental design, the mosaic technique is also present in the modern and contemporary era.

The mosaic is a component of the tangible immovable cultural heritage when it is found as a work of decorative art within monuments or archeological sites.

Ancient mosaics, especially from the Roman period, represent a distinct form of monumental art frequently used on pavements. However, the archeological research of the mosaic floors raises certain problems due to the peculiarities of this type of artifact, namely, the large surface, the uneven wear of the component elements, the degradation of the decorative structure, and the chromaticity of the elements. The investigations on the cultural heritage line encounter problems related to the originality of the work as a whole and to the identification of the elements completed during the possible restorations, as well as the establishment of their chronology [1].

In general, investigations on cultural heritage involve human expertise on the one hand and the involvement of appropriate analysis technologies on the other. Currently, the field of cultural heritage research benefits from information technology in different forms—from traditional databases, digital multimedia archives, to advanced image analysis tools, big data knowledge discovery, and cognitive computing.

The involvement of computer science in archeology has been discussed since the early 1970s by James Doran in his pioneering work [2]. He points out that archeologists collect large amounts of data on complex problems in which information is poorly structured, so the use of computer applications would be indispensable. The major challenge in the field of archeological information is the management of imperfect knowledge in terms of uncertainty and incompleteness of facts. For several decades, human experts have relied on software applications for support in their decisions.

Expert systems are the most popular tools capable of performing logical deductions and automatic reasoning in distinct fields using existing facts and knowledge currently provided by human experts. **Table 1** contains a presentation of knowledge-based applications of expert system type and simulation programs in the field of archeology and cultural heritage investigation, published until 1996 and cited in [3]. Over the last two decades, computer applications have evolved from standalone products to computer systems based on distributed networks and data capable of integrating and accessing multimedia information. Cognitive computing and big data are current benchmarks of information technology that give considerable impetus to the development of artificial intelligence applications in various fields, including archeology [4]. In support of information management in the field of cultural heritage, several major projects, generally funded by the European Union, have been developed.

A distinct category of projects is aimed at digitizing museums and archeological sites, for example, the SMARTMUSEUM (Cultural Heritage Knowledge Exchange Platform) project is a research and development project sponsored under the European Commission's 7th Framework (FP7–216923), as well as the multitude of applications in the field of virtual museums and virtual archeology [5]. All these information technologies together with the advancement of the physical investigation methods of the artifacts, which can provide more and more detailed data related to the nature and structure of the materials, contribute to the development of knowledge-based systems in the field of cultural heritage [6, 7].

In the case of mosaics, as a kind of intangible and immovable cultural heritage, an essential activity is the expertise of the artifact status based on the data on the historical background, the artistic characteristics, the physical structure and condition, as well as possible interventions on it in a certain context.

The first step of the expertise consists in collecting the data and organizing them as characteristic vectors for the classification of the studied objects. The next step is to convert the data into knowledge and make up the pieces of knowledge that will

Application	Type of application/Subject	Reference
—	Expert system translation of an archaeological guide book	Ennals & Brough 1982
BEAKER	Expert system for the identification and classification of ceramic beakers	Bishop & Thomas 1984
—	Expert system for ageing horse remains on the basis of tooth characteristics	Brough & Parfitt 1984
EXCHANGE	Simulation program for studying sociocultural changes in a multi-actor exchange environment	Doran & Corcoran 1985; Doran 1987
—	Expert system for simulating the interpretation of Seljukid and Greek iconography	cf. Lagrange & Renaud 1985
CONTRACT	Simulation program to demonstrate a mechanism of discontinuous socio-cultural collapse as provoked by internal change	Doran 1986a
RHAPSODE	Classification system for Bronze Age axes	Ganascia et al. 1986
—	Example programs (6) that reproduce complex reasoning processes as reflected in archaeological texts	Gardin et al. 1988
—	Expert system shell for the identification of finds from excavations	Rugg 1986
ARCHAEOPTEREX	Expert system for the analysis of bird bones	Baker 1987
ASPA	Design for an argument support program	Stutt 1988
FAST	Expert system for functional analyses of stone tools, using metrical and use-wear information	Grace 1989
KIVA	System emulating the reasoning processes of archaeologists in interpreting hypothetical archaeological sites, based on the findings from American Pueblo cultures	Patel & Stutt 1989
VANDAL	Expert system for the provenance determination of archaeological ceramics, based on instrumental neutron activation analysis	Vitali & Lagrange 1988; Vitali 1989
RAPS	Rule-based system for dating Japanese keyhole tombs	Ozawa 1989
—	Expert system prototype for the classification of Bronze Age burials	Gegerun et al. 1990
PALAMEDE	Expert system evaluating urbanization evidence for early state societies	Francfort 1991
ESTELAS	Intelligent database prototype for confirming the existance of social differentiation in the late Bronze Age in the southwestern Iberian Peninsula, based on warrior decorated stelae	Barceló 1991
—	Simulation program for testing contrasting models for the emergence of Upper Paleolithic social complexity	Palmer & Doran 1992
—	Hybrid neural network for archaeofaunal ageing and interpretation	Gibson 1992; 1996
WAVES	Expert system for analyzing and teaching use-wear analysis	Van den Dries 1993; 1994
PYGMALION	Expert system for the classification of Phoenician pottery (800-550 BC), by means of pattern recognition	Barceló 1996

Table 1.
Examples of archeological applications which handle knowledge by means of artificial intelligence [3].

form the basis of a logical inference system for estimating the conservation status and the degree of intervention on the mosaic.

2. Sources for the construction of the knowledge treasure

The field of cultural heritage research is multi- and interdisciplinary. The work of the experts in this field is quite complex, having the task of identifying and documenting as accurately and completely as possible the artifacts, to monitor their condition in order to make the most appropriate decisions regarding the interventions for the maintenance and restoration of the objects. The main issue of the cultural heritage expert is knowledge management, which is mainly based on collaborative work with specialists from complementary fields: historians, archeologists, plastic artists, ethnographers, and increasingly with specialists in transversal disciplines contributing to the investigation process: chemists, physicists, geologists, biologists, as well as computer scientists. Therefore, the major effort consists in merging information from different fields in an attempt to obtain a consolidated knowledge system regarding the heritage object. Three basic steps are distinguished in the formation of a knowledge system:

    i. Establishing an ontology in the approached field.

    ii. Collecting relevant data.

    iii. Conversion of data into knowledge.

The construction of the ontology is the first stage for organizing the data and information on the path of transforming them into knowledge necessary to solve the problems of a certain domain.

The domain ontology contributes majorly to the ordering of information by describing taxonomies, naming the categories, properties, and relationships between the specific data. Creating an ontology is a challenge that faces problems related to the reliability of information in terms of trust, incompleteness, and correctness.

Another aspect is related to the automatic generation of ontologies, which is in principle completely different from the traditional "manual" generation mode performed by knowledge engineers. Automating the generation of ontologies is also a challenge launched with Semantic Web and related technology Resource Description Framework (RDF) as a specification for data modeling. In this sense, a prominent concept is the knowledge graph used by Google, and it uses the principle of web search engine to extract relevant information and return an infobox which is a subset of structured information for the searched topic. The essential feature of this type of ontological synthesis is that it is generated ad hoc based on access to online resources such as the Wikipedia encyclopedia and the Wikidata, Wikibase, and DBpedia product suite. In this way, the actual construction of the ontology practically overlaps with the ad hoc generation of knowledge by querying large amounts of data from distributed web resources. This is the operating mechanism for virtual assistant applications such as IBM Watson, Google Assistant, Amazon Alexa, Cortana from Microsoft, Bixby from Samsung, or Apple's Siri. These products invoke artificial intelligence and understand natural language but nevertheless cannot provide expert level assistance in some areas, especially due to the lack of structured information.

The main shortcoming of ontology generation applications based on web resources predefined as online encyclopedias is the insufficient refining capacity to cover the particular issue of cultural heritage. Therefore, the constitution of the ontologies specific to the different sub-branches remains an open problem, which will be solved unequally, in time, as the expert communities will carry out concrete collaborative projects. Approaches in this area are reported in the literature [8, 9]. The collection of relevant data on heritage objects is a permanent activity through which systematic information is obtained, this being possible with advanced means of investigation using modern equipment for destructive and nondestructive analysis. The advantage of these methods is that they reveal new aspects, and a relative disadvantage of them would be the high cost of the equipment.

In the case of mosaics, as a decorative surface art, investigating the visual component is essential in obtaining nondestructive morphological and chromatic characteristics of the artifacts. Image-based investigations provide descriptions of the visual forms related to both the structural composition and the chromaticity of the areas of interest. By analyzing the image in the visible spectrum, a number of quantitative and qualitative nondestructive evaluations of the artifacts are possible [10, 11]. They can also provide valuable information and other types of passive scans, such as X-ray scanning, fluorescence, etc., and complementary physicochemical analyses of an invasive nature, which involve the taking of small samples from the mosaic.

3. Automatic image analysis

Imagery is the main source of data needed to form the knowledge base of an artifact [11]. Different types of descriptors are used to characterize the outline and the interior of the interest form, topology, and morphology of the regions of interest [12], as follows:

- Outline descriptors

- Regional descriptors

- Texture descriptors

- Morphological descriptors

A variety of algorithms for particular descriptors in each family mentioned above are reported in the literature. The first step is to address only those specific algorithms that contribute to the best classification of the regions of interest of the mosaic surfaces.

The next step is to develop consistent knowledge based on the classification obtained. An essential step for accomplishing these steps is the integration of appropriate algorithms for the automation of the image analysis and classification process. All digital image analysis and processing algorithms are based on pixel value which depends on color, illumination, and surface quality. Therefore, information can be obtained on materials and pigments, on the degree of finishing and flatness of the mosaic pieces. The illumination of the surface of interest when acquiring the image influences globally and locally—through reflections and diffusions the value of the pixels. In principle, the image analysis is done on intensity-type images (gray level or with a single color component) and on binary images (black and withe) obtained from the first. Most descriptors, such as contour, regional, and some morphological, operate only on binary images. Thus, the results of the image analysis are strongly dependent on the level of the reference threshold used to separate the gray levels into black and white. The choice of the reference threshold is generally a compromise, its value being influenced by external factors such as ambient lighting, directional light sources, and camera position at the time of image acquisition. In these conditions it is preferable to use those methods of analysis that do not depend on the conversion threshold and operate with measures applied to the intensity images. The basic requirement is to get the best quality images.

3.1 Texture descriptors

A defining visual feature for the morphological characterization of the mosaic is considered the texture. The strongest descriptors for texture are in the category of statistics: contrast, energy, homogeneity, and entropy; they form a vector of statistical characteristics or texture attributes [12, 13]. In summary they are formally described in **Table 2**.

We mention that the statistical measures of contrast, energy, and homogeneity are calculated based on the gray-level co-occurrence matrix (GLCM) derived from the image intensity of interest [13].

The analysis of the chromatic characteristics of the mosaic can provide essential information about general and local wear, about possible restoration interventions. Chromatic analysis is applied independently of texture analysis and uses histograms

Property	Formula	Notes
Contrast	$\sum_i \sum_j (i-j)^2 p(i,j)$	Give a measure of the intensity contrast between the current pixel $p(i,j)$ and its neighbor, applying over the whole image
Energy	$\sum_i \sum_j p(i,j)^2$	Give the sum of squared pixels value
Homogeneity	$\sum_i \sum_j \frac{p(i,j)}{1+|i-j|}$	Give a measure of the closeness of distributions of pixel values to matrix diagonal
Entropy	$-\sum_i \sum_j p(i,j) \log_2(p(i,j))$	Give the scalar value of the entropy of the whole image

Table 2.
Statistical properties used for texture description.

of perceptual components of HSV [10]. This proves a method available to the expert for the detailed analysis in the comparative study of various pieces or particular mosaic areas.

3.2 Morphological image descriptors

An image can be considered as an assembly (a lot of component parts) having a similarity of variable topological shape and regularity. The morphological analysis of the image approaches the notion of form by applying transformations consisting of (i) extracting some simpler relevant forms called structural elements, from the complex forms of the image, and (ii) comparing some classes of structuring elements with the elements of the image. Structural elements can be considered as regular polygonal shapes such as square, rectangle, rhombus or octagon, as well as the round disk type. Their size is defined by a single dimensional parameter. An interesting structural element used in our approach is the linear one, in the form of the right-hand segment whose size is controlled by two parameters: its length and its orientation angle, measured against the horizontal axis in the opposite direction to the clockwise. The application of the morphological descriptor on an intensity image with gray levels leads to a transformation of it as shown in **Figure 1**.
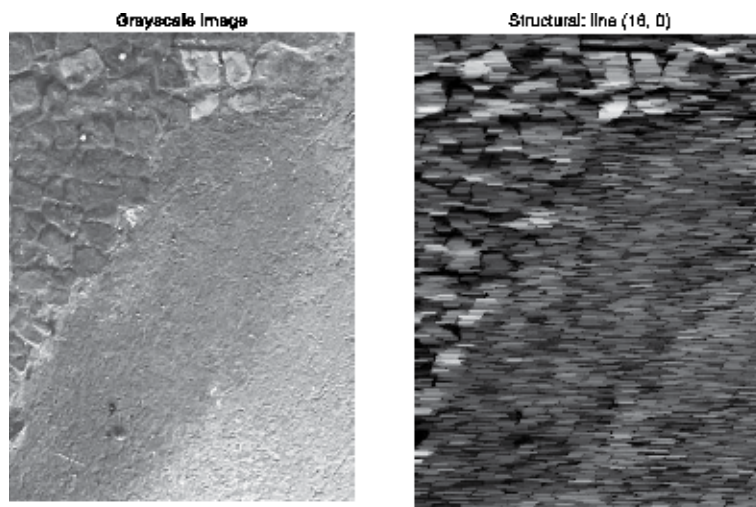

Figure 1.
A linear structuring element with length 16 pixels and angle 0° applied to the grayscale picture.

This descriptor is useful in classifying the images of interest as a discriminator for the variation of the cumulative intensity of the pixels according to the length and orientation of the linear structuring element. An algorithm for calculating this discriminator involves calculating the intensity of the pixels for the entire range of lengths and all the angular positions of the structuring element and detecting the maximum intensity variation. The classification of the images evaluated according to the pair (length, angle) of the structuring element (star) gives us a measure of the degree of structuring of the mosaic.

The automation of the expertise for mosaic investigation is possible by integrating the analysis tools in the form of an application program that will provide solutions for classification of the mosaic surfaces by areas of interest.

3.3 Feature vectors for classification

Feature vectors are composed of elements representing statistical measures of the analyzed image. In our study we considered the four descriptors for texture as defined in **Table 2**. They are the basic vector for classifying a set of N images of the same size, obtained by dividing the image of interest. The proper classification consists of applying the k-means clustering algorithm, which evaluates a possible group structure in the data observed for the four descriptors. Thus, proposing a number of k classes in which the given images could fit, the algorithm distributes the observed data based on distance metrics, in k clusters.

An important aspect for classification is the characterization of clusters in terms of their size, dispersion, and separation. The silhouette of the cluster is dimensionally characterized by the number of elements (objects) that compose it and the value of the silhouette—a number that designates the extent to which a particular object belongs to that cluster. A common dimensional measure of clusters is the average of the silhouette values, the situation being better if the average is higher. Clusters of elements with the values of the closest figure represent a good solution, while values of 0 or even negative denote a confusing belonging of the respective element to one cluster or another or belonging to a wrong cluster.

Clusters can also be characterized in the plane of the characteristic variables, by 2D representations of the points for characteristics taken by two, showing much more clearly the dispersion of data within each cluster by their grouping in relation to the center or weight and possibly the degree of overlap of some clusters.

3.4 Classification examples

Let be the working image taken from Roman Mosaic of Constanta, presented in **Figure 2**, that we propose to classify using the vector of texture characteristics and morphological descriptors. This operation will be performed automatically with the help of an application program developed in MATLAB that uses special functions for image processing [13]. The working steps of the program are as follows:

- The image of interest is read.

- The number of the image division is given by horizontal (n_x) and vertical (n_y) to obtain $K\_max = n\_x \times n\_y$ subimages to be analyzed.

- The number of classes $k\_classes$ proposed for classification is given.
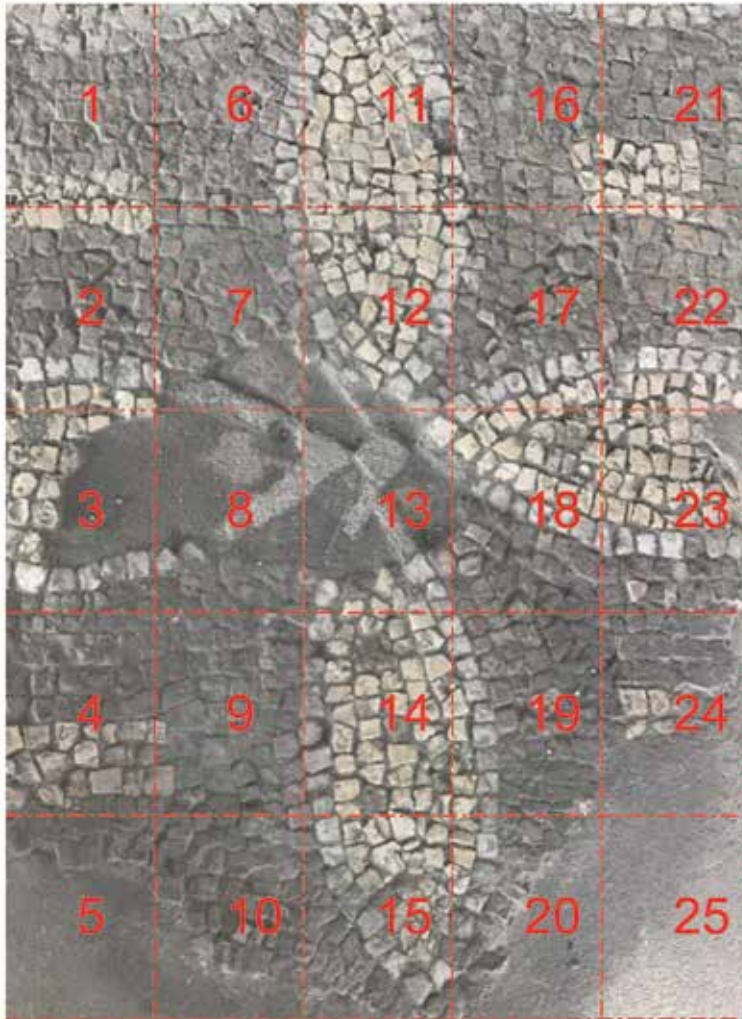
Figure 2.
Image of interest divided in 5×5 subimages.

- The program evaluates the formal descriptors, applies the k-means classification algorithm, and performs the clustering of the results.

Figure 3 shows graphically the results obtained for several classification solutions for different number of classes.

If the number of partitions of the image of interest is changed, the classification solutions change accordingly. The following are two situations: for 9, respectively, 16 partitions of the same original image. **Table 3** presents the classification result for the original image divided into nine images of interest based on the structural morphological descriptors, resulting in four classes. Comparatively, classification, based on the vector of texture descriptors in three classes, generates the solution from **Table 4**. **Figure 4** shows how the classification is based on the two categories of descriptors.

A new classification test for the same mosaic portion divided into 16 areas (images) of interest, for k = 3 belonging classes for texture analysis, reveals the
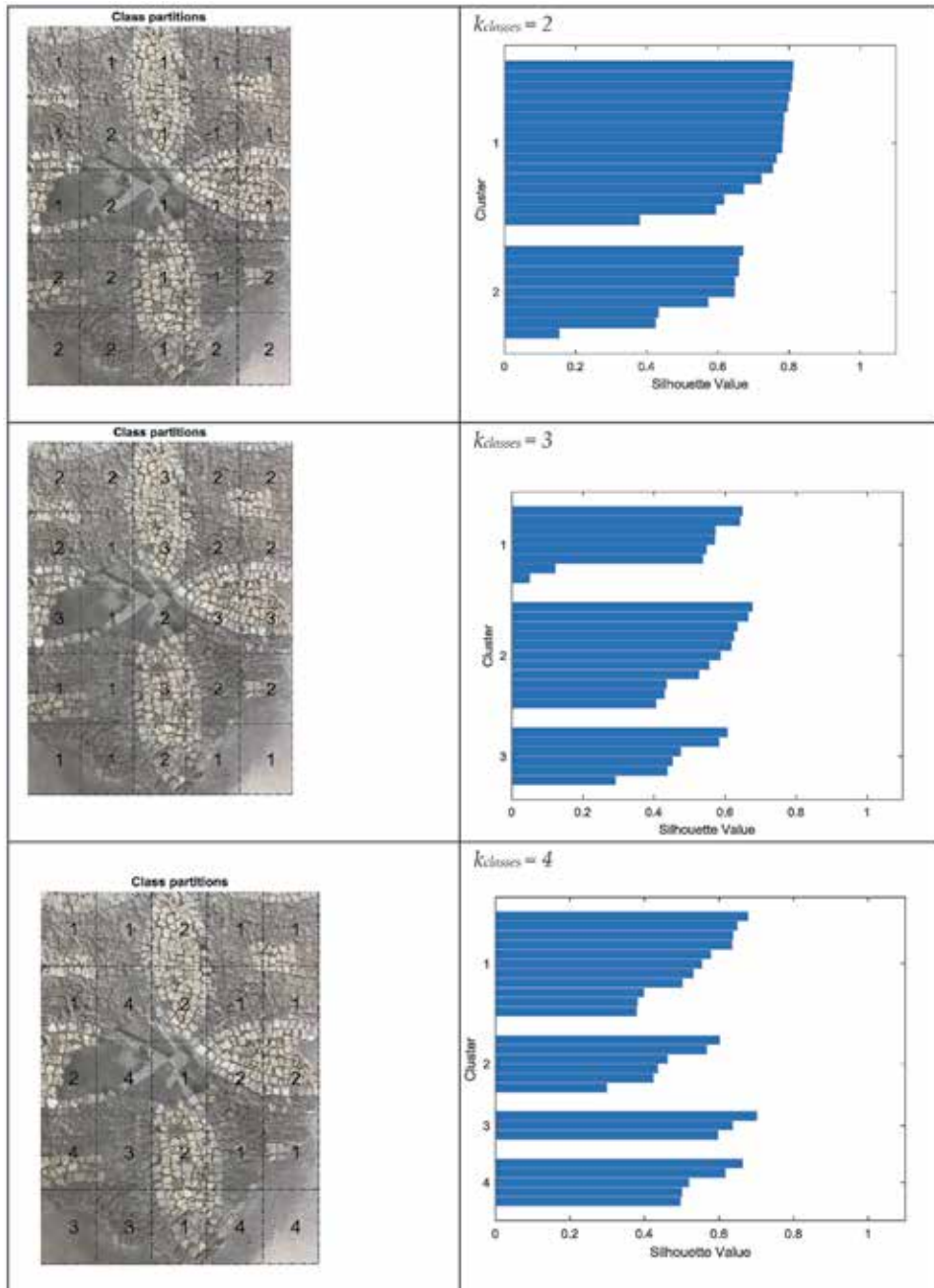
Figure 3.
Image classification and clustering.

solution in **Table 5**. The morphological analysis also reveals in this case four classes, and the classification solution is presented comparative in the same table.

Some differences can be noted due to the different numbers of classes and the different natures of the descriptors used in the two cases presented. It is not a question of judging whether one classification or another is correct but rather to explain the plausibility of the solutions obtained. The plausibility of a classification solution is ultimately verified by the human expert who uses visual perception in connection with the domain ontology.

Class no.	Image partition no.	Strel parameters (length, angle)
1	1, 2, 4, 7, 8	5, 43°
2	3, 9	2, 122°
3	5	2, 32°
4	6	5, 133°

Table 3.
Classification based on morphological descriptors.

Class no.	Image partition no.	Descriptors
1	4, 8	Contrast, energy, homogeneity, entropy
2	3	
3	1, 2, 5, 6, 7, 9	

Table 4.
Classification based on statistical texture descriptors.
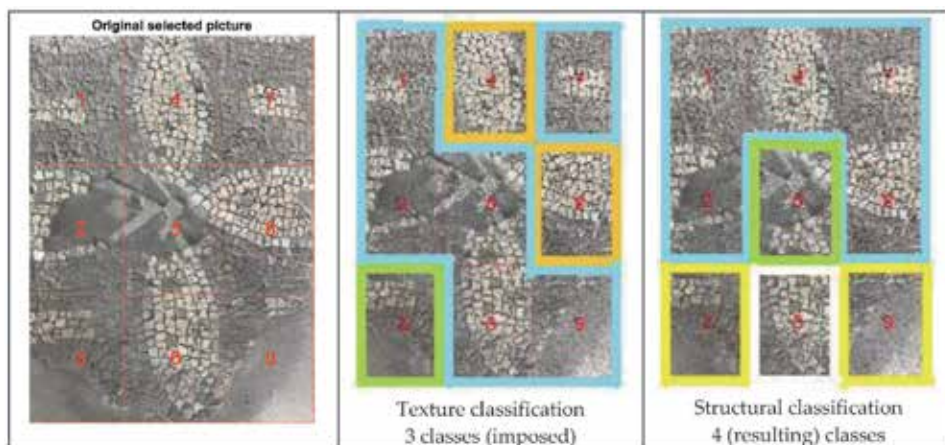
Figure 4.
An example of classifying image partitions into two modes.

Class no.	Texture classification	Morphology classification
1	3, 4, 7, 8, 16	1, 2, 3, 7, 9, 10, 11, 13, 14, 15
2	5, 9,10,14	4, 14
3	1, 2, 6, 11, 12, 13, 15	5, 16
4	—	8, 12

Table 5.
Image partitions grouped on classes.

4. The system of knowledge inference

The step of converting the data into knowledge is done by interpreting the clusters obtained after classification in the space of the descriptors in correlation with elements of the ontology in the mosaic field. Thus, the relationships between the mosaic descriptors generate different classification solutions that will logically
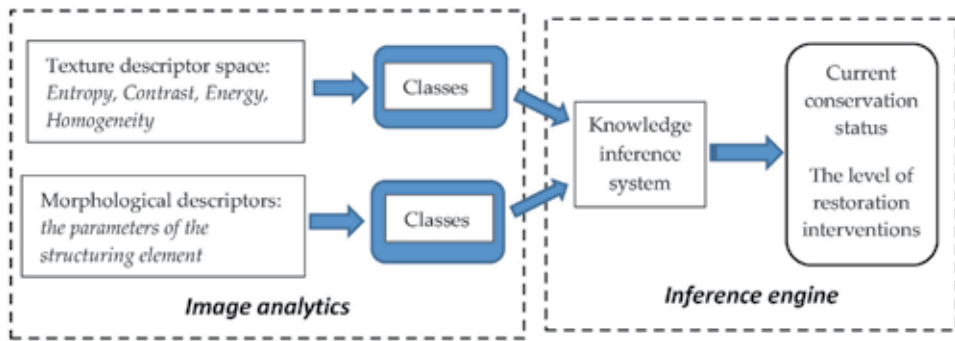
Figure 5.
All the data processing flux for extracting knowledge.

connect with conclusions regarding the current conservation status of the mosaic, respectively the degree of intervention on it. In **Figure 5**, the process of data fusion for knowledge construction is presented schematically.

4.1 Building knowledge

The main technique used here for representing knowledge is based on rules that operate with hypothesis-type and conclusion-type sentences. A rule is an assertion with the generic structure If () -Then () implementing a conditional relationship between a premise and a consequence. The linguistic terms for the construction of sentences in the composition of the rules are the names of the quantitative descriptors of image analysis, as well as qualitative attributes regarding the state of the artifact and the restoration intervention on it. These linguistic terms are actually variables defined on numerical discourse domains and make the connection between numerical and knowledge space. There are input variables in the premise part of the rules and output variables in the conclusion part. The input variables are of a physical type defined on real numerical discourse domains, while the output variables are more or less qualitative and are represented on conventional definition domains.

Table 6 presents the variables manipulated in the knowledge formation process for the characterization of the mosaic and their fields of description.

The intervention on the mosaic has the following classes:

i. Original (artifact without intervention).

ii. Little (a small surface restoration).

iii. Possible (a multi-zone restoration).

iv. Obvious (a larger surface restoration), which can be *right* or *incorrect*.

The current state of conservation of the mosaic has the following four classes: *very good*, *good*, *poor*, and *very poor*.

In practice, different combinations can be found in the correspondence matrix of the two qualitative variables.

The representation of knowledge in the form of rules is based on the cause-effect relationships observed between the input and output variables. Following the experiments, the relationships between the image descriptors were monitored, and the sensitivity and consistency of the dependencies were identified by analyzing the clusters from the perspective of their separation (distinction) and the scattering of

Variable	Type	Definition
Clusters similarity	Input	Dimensional similarity ratios between two clusters
Cluster dimension	Input	Number of elements of the cluster (width)
Cluster component dispersion	Input	Uniformity of silhouette values, usually the average of the values on the cluster
Number of structural classes	Input	Resulting combinations between dimensions and positions of the reference structural element (e.g., a linear segment)
Dimension of structuring element	Input	Morphological measure
Entropy	Input	Texture descriptor
Energy	Input	Texture descriptor
Contrast	Input	Texture descriptor
Homogeneity	Input	Texture descriptor
Intervention	Output	Conventional from 0 to 10
Conservation	Output	Conventional from 0 to 10

Table 6.
Variables for knowledge building.

data within the clusters. We used, for example, another image of Roman Mosaic of Constanta containing original portions in different degradation states and portions with obvious interventions, which was classified into three classes as shown in **Figure 6**. The following are observed:

a. The largest group of portions is *class 1*, which contains poorly preserved mosaic—with varying degrees of wear, with significant defects, including missing elements, possibly with limited, incorrect intervention.

b. A large group of analyzed portions is *class 2*, which contains well-preserved original mosaic.

c. *Class 3* is the most restricted in this case; it contains only two portions where it is intervened obviously, incorrectly.

The dendrogram (**Figure 6c**) provides useful information on the relatedness (relationships in terms of similarity) of the analyzed images.

Analyzing the dependencies of the data in the descriptor space, it is found that the most distinct groups are noted in the following relations:

• Contrast vs. homogeneity (see **Figure 7a**)

• Contrast vs. energy (see **Figure 7b**)

• Contrast vs. entropy (see **Figure 7c**)

Therefore, these dependencies provide us with the first source of facts for constituting knowledge. The following sentences link the numerical data with the expert's observations:

• Mosaic is well preserved (class 2): Contrast is high, entropy is high, energy is low, and homogeneity is low.
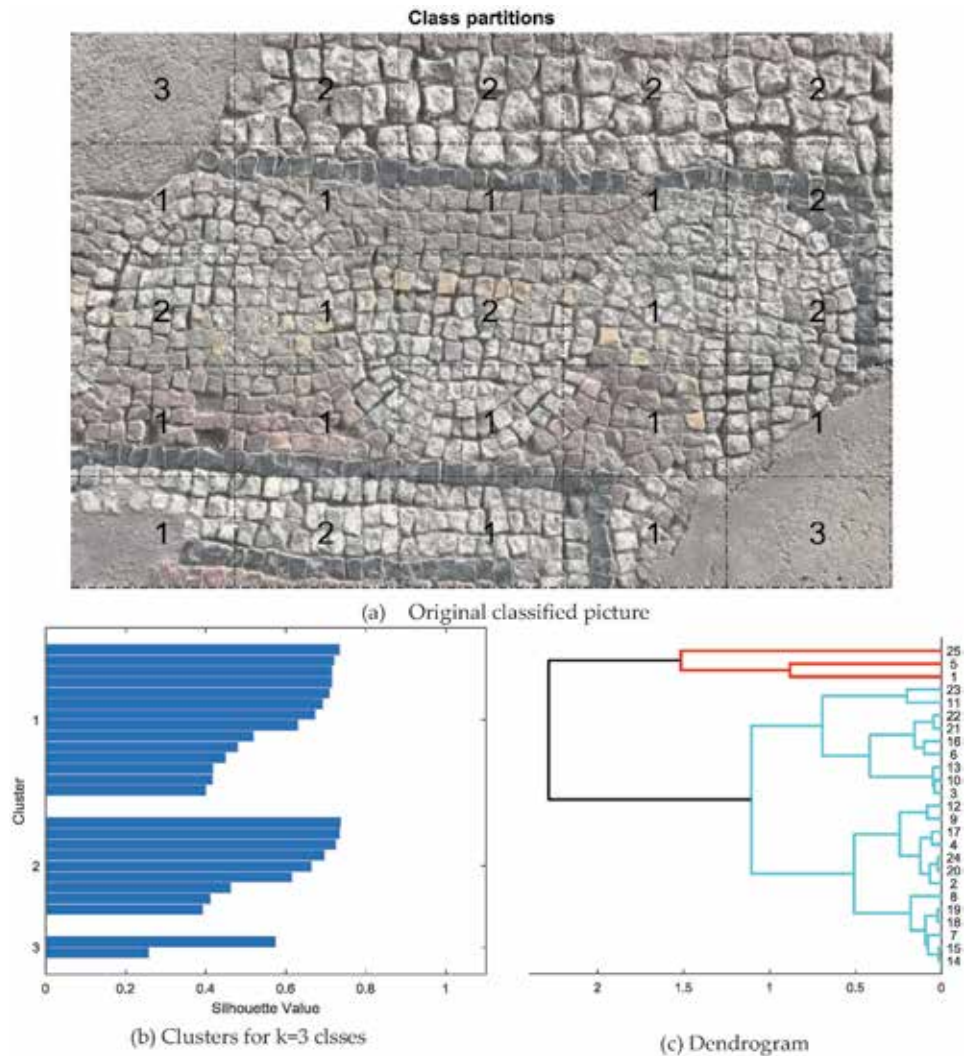
Figure 6.
Image with classified portions, clusters, and dendrogram generated.

- Mosaic is poorly preserved (class 1): Contrast is medium (i.e., lower than in the previous class), entropy is medium, energy is medium, and homogeneity is medium.

- Mosaic has obvious intervention (class 3): Contrast is low, entropy is low, energy is high, and homogeneity is high.

Some interpretations on the statistic descriptors are given in following in order to provide a better understanding of their meanings in this study. The entropy is probably the most popular descriptor in information theory counting the randomness of a system states. It is conceptually close related on entropy thermodynamics in terms of order and disorder in a multiparticle system. Basically, high entropy denotes disorder, a lot of diversity, so a wealth of details. Usually, the degradation of artifacts leads to the loss of original details which is reflected in lower entropy.
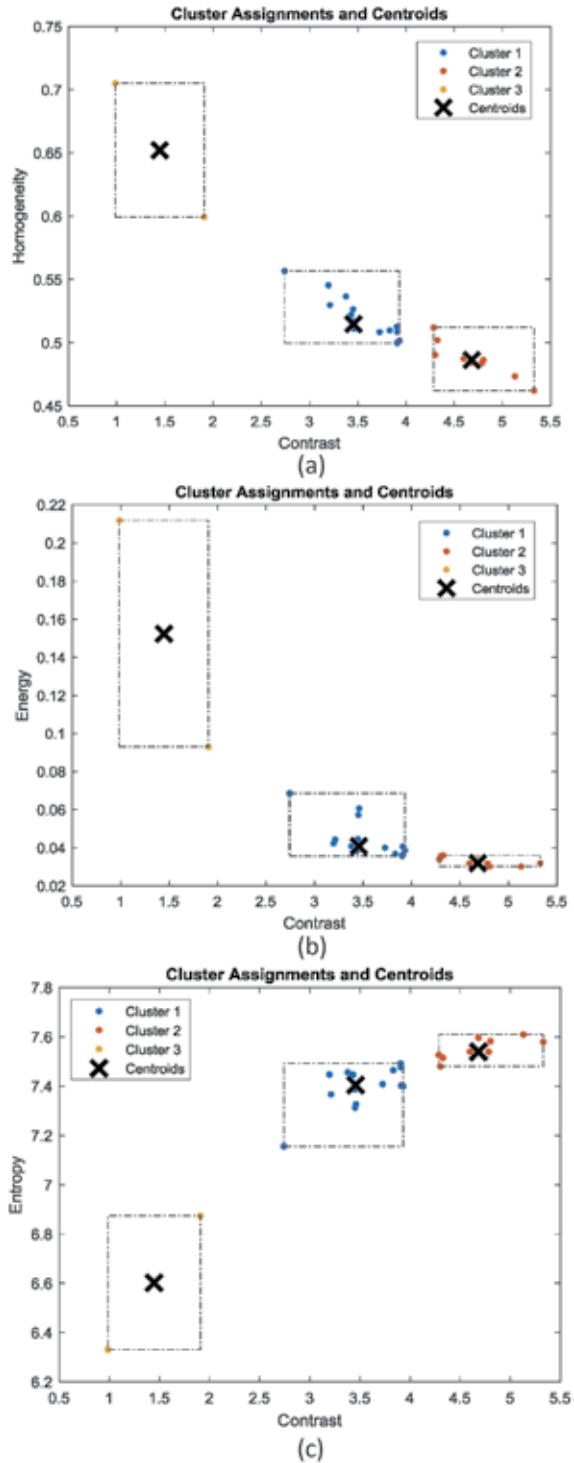
Figure 7.
(a) Data grouping in the contrast-homogeneity plan. (b) Data grouping in the contrast-energy plan. (c) Data grouping in the contrast-entropy plan.

Thus, in the case of the studied mosaic artifact, it is observed that the entropy decreases in the areas susceptible to degradation due to wear or lack of elements. Moreover, the entropy is even lower in the case of coarse restoration interventions.

However, entropy is not an absolute indicator to quantify the integrity of the mosaic texture. Some confusion is possible if entropy is considered as the only descriptor, and therefore contrast is considered as a descriptor of discrimination. Contrast is a measure of the difference in intensity of a pixel in the image relative to its neighbor, which is calculated over the entire image. For a constant image, the contrast is zero. Therefore, the contrast is higher for mosaic areas with many better contoured details.

Homogeneity is a statistical measure for approximating the distribution of pixel values in relation to the diagonal of the gray-level co-occurrence matrix. For a purely diagonal matrix, the homogeneity has a maximum value of 1. This makes the surfaces without morphological and chromatic details to have high homogeneity.

Finally, energy is a global indicator of the image that increases with its chromatic intensity and uniformity. Therefore, the energy is higher on evenly colored portions and decreases in proportion to the complexity of the texture details. A constant image has a maximum energy of 1. Energy can be a good discriminating indicator for restored mosaic portions.

4.2 Estimators with fuzzy logic

The fuzzy approach is fully justified for the mosaic expertise issue. First of all, the fuzzy logic works well with the uncertainty of the decision model and in conditions of uncertainty of the numerical data. Fuzzy logic treats physical and qualitative variables by providing a consistent and robust response in roughly defined approximate conditions.

The current state of conservation of the mosaic is a qualitative, subjective attribute, which can be conventionally quantified on a rating scale from 0 to 10, zero corresponding to "very poor" and grade 10 to "very good." The intervention is also a qualitative characteristic that can be evaluated quantitatively by the extent of the restored areas. When the intervention is certain, the question arises to evaluate whether the restoration was correct or incorrect. The correctness of the mosaic restoration is also a qualitative attribute, but which can be evaluated quantitatively in comparison with original areas. The metrics used for the qualitative evaluation of the mosaic result from the automatic classifications based on image descriptors in numerical form that will serve as inputs for estimators with fuzzy logic.

In principle, a system of fuzzy estimators consisting of independent blocks for partial decisions will be built, which will be linked to generate the final decision regarding the state of conservation of the mosaic, respectively the intervention on it.

4.2.1 Designing the fuzzy estimator

The proposed estimator operates with three input variables: two texture descriptors of the evaluated image (contrast and energy) and a quantifier for the consistency of the class, respectively the width of the cluster to which the evaluated image belongs. Input variables are described by fuzzy sets defined on real numeric fields of speech. The output variables (from the conclusions) are described by fuzzy sets on conventional definition fields for the current state of conservation, respectively, for the degree of intervention, as shown in **Figure 8**. The generic assertion for constructing the first fuzzy inference block will be of the following form:

If (Contrast is {Low, Medium, High}) and (Energy is {Low, Medium, High})
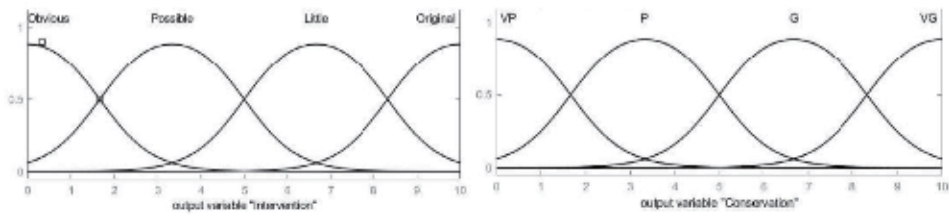then (Conservation is {Very Poor, Poor, Good, Very Good})

Figure 8.
Membership functions of fuzzy output variables.

The third variable results from the automatic classification and represents the size of the class in which the evaluated image falls, being quantified by the width of the cluster of the respective class, as a percentage in relation to the total number of elements. This variable intervenes with the output of the first block, as an input to the second block of the fuzzy system, which estimates the degree of intervention on the mosaic. The generic assertion for the second fuzzy inference block is as follows:

$$If\ \big(Conservation\ is\ \{Very\ Poor, Poor, Good, Very\ Good\}\big)$$
$$and\ (Cluster\_Width\ is\ \{Small, Medium, Big\})\ then$$
$$(Intervention\ is\ \{Obvious, Possible, Little, Original\})$$

The design of the blocks with fuzzy logic and the implementation of the functional model was done with the Fuzzy Logic Toolbox and the Simulink package in the MATLAB programming environment. The functional system, which estimates, based on the input data resulted from the processing of the image of interest—the conservation status and the intervention level—is shown in **Figure 9**.

4.2.2 Results and interpretation

With the help of the software modules for processing and decision based on fuzzy logic presented above, the mosaic in **Figure 10** was evaluated resulting in the graphs presented in **Figure 11** with the notes for the Kmax = 25 portions of the artifact.

First we observe a few peaks on the *conservation* curve (circle markers) that corresponds to the images with the numbers 3, 6, 10, 11, 13, 16, 21, 22, and 23. They are all above the level 6.7, which belongs to the class good. Two of them, 11 and 23, are qualified towards very good class. Other remarkable points on the same curve denote minimal values (square markers) that correspond to images 1 and 25, which are qualified as poor and very poor, respectively. The low grades also have the
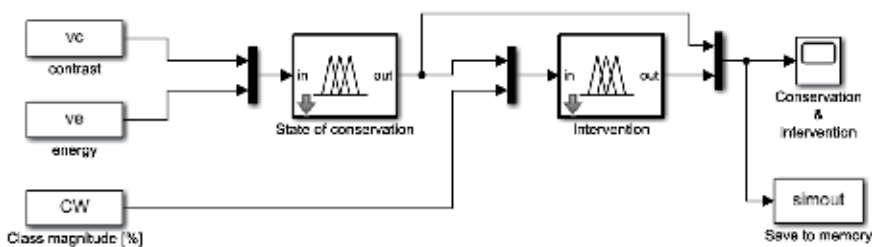
Figure 9.
Model of fuzzy inference system.
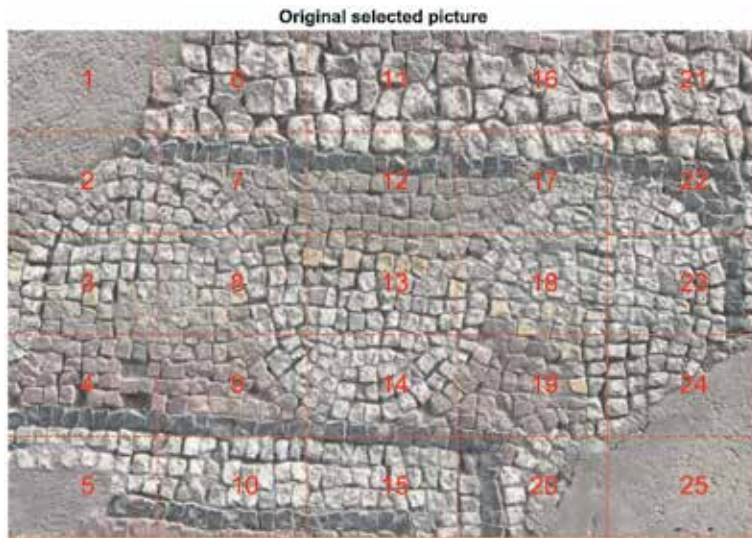
Figure 10.
Mosaic artifact partitioned into 25 subimages for analysis.
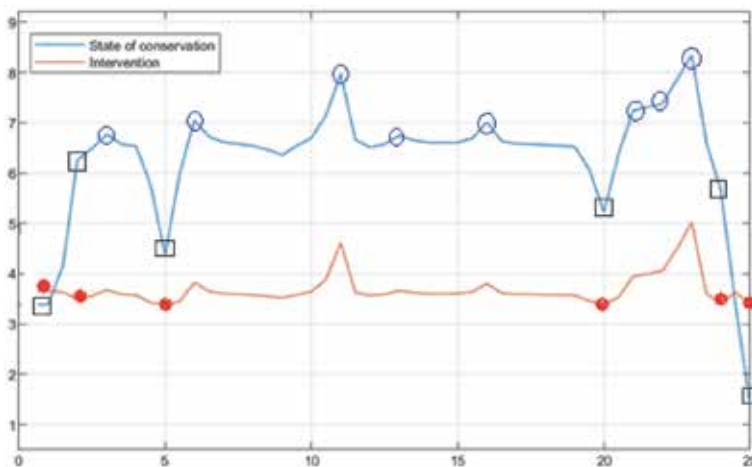
Figure 11.
Answer of the fuzzy inference system.

images with numbers 5 and 20 but also 2 and 24. All these belong rather to the poor image class.

The interpretation of *intervention* curve reveals some peaks, which, however, do not exceed grade 5 as are images 11 and 23. They show the best preserved parts of mosaic but few interventions are not excluded. On the contrary, the points marked with red points denote possible interventions for images that were already qualified as poor. These images are 1, 2, 5, 20, 24, and 25 that were detected with obvious level of intervention and visually confirmed as such.

5. Conclusions

Automatic analysis of images with mosaic-type artifacts and automatic classification of images of interest is sustainable and efficient. The mathematical tools for

the analysis of textures are powerful enough if they are combined into feature vectors to obtain classification solutions.

It turns out that the development of logical inference systems using the mosaic ontology is possible and perfectible at the same time, by introducing new variables to refine the decision.

In this chapter we have integrated into a software application functions for processing the data from the images and calculating some descriptors needed in the classification process. We also presented a solution for using artificial intelligence models consisting of fuzzy inference systems for knowledge in the field of mosaic expertise. Fuzzy systems are estimators for solutions of framing the mosaic portions in the conservation-intervention matrix. The rule bases reflect the human expertise that can then be applied repetitively, thus allowing the automation of decision support within the management of cultural heritage.

The obtained results prove the concept and validate the proposed solution at the experimental level. Like any logical-formal model, validation under relevant conditions is dependent on the correctness of the data. Thus, for a correct analysis, the images of the mosaic, as a primary source of data must meet certain conditions from the acquisition phase, as follows:(i) to be taken at an angle right to the surface of the mosaic (in the direction of normal); (ii) to be captured under uniform lighting conditions, without shadows, reflections, etc.; (iii) to be taken from the same height (constant distance) for the entire surface: and (iv) the resolution must be as high as possible.

Other directions for improving the system response and achieving a ready-to-use system for mosaic expertise would be to merge several chromatic variables and descriptors, as well as research to find new morphological descriptors.

Acknowledgements

Author details

Silviu Ioniță[1*] and Daniela Țurcanu-Caruțiu[2]

1 Regional Center of Research and Development for Materials, Processes and Innovative Products Dedicated to The Automotive Industry (CRC&D-Auto), University of Pitești, Pitești, Romania

2 Center of Expertise of Artworks by Advanced Instrumental Methods (CEOAMIA), Ovidius University, Constanța, Romania

*Address all correspondence to: silviu.ionita@upit.ro

IntechOpen

References

[1] International Committee for the Conservation on the Mosaic. Available from: https://iccm-mosaics.org/

[2] Doran J. Systems theory, computer simulations and archaeology. World Archaeology. 1970;**1**(3):289-298

[3] Van Den Dries, Monique Henriëtte. Archaeology and the application of artificial intelligence: Case-studies on use-wear analysis of prehistoric flint tools. 1998. Available from: https://openaccess.leidenuniv.nl/handle/1887/13148 [Accessed: 30 October 2019]

[4] Puyol-Gruart J. Computer science, artificial intelligence and archaeology. BAR International Series. 1999;**757**:19-28

[5] Berni M et al. Smartmuseum: A cultural heritage knowledge exchange platform based on ontology-oriented, context-aware and profiling systems. In: Proceedings of 2009 Electronic Imaging and the Visual Arts EVA'09. 2009

[6] Prabawasari VW et al. Knowledge-based systems in the information system of Indonesian C. In: DEStech Transactions on Environment, Energy and Earth Sciences SEEIE. 2016

[7] Poux F et al. 3D point clouds in archaeology: Advances in acquisition, processing and knowledge integration applied to quasi-planar objects. Geosciences. 2017;**7**(4):96

[8] Fernández-López M. Overview of methodologies for building ontologies. In: IJCAI99 Workshop on Ontologies and Problem-Solving Methods: Lessons Learned and Future Trends. Vol. 430. 1999

[9] Corcho O, Fernández-López M, Gómez-Pérez A. Methodologies, tools and languages for building ontologies. Where is their meeting point? Data & Knowledge Engineering. 2003;**46**(1):41-64

[10] Ioniță S, Țurcanu-Caruțiu D. Intelligent image processing and optical means for archeological artifacts examination. In: Advanced Methods and New Materials for Cultural Heritage Preservation. London: IntechOpen; 2019

[11] van der Maaten L, Boon P, Lange G, Paijmans H, Postma E. Computer vision and machine learning for archaeology. In: Proceedings of Computer Applications and Quantitative Methods in Archaeology. 2006. pp. 476-482. Available from: https://publikationen.uni-tuebingen.de/xmlui/bitstream/handle/10900/61550/CD49_Maaten_et_al_CAA2006.pdf

[12] Vertan C, Ciuc M. Fundamental Techniques of Processing and Analysis of Images (in Romanian). Bucharest: Matrix Rom; 2007. pp. 182-184

[13] Matlab product documentation [online]. Available from: https://www.mathworks.com/help/images/ref/regionprops.html [Accessed: 15 June 2018]

Ideological Interaction, Public Governance and Diplomacy in Cultural Space

Chapter 15

Ideological Interaction Theory in Critical Discourse Analysis

Yadu Prasad Gyawali

Abstract

Cultural and ideological references in critical discourse analysis aim at reframing decisions with exploring the cultural as well as ideological perspectives of the familiar and idiosyncratic styles. The chapter focuses on the development of the ideological interaction theory for connecting the discourse with language and personal thought. The concern criteria are ideology and the other social components like people, status, economy, media, and politics with their connectivity to the global situational trends. Therefore, the chapter surveys the personal traits as psychology, sociological surrounding, and cognitive efforts for the development of social as well as cultural interaction with the perspectives of individual influences.

1. Introduction

Discourse, a construct with the personal thought which reflects personal behavior and attitude, is known as the ideology. The socially conditioned and socially constructed ideas are considered as ideology. Ideology connects peoples' perspectives from the different fields, such as, in the context of Nepal, political leaders may develop one kind of thought; on the other hand, educationists may develop educational thoughts differently. The perspectives educationist and the political leaders create the interactive situation in which they could discuss their thoughts and generate new thoughts. Fairclough [1] identifies transforming goals with the perspectives of textual and contextual variations; discursive practices may have significant ideological effects, which they can help to produce and reproduce unequal power relations among the different bodies of the community and how they represent the things and position of people. Van Dijk [2] states that ideologies are the ideas and belief system of a particular group of people defined from the multidisciplinary ways involving social, cognitive, and discursive aspects. He further argues that ideologies are acquired, expressed, changed, and reproduced in the society, mainly in different forms of discourses such as texts and talks.

According to Fairclough and Wodak [3], "CDA as discourse analysis which aims to systematically explore the often opaque relationship of causality and determination between discursive practices, events, texts and wider social and

cultural structures, relations and processes; to investigate how such practices, events, and texts arise out of and are ideologically shaped by the relation of power and struggles overpower, and to explore how the opacity of this relationship between discourse and society is itself a factor securing power and hegemony."

Regarding the above definition, ideology refers to social forms of processes within which and employing which, symbolic forms circulate in the social world. Ideology is the study of "how meaning is constructed and conveyed by symbolic forms of various kinds" [4]. Another perspective suggested by Luke [5] in a different context claims that language gets power when influential people use it. There is a close relationship between language and power in several ways; societal and cultural frameworks shape the ideological interaction which is based on the language associated with power relationship.

In Refs. [6, 7], it is stated that ideology is perceived as a multidisciplinary approach which is the fundamental framework for organizing multiple ideological concepts and consumptions. Similarly, Van Dijk [6] focuses that ideologies usually control the thoughts of a social group which then represent the essential social characteristics of a group based on their identities, goals, norms, values, positions, and responses to other negative stances. However, Van Dijk [2] emphasizes the ideological consumption in both cognitive and social levels and proclaims that social cognition is a system with shared sociocultural knowledge by members of a specific group, society, or culture. On the other hand, cognitive functions are considered as the basic form of ideological properties that organize, monitor, and control attitudes of a social group and are accompanied by the experiences of a person [6].

Ideology represents the discursiveness by which it allows interaction in the correspondence of the social thoughts and responsibilities. As suggested by Van Dijk [8], ideologies are particular ways of representing and constructing a society that reproduces distributed power relations.

Ideology is not only associated with representing social reality. It reflects the social identity and construction of thought. Therefore, ideology imparts the presence of thoughts coordinated by social and cultural influences.

2. Basic traits

Ideologies are foundational social beliefs of people rather than general in nature because fundamental ideologies are not developed overnight, such as a person cannot be a feminist or socialist in few days but it takes time for framing the foundation of personal, social, and contextual ideologies including many experiences and discourses. Hodge [9] states that interaction is a basic requirement for discourse which is sturdy and transformative as it introduces different perspectives, ideas, structures, and ontologies. Ideologies always interact in different forms. For example, Van Dijk [6] contends that ideologies are endorsed in the forms of action and interaction, and ideological reproduction is often rooted in organizational and institutional contexts. For example, racist ideologies are expressed in racist talk, and feminists reproduce their ideologies in feminist talk. Therefore, many forms of interactional discourse play a vital role in communicating ideologies in the society. Ideologies are the principles that essentially function as the cognitive representations in the form of discourse, societal position, and interests of social groups which connect macrolevel analyses of social structure

with microlevel studies of individual interaction. However, Martínez-Roldán and Malavé [10] contend that ideologies are not only the shared beliefs of a group, social interactions between individuals within a sociocultural context, and negotiation of meanings but also indicate multifaceted social phenomena including various social classes, groups, and social institutions within the broader societal contexts. It involves diverse social groups within different contradictory ideological groups.

The context of ideology reflects the personal framework [4]. Moreover, Fairclough and Wodak [3] state that context has the determining role in producing the ideology. In the context of communication, simply we get a contradiction of the ideologies. For example, media discourse may have a different ideology to educational and political discourses. The tenets of ideological interaction theory represent the guidelines to present the contextual variations or perspectives, as suggested in Refs. [1, 7–9]. The basic tenets of critical discourse analysis introduced by Fairclough and Wodak [3] are the baseline for determining the traits of ideological interaction perspectives.

- Social dimension has the decisive capacity to determine the ideological interaction

- Ideological creation in the perspectives

- Culture, sex, social status, and economic status are discursive

- Contextual discourses and communication abilities and skills are core thought of the ideology

3. The framework of ideological interaction theory

The framework of ideological interaction theory is based on sociocultural perspectives. Scott and Palincsar [11] argued that cultural and social entities suggest ideological consequences. Similarly, in Refs. [12, 13], the significance of the cultural contribution to implant ideology is stated, as an ideology has an impact on the social activities, attitudes, and shared understanding in interdisciplinary fields. The social role has tribute consideration in determining the ideology. For example, the authors in Refs. [2–5, 7, 9, 14] focus on the contextual, cognitive, and attribute relevance and variable to construct the thought, and the thought is considered to the social issue; in the way, social issues may have multidimensional and diverse perspectives might be revealed as addressing the ideology.

Ideologies are expressed by text and talks as mentioned by Padilla and Vana [15]. It helps to construct new and confirm already present ideologies persuasively. Similarly, the communication skills and strategies lead to construct ideologies and prevail interactions among groups in different circumstances.

On the other hand, there are unseen priori theoretical grounds to exclude any textual structures from expressing underlying ideological principles [3]. Undeniably, the mental model of functional categories involved in events or communicative contexts.

Some of the tenets of critical discourse analysis can already be found in the critical theory of the Frankfurt School before the Second World War [3].
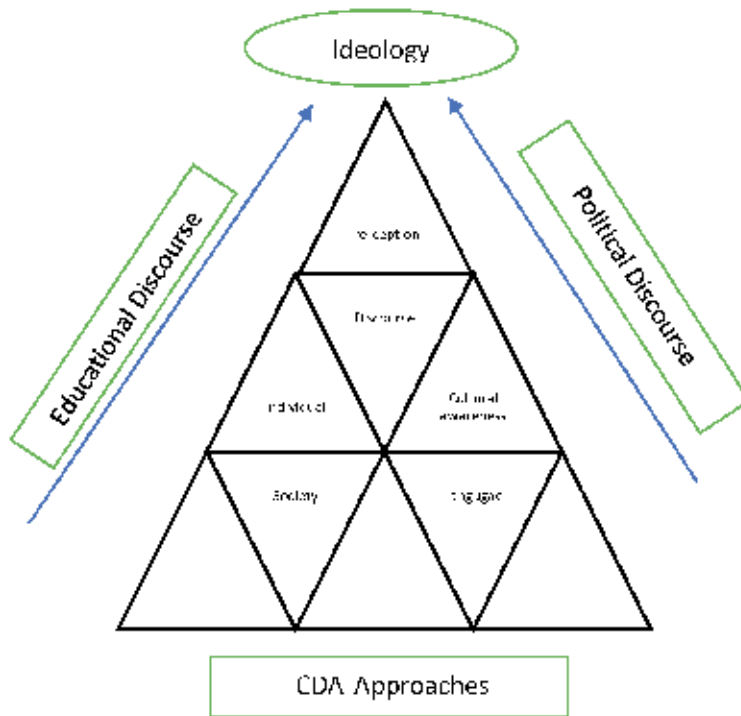
The framework discusses on the interaction process where society and language interact to the individual and cultural awareness and that have the effects of critical discourse approaches from the baseline, and with this reference, an individual perceives a perspective of a discourse of any educational or political situation. Moreover, the different levels of the discourses interact to the ideologies, and by the product, there is another form of ideology. For example, the Modern Era introduces diverse thoughts and beliefs guided by ideology and conscience, and more or less, they are interacting with the other ideologies around us. In this process of interactions, we generate other modified thesis and new perspectives to see things around us. As proof, we can take an example from the situation of the COVID-19 pandemic. In Nepal, the suicidal death rate is 25 times higher than the death of those infected during this lockdown period. People have different perspectives. Some people argue that the financial crisis has caused this, whereas other people believe that it happened because of fear and psychological threat; but after the interaction between these two diverse ideologies, people have come to modify their arguments by considering each other's factual arguments. Now, the state of their ideologies shares some common ground and they have generated ideology based on their thought and social status which is the outcome of the ideological interaction theory.

4. Issues and contexts

The theory of ideology is articulated within a conceptual triangle [6] that informs the discourse analytic approach and connects society, discourse, and social cognition in the framework of a critical discourse analysis. Ideologies are the straightforward outlines for establishing the social cognition communal by associates of social groups, organizations, or institutions. In this respect, ideologies are both cognitive and social [6, 7, 16]. Moreover, ideologies function and interface the interface between the cognitive representations and processes underlying discourse

and action, on the one hand, and the societal position and interests of social groups, on the other hand. Similarly, according to Padilla and Vana [15], this conception of ideology also allows us to establish the crucial link between macrolevel analyses of groups, social formations, and social structure and microlevel studies of situated, individual interaction, and discourse. Ideologies, then, are the overall, abstract mental systems that organize such socially shared attitudes. In Refs. [9, 17], the authors report in the different contexts that the feminist attitudes just mentioned, for instance, which may be internally structured and mutually related by general principles or propositions that together define a feminist ideology. Similar examples may be given for racist, anti-racist, corporate, or ecological attitudes and their underlying ideological systems.

As stated by Vygotsky [18], sociocultural issues play a vital role in the formation of discourses, and scaffolding creates several opportunities to interact with the different behaviors in society. On the other hand, ideological configurations are landed by the approaches of critical discourse analysis [12]. However, Lazar [19] states that the approach, specifically, feminism shows the level of interaction among the communities and personal perspectives. The way we perceive the concept is crucial for shaping the grounded reality. Scott and Palincsar [11], on the other hand, discuss the sociocultural impacts on discourse management.

Here I am presenting some examples of interaction connected to feminism and sociocultural realities.

Feminist theory focuses on analyzing the nature of gender inequality, women's social roles, interests, choices, and female politics in the different fields such as in philosophy, sociology, psychology, literature, and education [20]. It examines the exploitation, domination, sexual objectification, oppression, patriarchy, and stereotyping. The theory of feminism mainly talks about the role of women in society, such as being economically dependent, having low status and power, doing unpaid work, loss of choice, and division of labor in different cultural and sexist beliefs.

Feminism theory first appeared in about 1794 from the United States, and it evolved dealing with contemporary issues and women's experiences [21]. There are different concepts associated with the theory of feminism. According to Code [20], there are different waves in feminism; the first wave was initiated in about 1928 which argued for the political equality and the rights of property and representation of women in the society, by some of the leading figures of feminism such as Wollstonecraft and Suffragettes.

Similarly, the second wave of feminism started after the Second World War period, representing the female emancipation and woman liberation movement of the 1950s and 1960s which mainly argued for the social and economic equality of the women in the society, especially equal pay and equal rights. It reacted against the uneven distribution of power, women's racial, religious, class-related, and different forms of oppressions. The third wave appeared by pointing out some of the drawbacks of second-wave feminism in the late 1980s and 1990s by representing the experiences of woman globally—women of different races, classes, ethnicities, and sexualities are positioned differently within the countries. The most recent wave of feminism deals with the female empowerment of women in the use of digital technology or social media to encourage female achievement.

While analyzing the transcribed text of Muniba's video speech, this research connects feminism which covers the gender-based realities in the society to its transformation to social activities. The critical discourses value the diverse perspectives in the society based on the concept of power, domination, and social equality focusing on groups, organizations, and institutions. Personal and cultural knowledge may have the crucial role in ideological interaction [19]. He further says that

group knowledge is shared by the social group of society. Reality lies in the knowledge and attitude representing the ideologies of social groups such as socialists, ecologists, feminists, as well as anti-feminists and can be analyzed in terms of local and global interaction among groups and social organizations.

Throughout analyzing this discourse, the term feminism refers not only to female-oriented characteristics but also to gender practices with constructing values. Similarly, the concept reflects gender identity, responsibility, belief, and the traditions of the social practices concerning the ground reality of women in the society. Lazar [22] reports that feminism is one of the critical perspectives of social transformation and emancipation with the values of gender-based realities that existed in society. Further, he argues that the society has the dividend role from the perspectives of gender and that focuses to the categories of cultural influences, social identity, sexuality, discrimination, power practices, social position, ideology; particularly, asymmetrical power relations and gender ideology are the major discussions of feminism. Urban [23] discusses the feminist movement from society to pedagogy; the main concern lies in the core aspects of the feminist movement, care, diversity, and collaboration.

The video that I selected has a good connection to the disability and material feminist theory; for example, Mays [24] discusses domestic violence, social oppression as a moment of gender and disability dimensions. The psychosociological context has several emerging issues of feminism; however, the real situation that the disabled female has been coping with in the sociocultural setting demands exploring gender and disability dimensions.

In the speech, she has described about how people in the society including her relatives behave her after being physically disable in a car accident and how she dealt with socially diversified ideologies to live a successful and motivating life despite her physical inability. As we know, feminism focuses on gender identity with the aspects of society as well as cultural configurations. Van Dijk [25] discusses several approaches regarding the socio-cognitive perspectives where feminism remains as the core component. He further supports that social inequalities have been introducing several hidden realities such as attainment of knowledge of diverse groups or issues, practicing the social and cultural values associated with the ideological awareness, and social equity in the society.

For the exploration of the issue material, feminist interpretations and disability theory associated with cultural dimension have the prominent focus to experience the gendered and disabling capacities in the sociocultural environment. The women are biased due to the male dominance in the process of decision-making and power relations. Some questions such as: Are there no provision of women's independence? Is there no value to women's decisions? Why society marks a huge gap between male and female for education, job, and lifestyle? triggered my mind while observing the nature of society. I wanted to introduce and explore the different aspects of society where females live. I found the speech motivating to describe the hidden potentialities of the women who want to introduce their existence and prove their perfection in their physical imperfection. This empowers all the women around the world to recognize their inner capacities, to face problems created by the social system, patriarchy, and power relations. It is observed in the speech that despite many challenges, the females can raise their voices to unlock the more significant opportunities and possibilities in society.

The speech is full of positive and negative feelings of pain, sorrows, fear, and determination. She has unhappy feelings about being disabled in the accident due to her belief in misfortune and fate. She explained the situation as follows:

The next day, the doctor came to me and said, "Your spine injury is so bad you won't be able to walk again." I took a deep breath. And I said it's all right. The next

day doctor came and said, "Because of your spine injury and the fixation that you have in your back, you won't be able to give birth to a child again." That day, I was devastated [26].

The women with disabilities are depicted as weak, helpless, vulnerable, dependent, and incapable bodies [27]; the doctor had reported her as unable to give birth and walk normally. The word devastated illuminates her deep and sad feeling of disappointment, hopelessness, and unhappiness.

In another context, Mazari [26] opines, "I'm tired of looking at these white walls in the hospital and wearing these white scrubs. Bring me some colours, bring me some small canvas. I want to paint." The word tired of is related to her unhappiness as she was convicted for full 2 years in the complete bed rest and "I want to paint" shows that she wanted to overcome all those negativities and forget the pain by painting.

According to her, "So the very first painting I made was on my deathbed where I painted for the very first time, it was not just an art piece or just my passion. It was my therapy." To signify that she expresses her internal pain into that painting as she has a passion for portraying herself in the beautiful arts. In this way, she develops a feeling and emotion of fear, sadness, and negativity to determination. The feeling of determination has overcome her reality when she says,

After 2 years and two and a half months when I was able to sit in a wheelchair, that was the day when I had the rebirth. So, I have to accept myself the way I am, the sooner the better.

This shows her strong sense of accepting herself as the way she is. Finally, she tried to motivate the audience to summarize all her life experiences and the struggle she faced by sharing some happy and successful moments in her expressions. She says, "I became the national goodwill ambassador for UN Women, Pakistan. And now I speak for the rights of women and children. We talk about inclusion, diversity, gender equality which is a must."

Mays [24] argued that women with disabilities experience social domination and domestic violence continuously as a result of gender and disability dimensions. It is praiseworthy and inspirational to all people that despite all these miseries, illness, injuries, hatred, ignorance, disability, and lack of acceptance, she overcame her depressing feelings and faced the world as an average and happy person. By accepting all the challenges and personal limitations, how she managed her life to return in a new transformative form shows her a motivational and robust figure in the world. Muniba wanted to convey that every bad experience teaches us the best lessons in life, when she says, in the first line of her speech "They see my disability, I see my ability,' they call me to disable, I call me differently able." The words delivered by her reflect her strong sense of self-determination and confidence. She takes the suffering of spinal cord injury as a challenge and becomes more determined to express her feelings through her art and paintings. She further suggests to all the audience and says,

Live your life fully, accept yourself the way you are, be kind to yourself, and only you can be kind to others, love yourself and spread the love if you accept the way are, the world will recognize you, it's all starts from within.

Through her speech, she has proven to the world as a capable and inspiring lady despite her disability. She is spreading motivation to all the people around the world to have a positive sense of self-acceptance and kindness to the self before spreading compassion to the world.

The cultural aspects of feminism believe in gender equality, and radical feminism believes that women are dominated by the practice of patriarchy in the family [28]. Mazari expresses that she *was 18 years old when she got married.* She said, "if that makes you happy, I will say 'YES.' And of course, it was never a happy marriage." This has characterized how social structure and patriarchy are the root

cause of gender inequality leading women to domination. This exemplifies how she accepted the forceful marriage proposal led by her father though she was not happy in the marital relationship. Similarly, she said, "You know what was my biggest fear? "Divorce. I couldn't stand this word. I was trying to cling on to this person who didn't want me anymore I got the news that he is getting married, I sent him a text and said, 'I am so happy for you and I wish you all the best.' This demonstrates how men have the freedom and choice in their life of making a decision of remarriage, ignoring the disabled wife in the pain and miseries. This depicts the real picture of male domination over females.

From the linguistic perspective, the language, and utterance, linguistic aspects such as grammar, vocabulary, cohesion, and structure used in the speech of Muniva Mazari were analyzed, which were found as per the principle of consistency and comprehensiveness.

The motivational discourse of Muniba Mazari illustrates that if people want to explore their hidden talents regardless of their physical disabilities, social inequalities, domination, and weaknesses, they can transform into a recognized person contributing to the society, nation, and the world. Human life is full of challenges, hardship, and turmoil but a strong sense of determination makes people break all those barriers. Disability is not a limitation to those who take it as an opportunity to explore their inner capacities. Ignorance and inequalities make victim suffer a lot but finally makes a person more strong-minded and goal-oriented as Muniba Mazari who has been working for many social campaigns, spreading awareness on gender discrimination, women, and child rights.

Muniba's speech is the reflection of the societal structure including gender discrimination, violence, domination, and ignorance of the disability. Some of the important realities she exposed in her speech are how women are living in the society, how their decision-making affects their life, how they react to the unexpected incidents in life, how the disable people need familial and social acceptance, how females are standing in their career, and how they feel being discriminated and ignored by the society and dear ones. Her speech reflects personal experiences representing life before and after disability. The speaker focuses on motivating people, particularly women, to recognize self-power of potentialities, to spread love, care, and kindness to the self and the rest of the world by fighting against social and gender discriminations.

In another context, critical discourse analysis deals with multiple perspectives guided by ideology, power, social activities, action, and ethics. Kalina and Powell [12] argue that the approaches of the constructivist thoughts have been recognized as the best practices with multiple meanings around the globe. Constructivism has several branches; among them, the sociocultural theory of Vygotsky might have a good connection with the discourse. Turuk [29] opines that human understanding is the fundamental concept of sociocultural theory as it connects with different levels of connections such as zone of proximal development (ZPD). Vygotsky [30] claims that a child is a dependent phenomenon, and the sociocultural environment ensures the engagement of the task, activities, and instructions to actualize the shape of learning.

Sociocultural theory reflects the sociocultural influences as well as relationship traits in learning behaviors. The meaning and learning situation is situated in social values and cultural traditions. In the same way, the theory introduces the collaborative and interactive situation. In the context of personality development, Jaramillo [31] explains that learners' success depend upon the collaboration. Similarly, sociocultural theory creates spaces for learner's active participation and motives with regard to the unit of the developmental framework, and the letter written by Lincoln demands the social and cultural setting regarding child psychology.

On the other hand, Vygotsky [18] claims that sociocultural theory differs from cognitive approaches, in that, the cognitive approaches assign several internal processes to gain the knowledge gaining channels with reference to socially as well as culturally mediated prospects. Kalina and Powell [12] support the model of sociocultural learning modality and focus on the collaborative act, coordination skills, negotiation strategies, and creative as well as critical behaviors for the successful adaptation of learning behaviors.

Therefore, the theory focuses to the gap between the inter-psychological/social and intra-psychological/individual aspects and believes that collaborative and psycho-centric instruction helps learners to understand and see how interactions take place and enable learners to achieve the goals within a social instructional network; with the assumption, I used this theory, though others' theories are also equally possible to connect with the text that I have selected for the analysis.

Lincoln's primary concern is that the teacher should be able to instruct his child on the thought that educational scholarship should accompany the first instruction of character. He took education as a journey to gain values of faith, love, and courage and asked the teacher to teach his son moral and ethical values as his son could realize the world and his responsibility. These values square measure ones that transcend content learning and facilities to make the premise of one's identity. Lincoln desires the teacher to reflect the truth that education is character based. Similarly, he instructs his son's principal to show his son a way to be a decent, honorable, and ethical person.

Furthermore, he wants his son to avoid jealousy. He further needs his son to understand each learning from a book and enjoying the refinement and wonder of nature. He needs his son to follow his integrity and to find out to track what he thinks is true, though it is unpopular. He should moreover learn that it's additionally honorable to fail than to comprehend accomplishment through dishonesty. Lincoln needs his son to feel comfortable to express unhappiness and nevertheless to find out to laugh once he is unhappy. Lincoln asks the principal to be kind to his son, however, do not spoil him and show his son patience. In the end, Lincoln needs his son to find out to be on his own.

In my observation, I found that Lincoln connected learner to *social beings* and focused the learners' reality in two basics, such as the right learning and wrong learning. As discussed in the letter, right being leads to the social well-being and to developing social thoughts and responsibilities, with reference to enhancing positive as well as cooperative and collaborative learning goals. For instance, education is defined as values, love, faith, courage, ethics, responsible thoughts, and personal as well as social identity and character. On the other hand, wrong being made the learners to tackle the situation and that might lead to the development of leadership skills.

The *cultural reflection* is another part of the letter, as the writer wanted to see his son as one of the examples of the cultural entity in which he could sketch his introduction and independence in society. Hence, he imagined a positive, motivated, encouraged, determined, dedicated, diligent, problem-oriented, and socially responsible son and that could be shaped by the teachers only. In his letter, he discussed *honesty, positivity, and sublime faith* on own self as the three fundamental values. According to him, honesty develops a positive mind, leads to happiness, and develops a realistic view. Similarly, positivity encourages us to be cheerful and prepares to face the challenges. He further claims that sublime faith itself enables learners to have sublime faith in humanity.

Similarly, knowledge reveals the several facets of the common goals such as content development, social responsibility, cultural well-being, political insights, and emotional radicals. According to the letter, Lincoln highly emphasized the values that he expected from the teachers.

The letter is the representation of the social guideline as to the triangularity (learners, teachers, and parents) with the diverse nature of social and cultural rhetorics. The letter is an example of the expectation of parents from the teachers, as they want their children to be accustomed to the diverse realities of the multidimensional world. It mainly focuses on the determination of individual principles concerning the sociocultural perspectives in the multidisciplinary rationale of transformational ethics. The letter covers several areas like psychology, sociology, linguistics, pedagogy, and other various disciplines and approaches. The writer only focused on the teacher's responsibility as concerning the issue, and it would be better if he could incorporate parents' role at home as students are at school for some limited time. Consequently, he needs to shortly talk on the home environment that he had been providing to his son. Therefore, every parent should play a vital role and be responsible for shaping the future of their children as they need to deal with different realities and the people around them.

Eventually, the letter illustrates and prioritizes that education is not only about teaching the books and using materials, but it should be practical and connected with the realities of society and the world too. This educational discourse is a mirror of the society that reflects how education should be incorporated in practical and real life.

This letter proves that education is a multidisciplinary approach that not only includes teaching and learning inside the four walls, but it is a process of habit formation, teaching students the real values and norms connecting with the social behaviors and real world outside. In Ref. [32], it is argued that Lincoln believed losing something is connected with learning because it is another way out or looking for alternatives to get another path to proceed with the task.

Regarding the sociocultural perspectives, learners' motivation, teachers' responsibility, parents' expectations, and societal needs are associated with forming cultural identities. Therefore, the letter reflects the social changes and adaptation. However, the learners are expected to be found to the determining curriculum, and they might develop their insights through the hidden curriculum or natural orders of learning praxis.

In the above contexts, generally, we find the interaction of the ideology with the individual and society.

5. Conclusion

Frankfort school introduces the relationship between theory and society, social inquiry, and the interconnection of the social life with the economy, psychology, ethics, traditions, values, and focus on social and historical contexts [33]. In the same vein, Kim [16] argues that the primary consideration is the transformation of knowledge. The knowledge has radical consequences, and subjective and intersubjective practices are implied.

Social framework and cultural consciousness are in the central concern for the study of social inquiries and activities. Critical consciousness, cultural inheritance, and sociopolitical adaptation and aspirations are critical considerations in educational practices.

In Refs. [15, 34], the authors believe on multidisciplinary and transdisciplinary educational policy in the field of critical pedagogy. It has a connection to ideology, power, economics, politics, and knowledge diversity. Discursive practice, social phenomena, and cultural diversity are the key issues discussed in the articles. Weiss and Wodak [7] suggest critical pedagogy, value system, power relations, critical consciousness, and critical literacy rather than functional literacy to

promote a subjective form of knowledge, culture, and understanding. Following Refs. [4, 5, 8, 35, 36], the role of education should be for developing a critical consciousness; furthermore, the educational approaches are highly context-sensitive and democratic approaches take an ethical stance on social issues to transform society into an approach or attitude rather than a step method. The socio-transformative practices' impact is seen accompanied by sociopolitical, socio-historic contexts which contribute to the production and interpretation of the text and are crucial aspects of the analysis. However, social responsibility connected with ideological concern is crucial for critical pedagogy, and power relations determine that. The societal framework is the connecting paradigm where different social theories and approaches surround the mind, ideology, and perspectives.

Author details

Yadu Prasad Gyawali
Mid-Western University, Surkhet, Nepal

*Address all correspondence to: gyawaliyadu.gyawali@gmail.com

IntechOpen

References

[1] Fairclough NL. Critical and descriptive goals in discourse analysis. Journal of Pragmatics. 1985;**9**(6):739-763

[2] Van Dijk TA. Ideology and discourse analysis. Journal of Political Ideologies. 2006;**11**(2):115-140

[3] Fairclough N, Mulderrig J, Wodak R. Critical discourse analysis. In: Dijk TAV, editor. Discourse Studies: A Multidisciplinary Introduction. Los Angeles: Sage; 1997. pp. 357-378

[4] Thompson JB. Ideology and Modern Culture: Critical Social Theory in the Era of Mass Communication. Hoboken NJ, United states: John Wiley & Sons; 2013

[5] Luke A. Beyond science and ideology critique: Developments in critical discourse analysis. Annual Review of Applied Linguistics. 2002;**22**(1):96-110

[6] Van Dijk TA. Discourse analysis as ideology analysis. Language and Peace. 1995;**10**(47):142

[7] Weiss G, Wodak R. Critical Discourse Analysis. Springer; 2007

[8] Van Dijk TA. Principles of critical discourse analysis. Discourse & Society. 1993;**4**(2):249-283

[9] Hodge B. Ideology, identity, interaction: Contradictions and challenges for critical discourse analysis. Critical Approaches to Discourse Analysis Across Disciplines. 2012;**5**(2):1-18

[10] Martínez-Roldán CM, Malavé G. Language ideologies mediating literacy and identity in bilingual contexts. Journal of Early Childhood Literacy. 2004;**4**(2):155-180

[11] Scott S, Palincsar A. Sociocultural Theory. Education.com; 2013

[12] Kalina C, Powell K. Cognitive and social constructivism: Developing tools for an effective classroom. Education. 2009;**130**(2):241-250

[13] Peca K. Critical Theory in Education: Philosophical, Research, Sociobehavioral, and Organizational Assumptions. Mexico: Eastern New Mexico University; 2000

[14] Van Dijk TA. 18 critical discourse analysis. In: The Handbook of Discourse Analysis. 2001. pp. 349-371

[15] Padilla LV, Vana R. Ideologies in the foreign language curriculum: Insights from textbooks and instructor interviews. Language Awareness. 2019;**28**(1):15-30

[16] Kim AI. (De)legitimation of monolingual ideologies in a US teachers' online forum. International Journal of Bilingual Education and Bilingualism; 2020:1-12

[17] Ayers DF. Neoliberal ideology in community college mission statements: A critical discourse analysis. The Review of Higher Education. 2005;**28**(4):527-549

[18] Vygotsky L. Interaction between learning and development. Readings on the Development of Children. 1978;**23**(3):34-41

[19] Lazar MM. Feminist critical discourse analysis. In: Handbook of Critical Discourse Studies. 2017. pp. 372-387

[20] Code L. Encyclopedia of Feminist Theories. New York, NY: Taylor & Francis e-Library; 2000

[21] Wilkinson S, Kitzinger C. Heterosexuality: A Feminism & Psychology Reader. Sage; 1993

[22] Lazar MM. Politicizing gender in discourse: Feminist critical discourse

analysis as political perspective and praxis. In: Feminist Critical Discourse Analysis. Springer; 2005. pp. 1-28

[23] Urbain M. A Feminist Critical Discourse Analysis of the National Board for Professional Teaching Standards. 2018

[24] Mays JM. Feminist disability theory: Domestic violence against women with a disability. Disability & Society. 2006;**21**(2):147-158

[25] Van Dijk TA. 18 critical discourse analysis. In: The Handbook of Discourse Analysis. 2001. p. 352

[26] Mazari M. Muniba Mazari the inspiring "Iron Lady of Pakistan" [YouTube Video]; 2017

[27] Garland-Thomson R. Integrating disability, transforming feminist theory. NWSA Journal. 2002:1-32

[28] Campbell R, Wasco SM. Feminist Approaches to Social Science: Epistemological and Methodological Tenets. 2000

[29] Turuk MC. The relevance and implications of Vygotsky's sociocultural theory in the second language classroom. Arecls. 2008;**5**(1):244-262

[30] Vygotsky L. Socio-cultural theory. In: Mind in Society. 1978

[31] Jaramillo JA. Vygotsky's sociocultural theory and contributions to the development of constructivist curricula. Education. 1996;**117**(1):133-141

[32] Lessons from Abraham Lincoln's Letter to his Son's Headmaster [Internet]. 2018. Available from: https://medium.com/@dinhnguyen0504/abraham-lincolns-letter-to-his-son-s-headmaster-2f287fd33bfa

[33] Martin J, Jay ME. Splinters in Your Eye: Essays on the Frankfurt School. Verso; 2020

[34] Pais A, Costa M. An ideology critique of global citizenship education. Critical Studies in Education. 2020;**61**(1):1-16

[35] Bachmann V, Moisio S. Towards a constructive critical geopolitics–Inspirations from the Frankfurt School of critical theory. Environment and Planning C: Politics and Space. 2020;**38**(2):251-268

[36] Portschy J. Times of power, knowledge and critique in the work of Foucault. Time and Society. 2020;**29**(2):392-419

Public Governance and Cultural Heritage: Exploring the Links between Culture and Social Indicators with the Principal Component Analysis

Ionela Munteanu Florea, Marioara Mirea and Cosmin Susu

Abstract

The cultural heritage encompasses the values and the identity of nations. It represents a vibrant proof of the past and, nevertheless, the core inspiration for the future. Still, culture is preserved and acknowledged with the care of political and economic spheres. In such context, the governance approach and strategies impact the cultural dimension. The understanding and assessment that governance has on the link between economic inputs and cultural heritage are of utmost importance for the actual preserving and acknowledgement of culture merits. The current chapter concentrates on exploring the synergy of governance strategies related to cultural heritage. The focus is set on two conceptual perspectives that governance of culture incurs: vision and knowledge. On the one hand, governance relates to compliance, accountability, and sustainability and shapes its vision according to these. On the other hand, from the perspective of knowledge, the chapter explores the interdependencies between cultural heritage and quantifiable socioeconomic indicators. By modeling statistical data with the principal component analysis (PCA) method, interesting results point to a possible social assessment of tendencies in the cultural heritage dimension.

Keywords: economic statistics, cultural heritage, education, occupation, principal components analysis

1. An introduction to cultural heritage and vision

Cultural heritage defines the identity of a country. It is not often explicitly defined [1, 2] or sometimes is associated to a process of remembering meant to show ways to understand the present by using the past experience [3]. From an economic perspective, cultural heritage is the property of a collectivity [1]; it raises questions on ownership of origin [1] and opportunity [4] and may represent an important source of economic boon [5]. The preservation and judicious promotion

of culture can greatly influence tourism and can contribute to better social coherence [6] and improvement of education and lifestyle. Moreover, heritage preserves the pride of belonging to a historical and territorial community.

This chapter analyzes cultural heritage as an expression of museums, libraries, cinemas, theaters, archeological sites, and archives of a community. Reminiscent of the past embodies an explorable physical form in museums, a written narrative value [7] transmissible by manuscripts, but also an expression of informative acts and freedom in artistic manifestations.

In the context of globalization and a multicultural world, political strategies [8] capture a special importance both globally but especially at national level. Global increase of population mobility, a continuous change of social context, turbulences, and political conflicts can threaten the preservation of individual and historical values of communities. In this context, the government's approach and concern on laws issued in the cultural field becomes of special importance [9].

In such a context, the governance vision has to address three major requirements: acknowledgement, support, and protection of cultural heritage (**Figure 1**).

As a general remark, the core scope of culture policies should reside in preserving national heritage. Worldwide, regulations regarding the three core elements are set, but it is in the power of every nation to decide on their own specific regulations. As Simmons states, "justice cares about insuring to all persons (access to) their fair share of goods and resources; it cares far less about the manner in which persons use these goods to advance their life plans and particular projects" [10].

Nevertheless, the European nations have agreed on a set of common regulations in order to set the grounds for uniformization and analogy between states' indicators. Still, there are several limitations in acquiring comparable data regarding culture from the member states, because of the use of different approaches in collecting data or reporting. But still, the importance of working and improvement in this field is of utmost importance.

The main limitations in correlating information in the culture sphere between states worldwide reside in the differences in collecting and reporting of statistical data. Comparison between states in this regard is not conclusive.
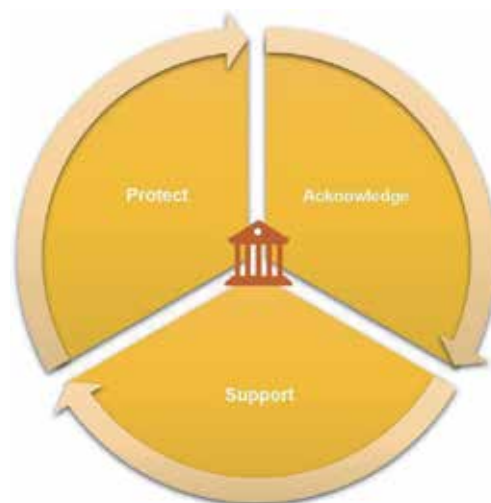

Figure 1.
Synergetic requirements of governance vision.

1.1 A snapshot of heritage acknowledgment

The national acknowledgment of cultural identity represents an expression of the raised awareness of the present under the light of the past [11, 12]. The Ming dynasty is a singular expression of the Chinese lands; the temples of the ancient Gods embody the Greek identity; the Roman baths are reminiscent of the historical presence of the Roman Empire; the Mayan pyramids still praise the ancestors of the Mexican land. The traces of the past invigorated in museums, archeological sites, and cultural establishments are the true ambassadors of wealth and heritage of communities.

In Europe, one of the measures agreed by the member states for the preservation and acknowledgment of community identity [13] was the creation of a system of certification by the EU for buildings, museums, documents, archives, or events, which played a special role in the history of the continent from the perspective of past actions that competed in its current reality. The selection process started in 2013, and by the year 2018, only 38 sites with symbolic cultural value were recognized by the EU by granting "the European Heritage Label" (**Figure 2**).

In Romania, a single objective was awarded the European Heritage Label, which is the Memorial of the Victims of Communism and of the Resistance, from Sighet. The Memorial was created to commemorate the victory against communism in 1989, and it represents "a means to resuscitate the collective memory" [14] on one milestone of Romania's and Europe's history (**Figure 3**).

Also, the UNESCO created the List of World Heritage Sites with the core goal to protect the selected properties under the terms of the 1972 UNESCO Convention concerning the protection of heritage. Regarding Romania, eight such objectives were inserted in the UNESCO list, out of which six are of cultural importance and two of natural value [15] (**Figure 4**).

- The eight monasteries of Moldavia (Voronet, Humor, Moldovita, Sucevita, Arbore, Patrauti, Suceava, Probota Monastery) with exterior very well-preserved mural painting, dating from the first half of the sixteenth century

- The Dacian Fortresses of the Orastie Mountains (Sarmizegetusa Regia, Costesti Cetatuie, Costesti Blidaru, Capalna, Luncani-Piatra Rosie, Banita)

- The Historic Centre of Sighisoara

- The Monastery of Horezu

- The villages with fortified churches in Transylvania (Calnic, Valea Viilor, Biertan, Saschiz, Viscri, Darjiu, Prejmer)

- The wooden churches of Maramures (Rogoz, Plopis Surdesti, Desesti, Budesti, Barsana, Ieud-Deal, Poienile Izei)

- The Ancient and Primeval Beech Forests of the Carpathian and other regions of Europe

- The Danube Delta

When it comes to the preservation of the written format of cultural heritage, Europeana [16] was created, an EU digital platform able to reunite works from all

Figure 2.
The map of awarded European heritage labels. Source: European Commission.

Figure 3.
Sarmizegetusa Regia, the pagan Dacian temple, in Hunedoara, Romania.

over Europe and share it with libraries, archives and museums. The contribution of such initiative is of uttermost importance for education, research and recreative activities [3].

1.2 A glance on cultural funding

The power of cultural heritage in enhancing social cohesion, unification and promotion of national identity is undeniable, as well as it is the force to strengthen

Figure 4.
Sucevița monastery, in Romania.

the population's trust towards national identity. However, it is interesting to take a glance in time on the governments' measures [12] to support the cultural sector [8] and use its potential in the social sphere (**Figure 5**).

The financing of the cultural sector has been achieved over time from different sources, while the government's input was more or less significant. Alongside public funding, the cult of sponsorship and donations/maecenates represents an active source of income with old origins for sustaining culture heritage.

The concept of Maecenas, known today as sponsorship, derives from the name of Gaius Cilnius Maecenas, a former Roman statesman who lived in the first century before Christ and whose name remained immortal in history for his merits of protector of arts, literature, and science [17]. Thus, although the maecenate/sponsorship has its origins in sustaining culture, nowadays the meaning and destinations of sponsorship have become much wider, so we can say that the cultural sector "competes" for these sources of financing with other sectors of the economy.

Figure 5.
The National Village Museum "Dimitrie Guști," in Bucharest, Romania.

Private funding/sponsorship has known different dimensions over time, so some states encourage and hold complex legal leverage in this direction compared to others. The succession of political regimes and the degree of economic development seem to have deep roots in this regard.

During communism, the interest of the government for culture has known both favorable and foul times. The public identity was shaped according to the interests of the parties in power, and the works of art were preserved or destroyed [1] according to the personal acceptance of rulers. On the one hand, appreciated works of art considered valuable for the party were preserved and exposed in museums and in personal collections. On the other hand, the period produced losses and destruction of those cultural elements considered dangerous by the party.

After 1989, after the communist period ended, many central and eastern European governments reformed the budgetary allocations by diminishing the funds for culture to the favor of other destinations. The governance interest focused predominantly on supporting other budgetary segments, leaving the financial support for cultural heritage mostly in the care of the private sector. Public/private partnerships have begun to develop with the aim to sustain the cultural sphere. Countries like Romania, Bulgaria, Hungary, and Slovenia have adopted regulations granting tax facilities to promote the private support of the cultural sector.

In the Western European side, the cult of donations/maecenas and sponsorship to support culture is much more developed. In Britain, for example, most of the museums are constituted as Charities (a legal form suitable for encouraging donations) [18]. Also, in countries like Denmark, Italy, France, and Spain, government initiatives aim to foster the development of a tradition in sponsorship; thus, the banks became an active sponsor of regional cultural spending.

1.3 Shortlist of heritage protection programs

The EU nations have developed a system of identification of potential threats that may harm the EU heritage, and, in accordance, appropriate policies and recommendations have been undertaken in order to mitigate the identified risks. Such potential risks are flood hazards, wars, earthquakes, pollution, uncontrolled urbanization, and unreported tourists.

The initiative is called Europa Nostra, it was launched in 2013, and it is funded by the European Investment Bank Institute and the Council of Europe Development Bank [19].

Romania also appears on the Europa Nostra list, with three objectives:

- The Constanta Casino—the identified problems are concerned with corrosion and rusting, salty moisture that heavily affects wooden elements, mold, freezing, and temperature that constantly affects the building's structure. Overall, the state is mainly held responsible for the situation because of lack of interest, failure in and prolonged public procurements, and abandonment.

- The wooden churches in Southern Transylvania and Northern Oltenia— approximately 60 such churches are being followed as to be restored from decay.

- Rosia Montana Mining Landscape in Transylvania—the site houses Roman edifices and roads along with small towns and villages, nestled in the mountains. The threat comes from a large-scale mining project which would have a major serious impact on both the natural and cultural heritages of the place (**Figure 6**).

Figure 6.
Rosia Montana mining landscape, in Transylvania, Romania.

2. Knowledge and cultural heritage

Cultural heritage represents a particular dimension in the life of a community. It sums up the wisdom of the past [11], gives confidence and recognition of history, and shapes the minds of future generations (**Figure 7**).

Research in cultural statistics has proved to be a real challenge. Limitations like the scarce number of statistical data and the usage of different reference points for reporting create serious difficulties in analyzing similar data between countries over a longer period of time. Heritage conservation projects are instrumented differently according to the governments' perception [20], so the reported indicators are not calculated on the basis of the same defining principles.

For many, culture is associated with arts and entertainment. The potential that culture has to support the economy, primarily because of the boost it may incur on

Figure 7.
Old Neolithic statues "the Thinker of Hamangia" and "the Sitting Woman," in the Museum of National History and Archeological of Constanta.

tourism, is not always acknowledged and appreciated. Culture is often perceived as belonging to a secondary plan of economic growth, thus being considered more an expense for budget than as an investment for regional benefits. The situation is somewhat applicable to Romania, taking into account the limited funds allocated to culture related to the annual budget of less than 1% of GDP.

Based on these considerations, this chapter focuses mainly on the analysis of cultural indicators in Romania. We are thus trying to obtain a trustworthy comparable statistical reference, which would allow to draw conclusions on the influences of cultural heritage on people.

This study is intended to be an attempt to capture and quantify the influences and interdependencies between cultural heritage and the Romanian people stratified on several categories of occupation and activity. The analysis is customized with the scope of investigating the correlation between heritage and various categories of citizens, relevant to the analysis being the level of education, work capacity, unemployment, and the retired persons.

3. Research methodology

The complexity of data defining the cultural field, as well as their impact on people, may present difficulties in calculating the links and causalities. Also, analyzed data can present strong correlations that would diminish the significance of the results. The solution in this situation is represented by the econometric modeling.

The PCA method is a tool to explore the correlation and interdependence of statistical data, as well as to create predictive models.

In this chapter, the principal component analysis (PCA) allows the transformation of the initial space of data into a new space of reduced size while maximizing the amount of information retained from the original space. In the new space created (called factor space), the initial variables can be designed, and the factor axes are determined by extracting the main components [21]. The main components are linear combinations of the initial variables, capable to condense the information of the original variables and to transpose it into a mathematical formula:

$$x_j = \alpha_1^j * y_1 + \alpha_2^j * y_2 + \ldots + \alpha_n^j * y_n = \sum_{j=1}^{n} \alpha_i^j * y_i$$

where

- x_j is the principal component j

- α^j are the vectors that define the standardized linear combinations

- y_i are the original variables, where i = 1, 2, … , n

4. Results and discussions

The indicators analyzed in order to assess the impact of cultural heritage on the Romanian people, based on available statistical data during 1994–2018, are:

- Number of visitors to museums and public collections—calculated nationally based on the number of sold tickets. This indicator includes also the number of

participants at the night of museums, which is an event meant to raise the general interest towards arts and culture (MUSEUM_V_No).

- Number of visitor to cinemas—the indicator is also calculated on the basis of the number of tickets sold for access to movies in cinemas (CINEMA_V_No).

- Number of readers in libraries—represents the number of people who borrowed at least one book during the year, for personal reading (LIBR_R_No).

- The number of cinematic shows—calculated as sum of projections of films in cinemas during 1 year (CINEMA_Show).

- Number of persons graduated from high schools/vocational schools—includes graduates of secondary schools with or without a diploma, as well as young graduates of a postsecondary school, masters schools, or special postsecondary schools (HS_No).

- Number of people with university studies—includes the number of people graduating from long-term higher education, inclusive with a master's or postgraduate diploma (UNIV_No).

- The active population—represents the number of working people (ACTIVE_No).

- Number of unemployed people—represents people who are capable to work, are looking for a job, and who do not have a current job (UNEMP_No).

- Number of retired persons—is the number of beneficiaries of social pensions in the public system (RETR_No).

The dynamics of interest in cultural heritage during that time can be observed based on the evolution of the number of visitors in museums and cinemas or readers in libraries.

Available data is concentrated on the quantitative number of visitors but not on the quantified value of the tickets sold. Information on the value of ticket sales is significant for the own budgets of the cultural institutions but it is not available for public knowledge or research.

The absence of centralized data on the amount of value brought by visitors to culture institutions reveals a first limitation in study analysis. Information on the amount of receipts could, for example, provide an indication of the efficiency of governance as for the measures taken by the management to attract a greater number of visitors in terms of increasing the institutional own budget. Thus, the absence of data strengthens the idea that the culture sector is not regarded by the governance as a significant point in the economic perspective.

The dynamic analysis of the chosen indicators according to **Table 1** indicates certain trends in terms of "consumption of cultural products" in Romania.

The number of visitors to museums shows the evolution over time of the visitor's interest towards the exhibits presented in the museums in Romania. Although until 2010 the number of visitors in museums has an oscillating evolution, starting with the year 2011, an increase of interest for this sector can be observed. An explanation for the ascending trend of interest in museums may be the input of the event "the Night of Museums," which is held in May every year and when visitors have free access to museum exhibits. Also, school programs like "a different week," when students in schools are encouraged to organize group visits in museums, increase the annual visitor number in museums.
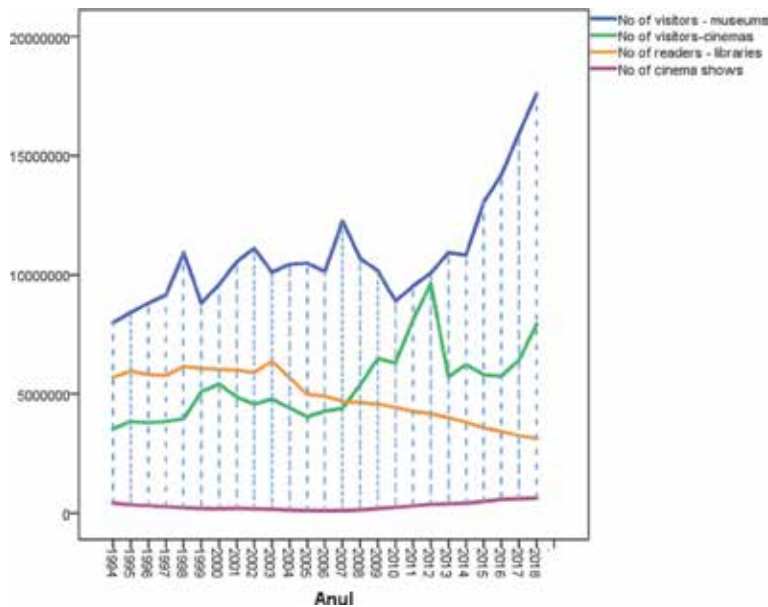
Table 1.
*Cultural heritage indicators in Romania.*

An interesting trajectory is revealed also for the number of readers in bookstores comparative with the number of visitors in cinemas. By the year 2008, in Romania the number of people who borrowed books from libraries was superior to the number of visitors in cinemas. The data analyzed indicate the year 2008 as the period when the two indicators were equalized and presented the moment of decline of interest in the libraries and also the increase of the number of cinephiles.

Although the year 2008 marks the global economic crisis, when it comes to culture, the evolution of indicators that can quantify the interest for books or for movies indicates an interesting phenomenon. The audience went more towards cinemas, and the interest for libraries started a sustained decline trajectory. A possible explanation in this regard is that digitalization and computer-wide access to information sources decreased public interest for libraries, while the increasingly varied cinematographic productions and the construction of malls with included cinemas contributed to raise the interest for cinematographic productions.

The analysis was also concerned with the number of cinematographic performances broadcast. The interest was whether the visitor number could be determined by significant variations in the number of performances visited. The data indicate that the number of performances was relatively linear over time, so that it did not represent a factor of influence on the number of visitors in cinemas.

The assessment of cultural interest on Romanian population is based on the indicators of population categorized by education (people that graduated high school or some form of professional school and persons with university studies) and occupation (active population, unemployed, and retired persons).

Table 2 reflects numerically and in evolution the indicators chosen for analysis. The graphical representation reveals an interesting evolution of the number of active persons with a general decline trend, which can be explained mostly by migrating labor force abroad. The number of retired persons occupies a significant
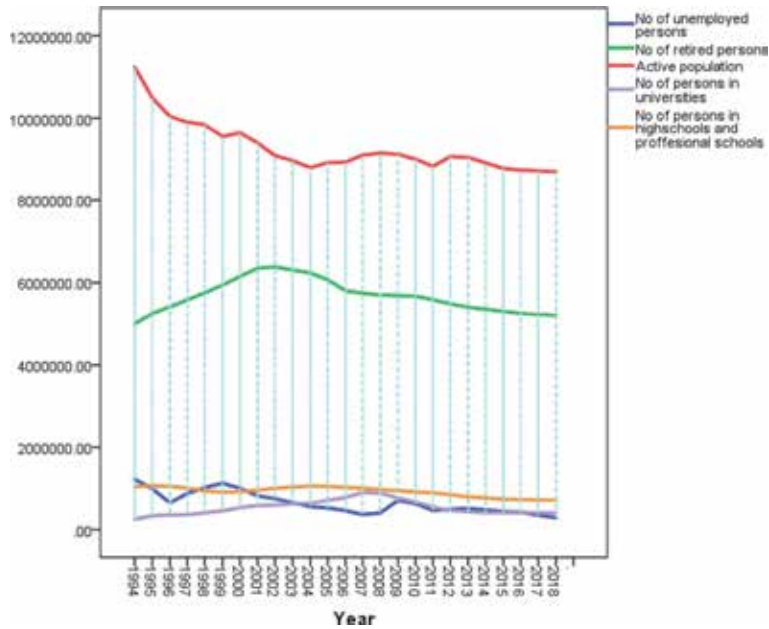
Table 2.
Romanian citizens categorized by education and occupation.

level of the number of people analyzed, while the number of people with university studies occupies a small number of the population's total number analyzed.

In order to analyze the interest of citizens for cultural heritage in Romania, we used an econometric model based on principal component model. For the first stage, the average and the standard deviation for each variable was calculated (**Table 3**).

The high results obtained for standard deviation show that the variables taken for analysis are spread out and far from the mean or average. In other words, the initial indicators are very different from each other; they form a space with widely spread data points around the mean, where the calculation of causal dependencies would be very complex and very difficult to determine.

	Mean	**Std. Deviation**
MUSEUM_V_No	10829214.00	2278168.062
CINEMA_V_No	5385778.92	1518761.996
LIBR_R_No	4933429.24	1033987.182
CINEMA_Show	289554.48	162522.019
HS_No	930147.72	117689.344
UNIV_No	534974.80	178519.195
ACTIVE_No	9276260.00	619501.210
UNEMP_No	650368.00	264544.151
RETR_No	5675760.00	397809.448

Table 3.
The mean and standard deviation calculated for each variable.

Correlation	MUSEUM_V_No	CINEMA_V_No	LIBR_R_No	CINEMA_Show	HS_No	UNIV_No	ACTIVE_No	UNEMP_No	RETR_No
MUSEUM_V_No	1.000								
CINEMA_V_No	**0.375**	1.000							
LIBR_R_No	−0.696	−0.665	1.000						
CINEMA_Show	0.594	**0.426**	−0.661	1.000					
HS_No	−0.713	−0.670	0.816	−0.776	1.000				
UNIV_No	**−0.043**	**−0.022**	**0.021**	−0.714	**0.335**	1.000			
ACTIVE_No	−0.588	−0.539	0.607	**−0.050**	0.509	**−0.452**	1.000		
UNEMP_No	−0.643	**−0.497**	0.781	**−0.250**	**0.474**	**−0.370**	0.820	1.000	
RETR_No	−0.265	−0.250	0.597	−0.788	**0.486**	0.550	**−0.227**	**0.173**	1.000

Table 4.
The correlation matrix.

Interdependencies between the analyzed variables can be seen with the correlation matrix. Bold values are considered insignificant and are not taken into analysis (**Table 4**).

According to the correlation matrix, the strong negative relationship between the visitor number in museums and the number of high school graduates and vocational schools (−0.713) indicates that an increase in the number of high school graduates and schools determines a decrease in number of visitors to museums. Professionalization can cause a decrease in the number of visitors in museums. The situation can be explained by the fact that many visitors in museums are students, who have not yet completed their studies. So, the assumption that a great number of the visitors in museums are pupils, and their visits are determined by programs School, seems to be certified by current results. The termination of secondary or vocational education indicates a decrease in interest in cinema time (−0.670), perhaps for more time needed for job search or for more careful spending behaviors.

A similar strong relationship exists between the number of visitors in museums and the active population (−0.588) or the number of unemployed (−0.643), which can be explained on account of the fact that an increase in the number of active persons presents a lower interest or allocate less time to visits to the museum. Also, active people seem to give a lower interest to visits to the cinema (−0.539), but instead it is likely to be more interested in culturalization by access to literature and the loan of books from libraries (+0.607). On the contrary, an interest in the loan of books in libraries appears to be represented by unemployed people looking for a job (+0.781), a situation that can be explained in the practice by the need for information and professionalization.

As for the number of retired persons, their interest seems to be rather oriented to reading (+0.597) rather than to visits to museums or cinemas, where statistical analysis does not show any significant correlations.

The number of cinema performances appears to be positively influenced by the visitor number at the museums (+0.594) and conversely proportionately by the number of people interested in reading. Thus, the link between the need for entertainment and the creation of leisure alternatives is tested.

The relevance of the sampling and the testing of the independence hypothesis have been verified by the output of Kaiser-Meyer-Olkin and Bartlett's test (**Table 5**). The result of KMO = 0.658 is significant for the application of the model [22]. A larger dataset would likely lead to a better KMO result of the test, but precisely the limited resources of credible information in the sphere of cultural heritage are one of the obstacles to the study. The significance of the model obtained using Bartlett's test of sphericity (Sig. = 0.000 < 0.05) indicates a probability of 95% as between the statistical variables analyzed there are significant links.

Values greater than 0.8 in the correlation matrix indicate too high correlations between the analyzed variables, when some data may become redundant and may diminish the significance of the results. Thus, the application of the PCA method eliminates the risk of multicollinearity and also accomplishes the purpose of dimensionality reduction.

Kaiser-Meyer-Olkin Measure of sampling adequacy		0.658
Bartlett's test of sphericity	Approx. chi-square	263.413
	Df	36
	Sig.	0.000

Table 5.
KMO and Bartlett's test.

The extraction of communalities represents estimates of the variation in each variable contained in the calculated components. The large values of communalities presented in the column "Extraction" indicate that the extracted components represent the information contained in the initial variables well. The situation is due to the fact that there is a connection between the forms of access of cultural heritage (museums, cinemas, bookstores) and the population categorized by education and occupation (**Table 6**).

In the next stage of PCA method, the eigenvalues of the correlation matrix are the variables of the main components. The eigenvalues greater than 1 are the only ones retained in the analysis because they have a higher variance than the original standardized variables.

According to **Table 7**, the correlation matrix has only two eigenvalues greater than 1 that correspond to the inertia explained by the factorial axes. Therefore, the first factorial shaft explains 52,968% of the total variation of the variable cloud, and the first two factorial axes explain 80,853% of the total variation. The percentage determined by the first two eigenvalues determines the graphical representation of the factorial axes in connection with the projection of the puncture cloud, as observed in **Figure 8**.

	Initial	Extraction
MUSEUM_V_No	1.000	0.666
CINEMA_V_No	1.000	0.541
LIBR_R_No	1.000	0.910
CINEMA_Show	1.000	0.964
HS_No	1.000	0.849
UNIV_No	1.000	0.849
ACTIVE_No	1.000	0.914
UNEMP_No	1.000	0.834
RETR_No	1.000	0.750

Table 6.
Table of communalities.

Component	Initial eigenvalues		
	Eigenvalue	Total % of variance	Cumulative %
1	4.767	52.968	52.968
2	2.510	27.886	80.853
3	0.660	7.330	88.184
4	0.615	6.831	95.015
5	0.206	2.291	97.306
6	0.168	1.870	99.176
7	0.033	0.367	99.543
8	0.027	0.300	99.843
9	0.014	0.157	100.000

Table 7.
Variance—the eigenvalues greater than 1.
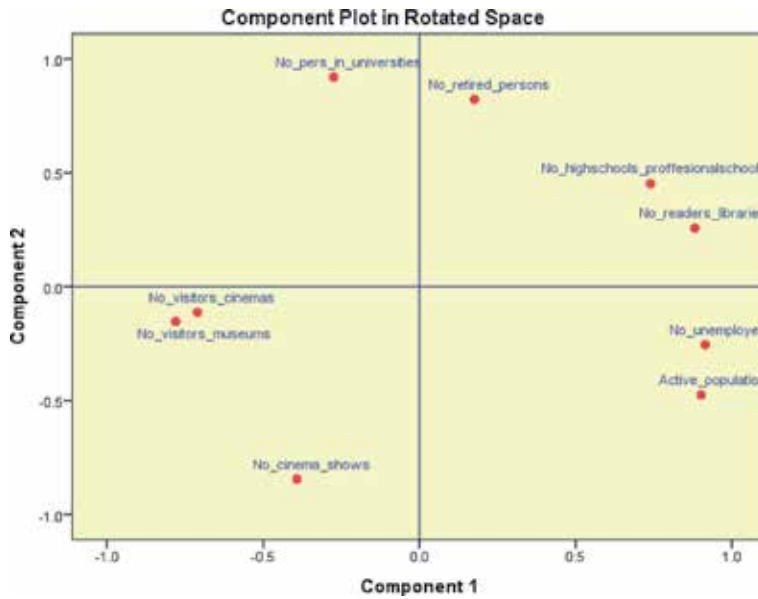
Figure 8.
Correlation between the extracted principal components and the initial variables.
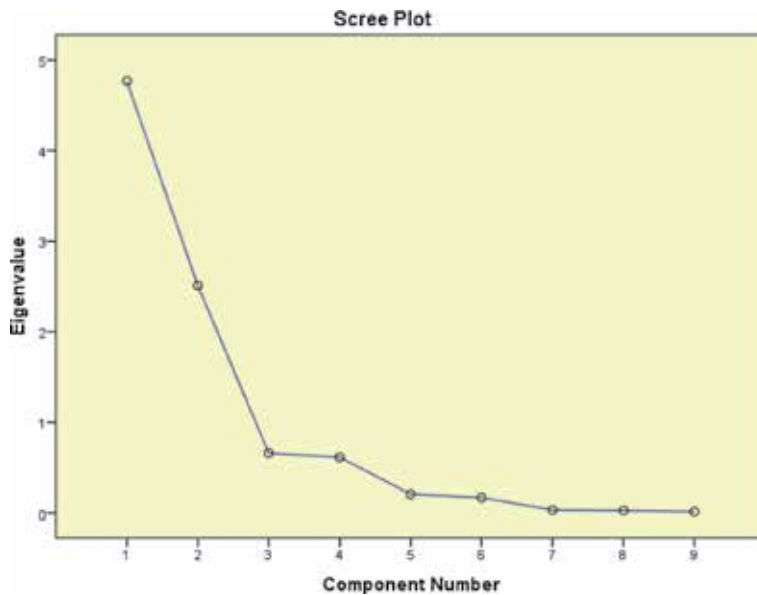
Figure 9.
Scree plot graph—variation of eigenvalues.

Figure 9 is a graphic representation of eigenvalues in correspondence with the number of components. Starting with the eigenvalue corresponding to component 3, the bonding line becomes almost flat, indicating that starting with component 3, each successive component accounts for less and less in the explanation of variance. Thus, the PCA method redistributes the variance on the first two extracted components.

The component matrix in **Table 8** shows the correlation between variables and the two components extracted with a value greater than 1. The obtained values

	Component	
	1	**2**
MUSEUM_V_No	−0.805	0.133
CINEMA_V_No	−0.721	0.145
LIBR_R_No	0.951	—
CINEMA_Show	−0.770	−0.608
HS_No	0.910	0.144
UNIV_No	0.180	0.904
ACTIVE_No	0.621	−0.727
UNEMP_No	0.738	−0.538
RETR_No	0.557	0.663

Table 8.
The component matrix.

indicate that all variables contributed to the formation of the first factorial shaft, while the variable "number of readers in libraries" had an insignificant contribution to the formation of the second factorial axis.

The scree plot in rotated space reiterates graphic values determined in the correlation matrix and places in space the variables chosen against the formed factorial axes.

5. Conclusions

From a cultural perspective, better conservation and promotion of cultural heritage are strongly linked to better awareness and assessment of public governance regarding the active contribution that culture can bring to boost the economic results. The development of future studies that may link the domain of cultural heritage to the economic sphere can bring significant benefits to both sides.

The experience of many countries, such as Italy, France, and Germany, shows that the cultural sector can bring about a strong contribution to tourism and to attracting of budgetary funds by increasing the number of tourists. In order to achieve this target, the study shows that in Romania, the interest of the government towards the cultural sector needs raising awareness for the development of statistical quantification of the revenues obtained from the cultural sector.

At the moment, statistical data reveal interesting links between cultural heritage and certain behaviors of people, considered in connection with education and occupation. According to the results of the present analysis, the active contribution of cultural heritage to the socio-human and economic spheres (from the perspective of the labor force impact) requires more careful attention especially with regard to finance.

The results of the current study show an interesting path regarding the interest of the Romanian people to heritage objectives, as explained through visits to museums, cinemas, and libraries. Throughout the whole analyzed period, the indicators show a greater concern of the Romanian public for museums, compared to cinemas and libraries. The statistical data document great enthusiasm for the cultural exhibits in museums compared to the sympathy for cinemas or reading in libraries. Although during 2010–2012 the interest for cinemas grew massively, the total number of moviegoers was lower than visitors to museums. The appetence for

old/new exhibits in museums as an expression of social behavior towards culture reveals the value of heritage as an expression of identity knowledge and vision.

Corporate governance has to comply with requirements regarding the publicity of financial and nonfinancial statements on cultural heritage and statistical databases concerned with arts transactions, as instruments to prevent frauds and forgeries. The outcomes of greater governance publicity in cultural heritage reside in matters like trust, state legitimacy, social participation, and discouragement of corruption.

The relationship between knowledge and transparency sets the incentives for governance efficiency and cultural heritage protection. With a better understanding of public managerial decisions comes cultural value acknowledgement and the improvement of protection measures.

Acknowledgements

Author details

Ionela Munteanu Florea[1]*, Marioara Mirea[2] and Cosmin Susu[2]

1 Bucharest University of Economics Studies, Bucharest, Romania

2 Ovidius University of Constanta, Romania

*Address all correspondence to: consultant.munteanu@gmail.com

IntechOpen

References

[1] Thompson J. Cultural property, restitution and value. Journal of Applied Philosophy. 2003;**20**:251-262. DOI: 10.1046/j.0264-3758.2003.00251.x

[2] Young JO. Cultures and cultural property. Journal of Applied Philosophy. 2007;**24**(2):111-123. DOI: 10.1111/j.1468-5930.2007.00359.x

[3] Smith L. The Uses of Heritage. New York: Routledge; 2006

[4] Liberto H. Exploitation and the vulnerability clause. Ethical Theory and Moral Practice. 2014;**17**:619-629. DOI: 10.1007/s10677-014-9494-z

[5] Shelby T. Foundations of black solidarity: Collective identity or common oppression? Ethics. 2002;**112**:231-266. DOI: 10.1086/340276

[6] Lindsay P. Can we own the past? Cultural artifacts as public goods. Critical Review of International Social and Political Philosophy. 2012;**15**(1):1-17. DOI: 10.1080/13698230.2011.583533

[7] Scoville JM. Historical environmental values. Environmental Ethics. 2013;**35**(1):7-25. DOI: 10.5840/enviroethics20133513

[8] Matthes EH. Repatriation and the radical redistribution of art. Ergo. 2017;**4**(32):931-953. DOI: 10.3998/ergo.12405314.0004.032

[9] Mezey N. The Paradoxes of Cultural Property. Georgetown Law Faculty Publications and Other Works 899. 2007. Available from: https://scholarship.law.georgetown.edu/facpub/899

[10] Simmons AJ. Historical rights and fair shares. Law and Philosophy. 1995;**14**(2):149-184. DOI: 10.1007/BF01001042

[11] Högberg A. Rodney Harrison: Heritage. Critical Approaches. London: Routledge, 2013. 268 pp. ISBN: 978-0-415-59197-3. Norwegian Archaeological Review. 2016;**49**:1-3. DOI: 10.1080/00293652.2015.1126632

[12] Weiss L. Heritage-making and political identity. Journal of Social Archaeology. 2007;**7**(3):413-431. DOI: 10.1177/1469605307081400 [Accessed: 3 October 2019]

[13] OECD. Culture and Local Development. Background Document. 2018. Available from: http://www.oecd.org/cfe/leed/venice-2018-conference-culture/documents/Culture-and-Local-Development-Venice.pdf [Accessed: 2 October 2019]

[14] Sighet. The Memorial of the Victims of Communism and of the Resistance. 2005. Available from: http://www.memorialsighet.ro/memorial-en/ [Accessed: 2 October 2019]

[15] Properties of Romania inscribed in the World Heritage List. 1992-2019. Available from: https://whc.unesco.org/en/statesparties/ro [Accessed: 3 October 2019]

[16] Europeana Collections. Available from: https://www.europeana.eu/portal/en, https://whc.unesco.org/en/statesparties/ro [Accessed: 4 October 2019]

[17] Richer H. The Life of Maecenas: With Critical, Historical and Geographical Notes. Corrected and Enlarged by Ralph Schomberg, M.D. Fellow of Society of Antiquaries, London: Printed for A. Miller, in the Strand; 1766

[18] Sauvanet N. Cultural Sponsorship in Europe. Paris: European Committee for Business, Arts and Culture; 1999

[19] Europa Nostra. 7 Most Endangered Programme. Available from: http://

7mostendangered.eu/, https://whc.unesco.org/en/statesparties/ro [Accessed: 1 October 2019]

[20] Logan W, Longfield M, Nic Craith M. Intersecting concepts and practices. Cultural Diversity, Heritage and Human Rights: Intersections in Theory and Practice. 2009;**1**:3-20. DOI: 10.4324/9780203863015

[21] Armean D, Lache L. Application of the model of principal components analysis on Romanian insurance market. Theoretical and Applied Economics. 2008;**6**(523):11-20

[22] Pintilescu C. Analiză statistică multivariată [Multivariate Analysis]. Iasi: Editura Universității Alexandru Ioan Cuza Iași; 2007

Chapter 17

Public Diplomacy in Cross-Border Cooperation

Oleg Tolstoguzov and Maria Pitukhina

Abstract

The chapter deals with migration challenges, a burning topic crucial for both the EU and the world. Hereby, public diplomacy tools are of huge interest as a factor influencing social and cultural space sustainability, especially, of cross-border territories. This chapter deals with complex studies of the Finnish case particularly migrants' inclusion analysis into local cultural and political environments as well as public diplomacy impact evaluation of an important "soft power" tool where migrants' role is rather high. The research method of migrants as a "soft power" is based upon interviews, which result in respondents' typology development; political information channels were defined; and the influence of education and social inclusion upon political communication was characterized. The resulting characteristics of migrants' political communication might be of high interest in terms of migration policy regulation and understanding the issue of migration quotas and help to predict structural changes in society and also to provide the basis for making decisions on the effective use of public diplomacy tools. At the same time, we believe that via public diplomacy tools it is necessary to rely on not only separate national cultural aspects but also the whole civilizational image-the so-called nation's gestalt.

Keywords: public diplomacy, cooperation, Finland, Karelia, Russian diaspora, social and cultural space

1. Introduction

Public diplomacy role has been growing in recent decades. Undoubtedly, public diplomacy strengthens sociocultural cooperation, good neighborliness and an atmosphere of security and serves as a tool of "soft power" that increases region/country attractiveness, language, culture and lifestyle. Means of "soft power" were interpreted by J. Nye [1, 2] as a process of achieving strategic interests by a state via positive attitude development in other states' society and its goals achieving through attractiveness. Active communication influences international life nature since it is determined by both beliefs and expectations that people have and that are established by social rather than material structures [3].

"Soft power" is presented with media, by educational organizations (operating in a framework of international cultural and educational programs), as well as by nongovernmental organizations engaged in public diplomacy in a form of various communications.

Soft power tools are also witnessed in Russian communications. It has become an integral component of modern international politics in Russia as a comprehensive toolkit for solving foreign policy issues based on civil society demands, information and communication, humanitarian and other alternative classical diplomacy methods and technologies [4]. Moreover, Russia has enormous potential for public diplomacy development. It's most important pillar is presented with a so-called Russian world when millions of people abroad feel a strong need to keep in touch with Russia, Russian language and its culture [5].

2. Migration challenge

Soft power is important not only because of its influence on a sociocultural space but also because of increase in anthropogenic mobiles (moving people), which today are considered a tool of geopolitics.

We also consider migration challenge and associated use of soft power tools that cause disturbances in social ecology.

In 2017, the number of migrants reached 258 million people. Over the past 17 years, the total number of migrants has increased from 173 million by 49% according to the International Migration Report [6]. The growth of migrants' mobility and the impact of migration flows on almost all countries' development include the international migration issue.

Migration processes are dependent on a structure of social relations and cannot be studied in isolation from various social, economic and political phenomena in which they occur (according to a modern theory of migration considered from a geographical point of view [7]).

Migrants' studies (including surveys) are highly important in terms of migration policy analysis in the European countries. They are performing migrants' surveys regularly for accessing migrants' living conditions, political preferences, etc. The best foreign practice has shown that migrants' studies are highly important in terms of society's structural changes projection.

Migrants not only affect population dynamics, changing its structure, but also to some extent influence local community life: the larger the proportion of migrants, the greater their impact on the local community.

In order to obtain up-to-date information on both state and sociocultural perspectives, a competent migration policy development is highly necessary taking into account different aspects of globalization phenomenon.

Therefore, it is necessary to research migrants' inclusion mechanisms in local cultural and political environment as a condition for sociocultural sustainability as well as public diplomacy as the most important "soft power" tool where migrants' role is rather high.

Europe remains migrants' most attractive region. Largest migrant groups consist mostly of people coming from the Middle East and Africa. At the same time, migration is being characterized with irregularity: migrants' distribution across Europe can be characterized with both low and high concentrations. Rather different situation is being witnessed in Northern Europe.

Increase in both migrants' flows and a concentration reduces naturally the share of a recipient community: there is a significant increase of Arab origin population in France, of Turkish-Arab origin in Germany and of Indopakistan and Arab origin in the UK.

Hereby, we apply the Pareto rule in order both to analyze and evaluate influencing factor effectiveness. Migrants' excess of over 20% is known as a threshold

after which sociocultural relation structure changes significantly. The interval amounting to "10–20%" is a transition zone. It shows migrants' increasing influence till a critical value. This is not an exact criterion, but rather a mnemonic rule that identifies an important meaning, namely a serious shift in a social environment.

Figures 1–**5** provide data for various European countries and regions [6].

Figure 1.
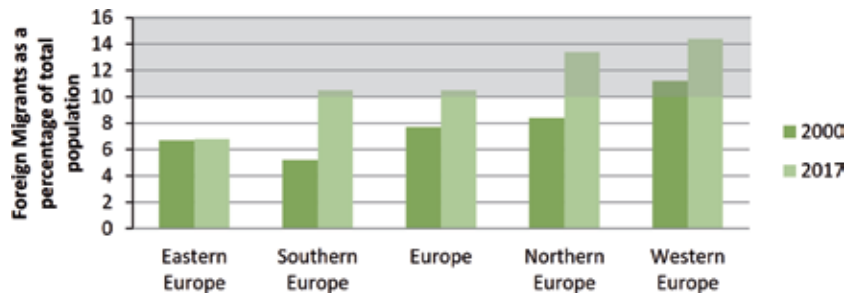*Foreign migrants as a percentage of total population of Europe.*

Figure 2.
Foreign migrants as a percentage of total population of Northern Europe.

Figure 3.
Foreign migrants as a percentage of total population of Eastern Europe.

Figure 4.
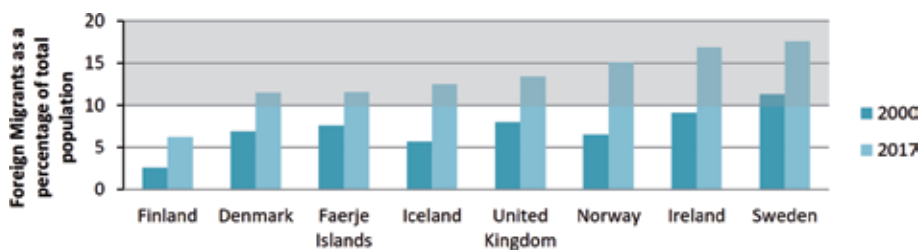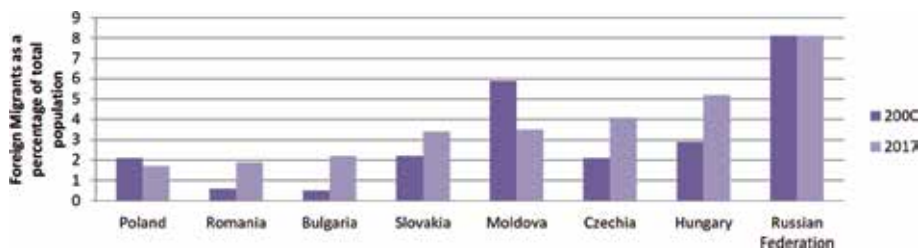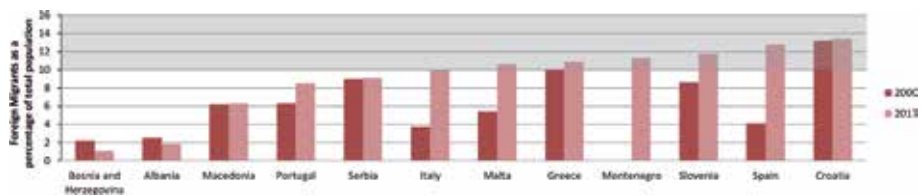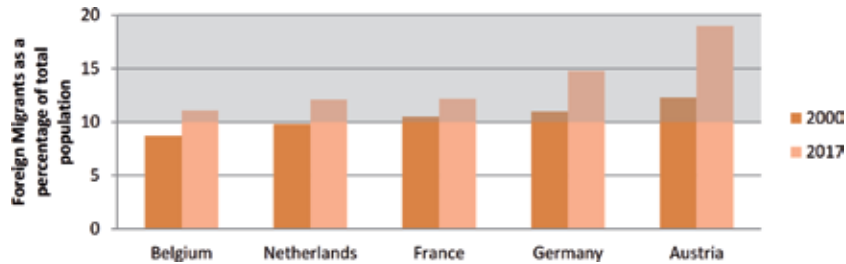*Foreign migrants as a percentage of total population of Southern Europe.*

Figure 5.
Foreign migrants as a percentage of total population of Western Europe.

There are three groups of countries to be shaped based upon **Figures 1–5** mentioned above. The first group of countries is without any significant migration challenges (migrants make up less than 10% of the recipient community in Finland and Central Eastern Europe), the second group, where migration challenges are pretty visible (migrants make up 10–15% in Croatia, Spain, Slovenia, Iceland and Denmark) and a third group, where migration challenges are highly critical (more than 15% of migrants in Germany, Sweden, Ireland, Austria and Norway).

The figures show that serious difficulties in trend preserving are being witnessed in Western and Northern Europe (in accordance with Pareto rule), while Northern Europe alongside with Southern Europe is showing much higher migrants' growth rates.

These circumstances shall be taken into account, since soft power becomes an instrument not only for migrants' integration but also for mutual influence on representatives' identity coming from different cultures.

Finland stands out quite separately out of a number of some other Northern Europe countries, which is undoubtedly an interest for research. Finland borders with Russia possessing a large diaspora of the Russian-speaking population (29,000 people), which turns out to be a serious public diplomacy resource in promoting "Russian world" abroad. Migration policy in Finland is considered to be highly adaptive and balanced, primarily preserving national interests and human capital. While analyzing reasons for Finland's success, we are highlighting the main aspects: high human capital quality of foreign migrants coming to Finland, successful information dissemination for migrants coming to Finland and successful migrants' integration in a Finnish labor market.

3. Regional dimension: Karelia and Finland

Public diplomacy has a regional dimension as well. It also acquires special significance in terms of border areas, where it is necessary to maintain a climate of trust and stable international relations and use neighborhood for a balanced sociocultural development of its territories. Cross-border mobility and active communication practices are transforming sociocultural space of border areas [8, 9]. It transforms in terms of an increase in a number of border crossings, contacts between people and joint actions; its structure becomes diverse, open to interaction and adoption of social innovations.

The European vector of public diplomacy is represented with a large number of NGOs and a wide range of opportunities coming from the European Union (educational programs, Northern Dimension partnerships, cross-border cooperation programs, etc.) [10]. Public organizations represent different sectors of population interests in a social and cultural space in order to achieve social, charitable, cultural, educational, political, scientific and managerial goals.

Since 1996, Russia and Finland have been participating in regional cross-border cooperation programs actively. In 2000, the Karelia Euroregion was founded combining the Republic of Karelia of the Russian Federation and the Finnish border provinces of Kainuu, North Karelia and Northern Ostrobothnia. The Republic of Karelia has adopted a regional cross-border cooperation program-a response to cross-border initiatives of the European Union, in particular, the Interreg IIIB and Interreg IIIA programs (including the Interreg IIIA-Karelia subprogram). The role of an effective platform for discussing initiatives and coordinating plans for cross-border cooperation programs is presented by the Karelia Euroregion. Cross-border and multilateral cooperation programs are unique tools for developing local and regional territorial initiatives. For over 5 years of the program's implementation, 66 projects were implemented amounting to 42 million euros, 30% of which were used to finance infrastructure projects including modernization of the Mäpp Värtsilä-Niirala [10]. Such cooperation practices as a cross-border shopping tourism, joint projects implementation and public diplomacy are widespread here. The Karelia Cross-Border Cooperation Program 2014–2020 (Karelia/CBC) is ongoing currently. It is called upon to strengthen Russian-Finnish inter-regional cross-border cooperation with the support of the Russian Federation, Finland and the European Union. The program is cross-border in nature and contributes to the implementation of strategic and thematic tasks of cross-border cooperation at the European level, as set out in the European Neighborhood Policy [10].

In a survey by the Organization for Economic Co-operation and Development (OECD), four factors that are critical for the development of cross-border cooperation were identified [11]. Given the current challenges, we reformulate them as follows: the transformation of global geospace; institutional order; institutional and social roots and an appropriate culture of cooperation; and identity.

At the same time, cross-border cooperation is considered as a form of population socialization in neighboring regions in a context of cultural diversity, a multiethnic community formation within transboundary spaces. Border zones are characterized with a specific cultural phenomena, readiness for its cultural interaction and a certain commonality of the world population outlook [12].

In this regard, it is necessary to apply soft power tools effectively. The latter is important not only because of sociocultural space sustainable development but also due to the increase in anthropogenic mobiles (moving people), which today are increasingly showing the property of a geopolitical tool and, in this regard, are becoming an important factor in relation to border territories affecting economy and social sphere.

Geopolitical challenges affect reality perception by residents of border regions and pose a choice of the cultural world to which they want to belong to. Modern globalization processes are associated not only with economic and political processes but also with cultural self-identification and social relations stability structure. Migration flows exacerbate and actualize the issues of sociocultural characteristics of communities introducing a different cultural and spiritual-value component that could change the existing social, cultural and psychological settings of the host community.

Border regions interaction leads to "the interpenetration of cultures, their mutual enrichment, contributing to a new sociocultural cross-border space." Transboundary sociocultural space is also considered as a variety of intercultural interactions of sociocultural practices.

At the Republic of Karelia, there are lots of attributes produced in Finnish language-a sociopolitical magazine "Carelia" and a monthly children's magazine "Kipinä" ("Sparkle"). A number of Russian-language media are also active in Finland, of which the largest local Russian-language newspaper is "Spektr." Finnish

language training is carried out by the Department of Baltic-Finnish Philology at Petrozavodsk State University, at secondary schools and preschools, as well as in a number of commercial centers for foreign language study. There has been a tendency toward an increase in the number of children learning national languages. In preschool educational institutions in the academic year 2017–2018, Karelian, Veps and Finnish languages were studied by 1166 pupils, and at schools by 6820 pupils [8].

In North Karelia (Finland), Russian language is taught both at schools and higher educational institutions. In 2017, there were about 3881 foreign citizens from 106 countries in North Karelia, of which the largest were Russians (43.2%), the next largest were Estonians (5.2%) and Somalis and Thais (a total of 3.8%) [13]. About 2344 foreign citizens lived in Joensuu, of which 955 were from Russia with a total population of 76,067 people [14].

In the framework of cooperation with Finnish partners, permanent organizers of the events are the friendship societies Karelia-Finland and Finland-Russia, literature and concert programs and exhibitions, a week of Finnish cinema, and touring activities of creative groups. The National Theater of the Republic of Karelia is the only theater outside Finland where performances are staged in Finnish, Karelian and Russian languages.

The greatest manifestation of cross-border sociocultural specificity is observed in the following areas: culture and art, project activities, education, tourism and information space [8].

The border position of the Republic of Karelia (Russia) and North Karelia (Finland) contributes to everyday neighborhood practices development, new forms of interaction emergence based on past experience. Cross-border interaction has a positive effect on the development of good neighborly relations and activates local communities not only to create networks of cooperation and establish direct ties, but also to develop initiatives of local communities, increase mutual understanding, trust and awareness.

The increasing role of border and cross-border territories in terms of sociocultural space transformation causes a significant research interest.

4. Finnish case of migrants' inclusion analysis into local environments: materials and methods

This and the following sections are devoted to comprehensive studies of the Finnish case [15]: migrants' integration into local cultural and political environment as well as public diplomacy impact assessing an important tool of "soft power" where migrants' role is quite high.

Finland is highly attractive both from the point of view of migration impact upon local community and taking into account multiple economic and cultural ties with Russia. Therefore, it is important to explore some possibilities for public diplomacy tools' application using Russian diaspora resource.

Since Russian diaspora in Finland is relatively significant, its communications are of certain interest from the point of view of public diplomacy instruments. Soft power is becoming an instrument not only for cross-border cooperation development but also for influencing identity and a serious resource of public diplomacy in promoting the "Russian world" abroad.

The goal is both to research on problems dealing with the Russian-speaking diaspora in Finland and public diplomacy tools (media analysis, social networks and social groups) aimed at migrants' integration policy upgrading in local communities.

Nowadays (both in Russia and in the world), the research is not devoted enough to migrants' political communication. In particular, in Russia, political communication is scrutinized in the following areas: power as a political communication, political communication theory, sociology of political communication, psychological aspects of political communication, information security impact on political communication, political communication as a way to deploy political order events; political communication as an independent phenomenon not as a function, but as a process; use of information and communication technologies [16].

Based upon a wide-known theoretical approaches in the field of migration-the so-called general migration theory (E. Ravenstein, Stoufer, E. Lee, etc.), we shall consider the Russian-speaking diaspora integrating problems in Finland as well as some public diplomacy tools as a soft power resource [1, 17–19].

The research is also dealing with Migrants Integration Policy Index developed according to Barcelona Center for International Affairs and Migration Policy Group [20–22]. This method embraces seven areas of migrants' integration: labor market mobility, family reunion, education, political participation, long-term residence, access to nationality and antidiscrimination (according to Migrant Integration Policy Index). Migrant integration policy index helps us to evaluate migrants' rights and well-being, analyze state migration policy and state's responsibility, as well as develop recommendations on migrants' integration policy. This article deals with one of the seventh integration areas in accordance with the Migrant Integration Policy Index-migrants' political participation, in particular, Russian migrants' political communication in Finland (our case).

The research is based upon interviews, which result in respondents' typology development; political information channels were defined; and the influence of education and social inclusion upon political communication was characterized. Thus, for example, in Finland, migrants' personal data upon age, gender, country of origin, immigration country, religion, marriage and date of entry are obtained from a variety of sources accumulated in one information system "Population Information System" under Statistical Agency of Finland. Information on migrants is accumulating from different confessions' parishes, hospitals and the Migration Service of Finland. In Finland, migrants need to obtain ID card necessary for work or medical assistance, and for this, each migrant has to undergo a mandatory registration procedure in "Population Information System." Every year, "Population Information System" staff are serving migrants and thus checking their residential address. In 2014, it turned out that 99% of migrants have the same address. Each month, the information system generates final reports on changes occurred for the last month-"Population statistics service." At the end of each quarter, the information system provides provisional statistics on population changes for the year ("Quarterly population statistics"). Statistics on migrants is published annually: in electronic form in May and in paper form in June of each year ("Population structure and vital statistics by municipality").

Migrants' surveys allow to supplement the information system data from open sources and are used to achieve the following objectives:

1. To access detailed information on various parameters

2. To identify migrants' sentiments

3. To define migrant problems

4. To get information that demands the response (e.g., which materials migrants are reading)

The authors developed a questionnaire in order to achieve the research goal. The questionnaire included 30 questions and was divided into five main categories: political information sources, political dialog, use of sources of information through the Internet, political participation and social status. Secondary questions were related to international news, national government, economic news, community events, and editorial columns of the local news.

Official statistics both of the UN and national states is widely applied [6, 23]. Migrants' survey is the most important tool that allows to identify structural changes in society and to evaluate reasons for these changes [24]. Migrants' surveys allow to supplement and provide more detailed information on statistics obtained from public information sources.

5. Research results

Among Northern Europe countries, Finland is of great interest as a neighboring country having a large number of migrants from Russia and as a country that pursues a successful migration policy aimed at local community sustainability. Finland's Future of Migration 2020 Strategy has been recently adopted and announces the following principles [25]:

- Diversity will be valued as Finland's internationalization continues.

- Equality and equal opportunities will apply to everyone.

- Migration will enhance the well-being of the population and boost Finland's competitiveness.

- Migrants will be able to use their skills and contribute to the future development of society.

- Migration will be foreseeable and controlled.

Starting from January 1, 2015, an updated Finnish Non-Discrimination Act came into force authorizing the Non-Discrimination Ombudsman [26]. Nowadays, in Finland, there are Non-Discrimination Ombudsman, Equality Ombudsman and Ombudsman for Children; all three institutions are also aimed at migration policy regulation.

According to Statistics Finland, Russians were the largest migration group till 2010 (29,500) [27]. For the last several years, the situation has changed. Russians (29,800) are the second largest group after Estonians (38,000). Today, migration flow in Finland is mainly represented with two largest groups of migrants: 49% of Estonians and 39% of Russians according to International Migration Outlook [28].

For the last 5 years (2010–2015), migration outflow has dried out from Russia to Finland. For a long period starting from 1990s till 2010 (about 20 years), basic reasons for active labor migration in Finland were the following: Inkeri Finns repatriation, international marriages and refugees. However, currently, Finnish immigration policy is changing drastically-foreign labor migration flows from Russia are significantly reducing. One of the basic reasons is that Finnish Government has fully stopped Inkeri Finns repatriation from Russia starting from July 1, 2011. As a result, Finnish migration policy has changed significantly.

Currently, Russian diaspora in Finland is not studied well though, especially Russian migrants' peculiar political communication traits. In this term, these characteristics are highly valuable from the point of view of migration policy regulation.

Russian migrants are the second largest group of migrants in Finland influencing potentially the political process. Here, we have in mind that Russian migrants in Finland have a very strong instrument of influence-right to vote at municipal elections. According to the Finnish law-the Election Act [29]-any citizen of any state has a right to take part in municipal elections. There are however additional two conditions such as the living status in the municipality in which the vote is held (at least 51 days before election day) and staying in Finland for at least 2 years.

Let us consider Russian migrants' living in Finland survey results in order to identify their political communication characteristics. The research of Russian migrants organized in Finland is a qualitative one and allows to both develop and prepare based on the more in-depth study. The aim of the research is to identify Russian migrants' relations with politics.

In general, 122 respondents took part in interviews. No doubt the obtained data demand further approval by quantitative data, but this research is mainly qualitative and aimed at analyzing interaction of the target group with an ambient environment.

Respondents were selected in accordance with the snowball effect. The respondent profile is presented with a Russian migrant living in Finland for more than 3 years, of Russian nationality, and of full legal age. Age, education level and income level were not taken into consideration. The interview also revealed some additional characteristics of the sample.

After the interview, it became clear that 45% of respondents were not interested in politics ("idle respondents"); 45% who became "active respondents" were actively using political communication channels [media, social networks, Internet, TV and social circles (family and job)]. About 10% of respondents were rather negative toward politics ("blocking respondents"): "I am interested only in my close people; I do not see any reason to spend my time on politics." About 13% of respondents participated in municipal voting. Finnish law is ensuring migrants' participation in municipal elections-"for those migrants who live at least 2 years in Finland and at least 51 days in the commune in order to involve them in the processes of integration" according to Election Act.

The most popular expression that served as a motive for respondents' typology was "try to follow up all the news." Thus, the respondents ranged from actively watching political events "to be in the swim" to never participating in elections, signing/creating petitions "because that doesn't help," and never be interested in news but participating in elections "of course it's my duty, I have to vote" or "it is necessary to do something, chose if you remain silent this will happen all the time." In summary, three main types of respondents could be identified based upon their interest in politics: active, idle and blocking.

Active respondent: Most active respondents have aspiration to compare different sources of information, interest in politics of both Finland and Russia, as well as international and local political issues. Those, whose interest in political issues is high, can be divided into two further groups:

• Those who actually like to discuss politics with peers

• Those who are actively looking for political news but they are not that open to discussions and consider this knowledge only for their personal development

Moreover, willingness to compare different sources of information often correlates with higher education.

Idle respondents are those who would listen about political issues in the general daily news flow but would not try to find information about political topics themselves. They would listen to political discussion and even might slightly participate in it but would not initiate it themselves. Politics for them is a parallel world in which they never seek to interfere, but always watch how it changes.

Blocking respondent: Mentioning politics brings negative emotions to members of this group. They generally have a skeptic approach toward political affairs. They would not participate in political discussions and would try to avoid them.

Thus, respondents' answers gave us an opportunity to categorize migrants in accordance with the above-mentioned types and also to allocate channels of political information for migrants.

Four main channels of receiving political information by Russian migrants in Finland-Internet, TV, newspapers and social circles-were outlined. It should be noted that information obtained by Russian migrants living in Finland is performed through a wide range of channels. However, another peculiar feature should also be mentioned. Thus, for some respondents who do not know Finnish language or possess low knowledge of it, it is difficult to access news in Finnish. Despite this, it is still believed that the most favorable conditions for migrants are established in Finland, which is actively working on migrants' integration including Russian migrants also.

This is also proved by a wide range of news presented in Russian, for example, Internet news resources "YLE" and "Spectrum," information portals "Russian.fi," "Fontanka.fi" and "Russian Finland," and radio news in Russian language-"Sputnik."

Thus, the variety of sources from which the respondents received information on political events is reduced to the following basic four channels:

1. Newspapers (both printed and electronic) are divided into three groups

    • Russian newspapers: "Novaya gazeta," "Argumenty I facty" and "Snob"

    • Finnish daily newspaper "Aamulehti" (second popular newspaper in Finland after "HelsinkinSanomat" and "TurunSanomat")

    • Finnish resources in Russian language "Spector" и "YLE"

2. Television-respondents prefer watching Russian channels such as ORT, NTV, RTR, TNT, Channel 5 and the channel "Spas." Respondents particularly noted such political programs browsing as "K Bariery" on RTR channel and "Pyaterkapoekonomike" on "Spas" channel.

3. Internet sources used by respondents in order to learn political news are Newsru.com, Yandex.ru, Euronews, Facebook, Vkontakte and Odnoklassniki.

4. Small groups-another popular method of respondents' political communication with coworkers and family members.

Migrants' survey results draw the following conclusion: newspapers (in electronic and printed form) were used by active and idle respondents. There is also a study outlining that newspaper reading and participation in discussions motivate to participate in political activities [30]. At the same time, it prevents from viewing
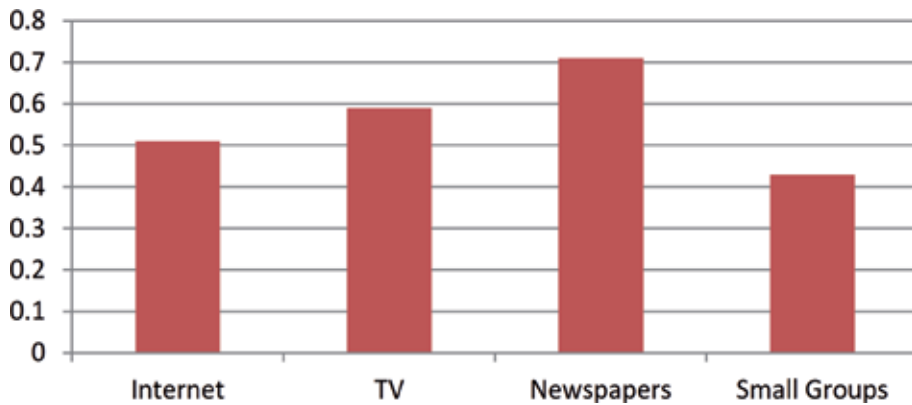
Figure 6.
Political communication intensity of Russian migrants in Finland based upon information channels.

entertainment television programs. Thus, according to the results, people with higher interest in political events prefer to read newspapers and analytical articles, but refuse to participate in any political activity. Those who prefer TV programs to newspapers are trying to participate in the elections.

Different channels' influence on political communication intensity was also studied.

Frequency of turning to different information sources (number of days per year when sources were viewed in relation with the total number of days) was used as an indicator characterizing migrants' political communication intensity. Thus, "1" is presented as a maximum (daily frequency) and minimum is corresponding to "0.03," which is several times per year.

Figure 6 shows the mean intensity of migrants' political communication depending on the type of source.

It is visible from **Figure 6** that political communication is getting more intensive when a migrant gets information from newspapers. In part, this might be due to the predominant position of Finnish newspapers that usually publish many details on municipality/city life in Finland. The second place goes to TV and the third to Internet.

Migrants' survey results showed that migrants' political communication evaluation is highly important since it allows to identify the underlying trends in political preferences, to obtain information for a rapid response in certain cases as well as identify areas where migrants need support or assistance.

6. Discussion

The chapter analyzed the interaction of the target group with ambient environment, and cause-and-effect relationship together with factors influencing respondents' behavior is outlined.

According to the study of Mutz and Mondak [31], the most likely place for the policy debate is a working place. However, data obtained under the interview indicate that the situation has some limitations for Russian migrants in Finland. In the workplace, both in mixed teams (with Russian and Finnish colleagues) and in teams where only Russian migrants work, there are some discussions on political topics. Colleagues discuss political events not only in Russia and Finland but also on international arena; however, in companies with international staff, political themes often get avoided.

The probability of discussion upon conflicting topics is much higher within the family members, since the level of trust is high. In the workplace, employees often prefer to avoid such issues, though it is not an absolute rule, and if there's trusting relationship between colleagues, it is quite possible to exchange opinions.

Under the interview, it was also defined that the role of small groups has an impact on Russian migrants' political communication in Finland.

Under the interview, the correlation between level of integration into the host society and choice of an interesting event in Russian and Finnish societies was found. For example, young migrants (students and young migrants in a labor market), who grew up in Finland and are fluent in Finnish language, have a higher degree of social inclusion, which allows them to understand more easily what is happening in the political arena.

Senior migrants often lack language skills and socialization experience in the new society (no work and no new education) and often prefer to concentrate on Russian political events, obtaining information mainly from Russian media. However, this is not a widespread rule. In Finland, there are Russian migrants who are active in the preretirement and retirement age. They continue to familiarize themselves with the host society and to stay up to date with its main events. For some Russian migrants, Finnish news daily newspaper "Aamulehti" is the main source of information, and they read it, even if they have to use the dictionary constantly.

Migrants' survey results confirmed previously identified relationship between the level of education and breadth of political interests (see [32, 33]) and have showed that migrants with higher education seek to educate a wider range of political topics. They used a wider range of information, including analytical programs and magazines. These respondents refer to news critically and compare news from various sources. The results of conducted migrants' interviews confirm this relationship again. Thus, "active" respondents with higher education are more eager to talk about information analysis from different (or even multilingual) sources ("I compare information from different sources, in particular, the Finnish sources-YLE, Russian news channels in Internet, British sources, then I can Skype with my friends and ask how it is in reality."). Thus, the analysis of a wide range of news gives a clearer picture of the situation in a political world and can provide a more solid basis for political communication and political participation later.

The research also proved the fact that migrants' social inclusion into host society is highly dependent on language knowledge. For confirmation of the hypothesis, a causal analysis of the social inclusion impact upon political communication intensity was conducted. As an indicator, which characterizes Russian migrants' social inclusion, we use factor of foreign languages' knowledge, including Finnish and English. The final indicator for political communication intensity became the frequency of interaction with information sources (access to Internet sources, reading newspapers, watching TV, small group discussion, etc).

Knowledge of Russian language is accepted as a minimum factor of migrants' social inclusion. Knowledge of one foreign language (English or Finnish) correlated to average value of migrants' social inclusion. The maximum value of the factor is the knowledge of two or more foreign languages.

Figure 7 below shows migrants' political communication intensity depending on foreign language knowledge.

Figure 7 shows that migrants' political communication intensity is higher if a migrant knows one or more foreign languages; accordingly, he/she has an opportunity to get acquainted with a wide range of multilingual sources.
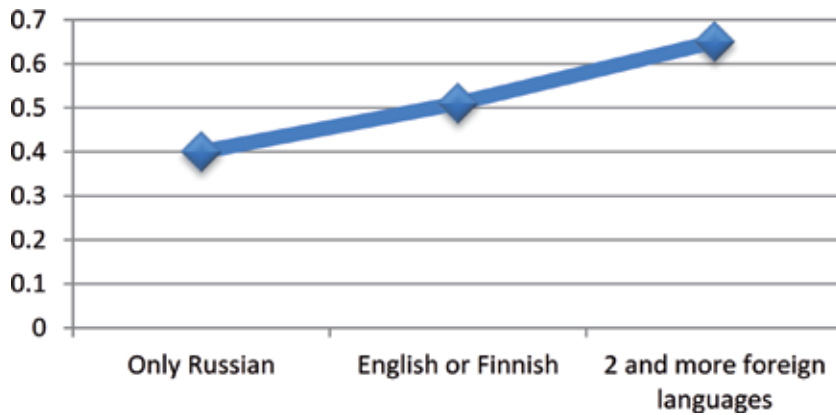
Figure 7.
Political communication intensity of Russian migrants in Finland depending on foreign language knowledge.

These results confirm the theory of Sotirovich and McLeod [30] that: "Education provides both knowledge and skills to work with information, and therefore, improves access to political process, at least, makes political participation more likely."

The survey results have showed that workers with higher education, in general, seek to familiarize with a wide spectrum of political topics and thus analyze events critically (see also [34]).

It is worth noting that research has proved the fact that migrants' social inclusion into society is heavily dependent upon foreign language skills. The following characteristics of migrants' political communication were outlined as a result of survey data processing:

- Respondents are distributed according to the following types of political communication: "active"—45%; "idle"—45% and "blocking"—10%.

- Relationship is found between the level of education and both quantity and quality of media sources accessed by respondents; for example, only migrants with higher education accessed analytical journals.

- Positive correlation between the number of foreign languages and migrants' political communication intensity is found.

- The following priorities for the use of political information sources among migrants are identified: Internet, 64%; TV, 45%; newspapers, 27%; and small groups, 18%.

- The impact of various information channels on political communication intensity of Russian immigrants in Finland is estimated.

- The role of small groups in migrants' political communication is discovered.

So, at the workplace and, in particular, in companies with an international team, despite the presence of small groups (colleagues), political topics are shot out by tolerant reasons. On the contrary, political situation is discussed more frequently within the family.

7. Conclusion

Complex studies of the Finnish case were dealing with migrants' inclusion into local cultural and political environments (as conditions to cultural and political environment stability) as well as public diplomacy evaluation of an important "soft power" tool where migrants' role is rather high.

In this research, we have investigated some unknown features of Russian migrants' political communication in Finland. We have identified some characteristics of political communication by applying the interview method. The main factors that would influence interpersonal communication in politics among Russian migrants in Finland are explored.

Theoretically, the research allowed both analyzing such an important aspect of migration policy as migrants' political communication and identifying its key features.

Interviews with migrants helped to understand the mechanism between political communications and shifts in local society.

The resulting characteristics of migrants' political communication might be of high interest in terms of migration policy regulation and understanding the issue of migration quotas. The findings would also help to predict structural changes in society, to assess the level of radicalization in society and to provide the basis for decision-making on effective use of public diplomacy tools. The growth of anthropogenic mobiles (movement of people and influence of cultures) is a phenomenon with many security contexts: it aggravates interethnic and interreligious contradictions between different ethnocultural groups of the population, increases social tension and defragments local community through ethnic enclaves' formation.

Sociocultural space is considered to be an area of culture, norms and values, cross-cultural interactions. It is important to understand how ethnic group (subethnic group and local community) is able to maintain homeostasis in social relations structure and its recognizable ethnocultural profile-a kind of gestalt. This term undermines as a "structure," "image," "form" and "integrity."

Thus, we have not just a certain sum of social relations but some kind of stable semantic and visual constructions, a contour made up of identity markers-the "gravity center" for the Russian world gestalt.

A debatable question thus arises: how stable these semantic constructions are and how a subethnos that is a subject both to external and internal factors is able to maintain its "gestalt"? In a paper [35], a number of reasons listed to upset social relations structure in relation to other ethnocultural groups/religions and united by a single cultural code are presented by the example of Karelia. By virtue of its genesis, this core has not only a solid fundamental (invariant) part but also a variable part that evolves under the influence of various factors. Invariants (empirically measured identification features that remain relatively unchanged in temporal and spatial dimensions) and inversions of sociocultural space are revealed. In particular, Protestant, Catholic and Muslim inversions were identified in a sociocultural landscape of Karelia, where the Orthodox Christian faith dominates overwhelmingly.

In conclusion, we came up with the main two principal results.

Firstly, identity factors together with cooperation culture are critical (in relation to border area development). It is necessary to promote consolidation of local community in Russian ideological spirit and its cultural codes expansion given that the cooperation development leads to local communities' consolidation within the framework of cross-border structures in changing geopolitical conditions in order to protect national interests.

In this regard, soft power tools' application is important. Promotion of markers, in our opinion, is of public diplomacy. Its task is the development of the civilizational cultural code "Russian world" (people get a whole attractive civilizational image of the Russian world).

The basis of this thesis is the assertion that we cannot perceive the world around us directly-a person always interacts in a communication process.

Thus, social communication, on one hand, is a conscious, targeted and appropriate informational impact on partners, which can be either an individual person or groups of people who participate, or are going to participate in joint activities. On the other hand, it is a complex multifaceted process of establishing and developing contacts between people, connecting people not only with the information transfer but also with practical actions, elements of mutual understanding, feelings and emotions. Therefore, from political communications analysis, it follows that gestalt transmission requires the following elements for a communication diplomacy model: (1) a generator (encodes a semantic or visual construction); (2) message translator-translates encoded information; (3) channel-means of transmitting information; and (4) recipient-a person to whom the information is intended and who decodes it in a given sense.

Secondly, the border appears to be such kind of a zone where the development vector is aimed at economic and cultural space communications. At the same time, the border is not only a zone of cross-cultural communications but also of institutional matrices' conjugation where communications are carried out.

Currently, more than 160 Russian municipalities are partnering with more than 750 foreign local territories. At the same time, communication is being built in not a very convenient multiformat with different institutions, powers and partners functioning. Therefore, on the basis of cross-border interaction studies, it was concluded that in order to unify the procedure for local authorities to implement cross-border relations it is advisable to harmonize regulatory institutions and use public diplomacy tools to promote cultural code and organize effective cross-cultural communications.

Conflict of interest

The authors whose names are listed immediately above certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements) or nonfinancial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

Author details

Oleg Tolstoguzov and Maria Pitukhina*
Russian Science Academy, Petrozavodsk, Russia

*Address all correspondence to: maria.pitukhina@gmail.com

IntechOpen

References

[1] Nye J. Interdependence and the changing international policy. World Economy and International Relations. 1989;**12**:72-76

[2] Nye J. Soft Power: The Means to Success in World Politics. New York: Public Affairs; 2004. p. 191

[3] Wendt A. Social Theory of International Politics. UK: Cambridge University Press; 1999. p. 429. DOI: 10.1017/CBO9780511612183

[4] Concept of Foreign Policy of the Russian Federation [Internet]. 2013. Available from: https://www.garant.ru/products/ipo/prime/doc/70218094/#review [Accessed: 10 May 2018]

[5] Rossotrudnichestvo [Internet]. 2020. Available from: http://rs.gov.ru/ru [Accessed: 10 May 2018]

[6] UN International Migration Report [Internet]. 2017. Available from: http://www.un.org/en/development/desa/population/migration/publications/migrationreport/docs/MigrationReport2017.pdf [Accessed: 10 May 2018]

[7] Smith DP, King R. Editorial introduction: Re-making migration theory. Population, Space and Place. 2011;**18**:127-133. DOI: 10.1002/psp.686

[8] Shlapeko E, Stepanova S. Cross-border trade development in Russia: Common trends and traits. Bulletin of Zabayakalsky State University. 2017;**23**(1):130-139. DOI: 10.24866/1998-6785/2019-1/17-25

[9] Käyhty A. The Russians Are Coming—And Lappeenranta Rubs Its Hands [Internet]. 1999. Available from: http://www2.hs.fi/english/archive/thisweek/51141999.html [Accessed: 10 May 2018]

[10] Official Web-Site of the Cross-Border Cooperation Program «Karelia» [Internet]. 2020. Available from: https://www.kareliacbc.fi/ru [Accessed: 10 May 2018]

[11] OECD. Territorial Reviews: Trans-Border Urban Co-operation in the Pan Yellow Sea Region. Paris: OECD; 2009. p. 224. DOI: 10.1787/19976585

[12] Abramova N. Transborder socio-cultural space development in terms of Russian-Chinese border. Bulletin of Zabayakalsky State University. 2012;**9**(88):80-84. DOI: 10.1080/14650045.2017.1398142

[13] Pohjois-Karjala [Internet]. 2017. Available from: https://tem.fi/documents/1410877/6463080/Pohjois-Karjala.pdf/3177b387-e039-4621-be26-6197795098c3/Pohjois-Karjala.pdf.pdf [Accessed: 10 May 2018]

[14] Joensuun kaupunki [Internet]. 2019. Available from: http://www.joensuu.fi/joensuu-lukuina [Accessed: 10 May 2018]

[15] Pitukhina MA, Tolstoguzov OV, Chernyuk I. Russian-speaking diaspora in Finland as a public diplomacy tool. Geography, Environment, Sustainability. 2019;**12**(2):6-17. DOI: 10.24057/2071-9388-2018-31

[16] Solov'ev A. Political communication: To the issue of theoretical identification. Political Studies. 2002;**3**:5-18. DOI: 10.17976/jpps/2002.03.02

[17] Ravenstein E. The laws of migration: Second paper. Journal of the Royal Statistical Society. 1889;**52**:241-305. DOI: 10.1086/229967

[18] Stouffer S. Intervening opportunities: A theory relating mobility and distance. American Sociological Review. 1940;**5**:845-867. DOI: 10.2307/2084520

[19] Lee E. A theory of migration. Demography. 1966;**3**:47-57. DOI: 10.2307/2060063

[20] Migrant Integration Policy Index [Internet]. 2018. Available from: http://www.mipex.eu/ [Accessed: 10 May 2018]

[21] Barcelona Center for International Affairs [Internet]. 2018. Available from: https://www.cidob.org/en [Accessed: 10 May 2018]

[22] Migration Policy Group Official Website [Internet]. 2015. Available from: http://www.migpolgroup.com/ [Accessed: 10 May 2018]

[23] EUROSTAT [Internet]. 2013. Available from: http://epp.eurostat. ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tps00024&plugin=1 [Accessed: 10 May 2018]

[24] European Social Survey Official Website [Internet]. 2014. Available from: http://www.europeansocialsurvey.org/data/themes.html?t=immigration [Accessed: 10 May 2018]

[25] Finland's Future of Migration 2020 Strategy [Internet]. 2013. Available from: https://ec.europa.eu/migrant-integration/librarydoc/finland-future-of-migration-2020-strategy [Accessed: 10 May 2018]

[26] New Non-Discrimination Act Entered into Force. 2014. Available from: http://www.finlex.fi/fi/laki/kaannokset/2014/en20141325.pdf [Accessed: 10 May 2018]

[27] Statistics Finland [Internet]. 2013. Available from: https://www.stat.fi/til/index_en.html [Accessed: 10 May 2018]

[28] International Migration Outlook [Internet]. 2013. Available from: https://www.oecd-ilibrary.org/social-issues-migration-health/international-migration-outlook-2013_migr_outlook-2013-en [Accessed: 10 May 2018]

[29] Election Act (714/1998, Amendments up to 361/2016 Included) [Internet]. 2016. Available from: http://www.finlex.fi/fi/laki/kaannokset/1998/en19980714.pdf [Accessed: 10 May 2018]

[30] Sotirovic M, McLeod J. Values, communication behavior, and political participation. Political Communication. 2001;**18**(3):273-300. DOI: 10.1080/10584600152400347

[31] Mutz D, Mondak J. The workplace as a context for cross-cutting political discourse. The Journal of Politics. 2006;**68**(1):140-155. DOI: 10.1111/j.1468-2508.2006.00376

[32] Hillygus D. The missing link: Exploring the relationship between higher education and political engagement. Political Behavior. 2005;**27**(1):25-47. DOI: 10.1007/s11109-005-3075-8

[33] Price V, Zaller J. Who gets the news? Alternative measures of news reception and their implications for research. Public Opinion Quarterly. 1993;**57**(2):133-164. DOI: 10.1086/269363

[34] Kyhä H. Educated Immigrants in Employment Markets. A Study on Higher Educated Immigrants' Employment Opportunities and Career Starts in Finland [Internet]. 2011. Available from: https://www.doria.fi/handle/10024/72519 [Accessed: 10 May 2018]

[35] Tolstoguzov O, Pitukhina M. Sustainability of social relations: Internal and external factors. In: Local Politics in a Comparative Perspective. The Cases of Petrozavodsk and Tubingen. Baden-Baden: Nomos; 2017. pp. 89-103. DOI: 10.5771/9783845282213-89

Public Diplomacy: Functions, Functional Boundaries and Measurement Methods

Cao Wei

Abstract

It is common practice when evaluating the effect of public diplomacy to associate it with soft power. This chapter challenges this view. It holds that, rather than turning soft power resources into soft power, the fundamental function of public diplomacy is to transform a country's assets into soft power resources that will attract the target country. This chapter also shows that although public diplomacy performs such functions, it is not necessarily effective, especially in 'high politics' such as territorial security. But even where its effectiveness can be exerted, public diplomacy is subject to other distractions. Therefore, in order to measure accurately the real effect of public diplomacy, it is necessary to exclude the potential influence of these interfering variables by strengthening the rigor of research design.

Keywords: public diplomacy, function, effectiveness, measurement

1. Introduction

To regard the accurate evaluation of the effect of public diplomacy work as the most important research topic for public diplomacy scholars is not overstating the case. Clearly, unless we make an accurate assessment of past work, it will be difficult to determine whether or not current working ideas and methods are correct, whether or not certain policy proposals aimed at improving the effectiveness of public diplomacy will work, and in which public diplomacy areas or projects to increase investment in the future. In this sense, the empirical measurement and scientific evaluation of the effectiveness of 'public diplomacy'—a research area that is highly policy- and practice-related—should be the primary and most critical topic of research in this regard as a whole. However, to make an accurate assessment of public diplomacy, it is necessary to define theoretically its function, utility boundary and measurement method.

This chapter holds that public diplomacy's most important function is to transform a country's general assets into soft power resources, which refer to those assets that people of other countries like or support and which are therefore attractive to them. In other words, the function of public diplomacy is to reverse the attitude of people in other countries towards the assets (such as a certain culture, set of values or policies) of the implementing country from not knowing, liking or supporting them to the opposite. Therefore, the success of a public diplomacy effort is assessed according to whether or not it improves or enhances the public of target country's evaluation of a particular aspect of the implementing country.

However, owing to certain functional boundaries, public diplomacy does not work in all problem areas. In 'high-politics' such as territorial security, for instance, public diplomacy is likely to be of little use. But even in fields where public diplomacy can play a role, factors such as changes in power structure, differences in political systems and the quality of political relations among countries will still have impact on its effectiveness. The ultimate purpose of clarifying the function and functional boundaries of public diplomacy, therefore, is to measure more accurately its effect. This chapter further proposes that there are two main methods in this regard: one is the sampling survey method that is aimed at the general public, namely, the public opinion poll, and the other is that of the unstructured interview with a small specific group of people. Both methods have their advantages. As regards their practical application, however, certain matters demand attention.

This chapter is divided into four parts as follows. The first part discusses the definition and functions of public diplomacy on the basis of combing through and criticizing the existing viewpoints, thus to clarify the judgment criteria of the effect of public diplomacy. The second part discusses the functional boundaries of public diplomacy and points out the disturbance variables that affect its actual effect. On the basis of the first two parts, the third part discusses two empirical methods through which to measure the effect of public diplomacy and the problems to which attention should be paid in this regard. The fourth part is the conclusion.

2. Definition and functions of public diplomacy

Scholars have yet to form a unified understanding of the definition of the term 'public diplomacy' since it was first proposed in 1965. At present, there are still discussions in this field on 'traditional public diplomacy' and 'new public diplomacy'. It is now believed that, since the turn of the twenty-first century, public diplomacy has shown signs of transition and transformation from the former to the latter. New public diplomacy, a horizontal mode with multiple actors characterized by communication and cooperation, is version 2.0. It is an upgraded version of traditional public diplomacy, which is a hierarchical mode of information dissemination centred on the government [1–7].

Although there are many cognitive differences between the two, with the deepening of research, scholars have reached a certain degree of consensus on the connotation of public diplomacy in the following aspects. The first is with regard to implementation, wherein the government plays an indispensable and irreplaceable role. Even through the eyes of advocates of new public diplomacy, and their embrace of other implementing bodies such as NGOs and the general public, there is no difference between them and scholars of traditional public diplomacy as to the issue of the government as initiator and important promoter.

In fact, no matter how far public diplomacy develops in the networking direction, the nature of its diplomacy does not change at all. As a specific branch of diplomacy, the representativeness of sovereign states, which is closely related to the government, is its essential attribute. The second aspect is the object, or object of implementation, where targeting the people is recognized as the core difference between public diplomacy and traditional diplomacy. Third is the means of implementation, where cultural exchanges and media communication are regarded as the main means of promotion. According to these consensuses, therefore, public diplomacy can be defined as a diplomatic activity wherein the government is the initiator, the public is the object, and relevant policy measures, including foreign policy, are introduced through cultural exchanges, media publicity and other means.

Having clarified the definition of public diplomacy, we need to make clear its functions, as it is only when we know what public diplomacy should and can do that we can determine, according to this criterion, whether or not it is effective. At present, academic discussions on the effect of public diplomacy generally associate it with the concept of 'soft power' as proposed by Nye [8–12], and tend to take the size of a country's soft power as the core measure through which to evaluate the effect of its public diplomacy [13–17]. In order to define more clearly and reasonably the function of public diplomacy, this part will critically refer to Nye's theory when clarifying the relationship between public diplomacy and soft power.

The first problem when discussing 'soft power' is how to define the concept. To better understand how Nye defines and discusses soft power, we must first clarify how the more fundamental concept of power is defined. In the field of international relations, there are two ways to define 'power'. One is the 'power-as-resources' approach, which treats power as an asset and attribute inherent in the state, with emphasis on the material resources needed to constitute it. The other is the 'relational power' approach, which emphasizes the impact of power on human behaviour [18].

Based on the 'relational power' approach, Dahl gave a classic definition that is widely accepted and cited in the field of international relations: The so-called power is the ability of A to get B to do something he or she would otherwise not do [19]. The 'power-as-resources' approach defines 'power' as what we now commonly refer to as 'capability', while the 'relational power' approach emphasizes the effect of the 'power' of one actor on the behaviour of other actors.

According to Nye's definition of soft power, it is the ability to get what you want through attraction rather than coercion or payment [11]. Or, more specifically, 'soft power is the ability to affect others through the co-optive means of framing the agenda, persuading and eliciting positive attraction in order to obtain preferred outcomes' [12]. Obviously, Nye's definition of soft power follows the 'relational power' approach. What he calls 'soft power' emphasizes the influence of one actor, rather than of the resources he owns, on the behaviour of another actor.

Nye points out that the common ground between 'soft power' and 'hard power' is that whereby both kinds of power can change the behaviour of other countries. The difference between them consists in bringing about this change in different ways. Soft power works through attraction, and hard power through coercion or inducement. The reason why one country may have the 'soft' power through 'attraction' to change the behaviour of other countries lies in the assets this country possesses that are attractive to other countries. Nye calls this kind of asset a 'soft power resource' [9].

In short, Nye's 'soft power' actually corresponds to the 'power' of the 'relational power' approach. What he called 'soft power resources' corresponds to 'power' as defined by the 'power-as-resources' approach, also commonly referred to as 'capability'. In this sense, 'soft power resources' can also be called 'soft capability'. The relationship between (soft/hard) capability and (soft/hard) power is shown in **Figure 1**.

It is obvious that a soft power resource is the material premise of soft power. Nye points out that the soft power of a country rests primarily on three resources: its culture (in places where it is attractive to others), its political values (when it lives up to them at home and abroad) and its foreign policies (when they are seen as legitimate and having moral authority) [9]. Public diplomacy plays an important role in the process of transforming soft power resources into soft power.

Governments (and sometimes not just governments) engage in public diplomacy by using their own soft power resources to attract other countries and form soft power. For example, 'Public diplomacy tries to attract by drawing attention

to these potential resources through broadcasting, subsidizing cultural exports, arranging exchanges, and so forth'. However, using unappealing resources (that is, non-soft power resources) to carry out public diplomacy will not create soft power and may produce the opposite result. For example, 'Exporting Hollywood films full of nudity and violence to conservative Muslim countries may produce repulsion' [11].

In sum, Nye's theory presents a process chain from assets to soft power resources and then to soft power. Based on this theory, the function of public diplomacy is to transform soft power resources into soft power, that is, to use soft power resources to change other countries' behaviour by attracting other countries' publics (**Figure 2**).

Nye's contribution to the study of public diplomacy lies in his creative integration of public diplomacy and his theory of soft power, which provides a theoretical framework for the analysis and study of public diplomacy and important enlightenment for us to define the function of public diplomacy.

However, Nye's specific views on the relationship between public diplomacy and soft power are debatable. To be specific, as Nye placed public diplomacy in step ② as shown in **Figure 2**, other scholars have therefore defined the function of public diplomacy as 'transforming soft power resources into soft power'. In the author's view, this point is difficult to establish. The definition of public diplomacy determines that it can only appear in step ① and not in step ②.

Step ② refers to the transformation of 'soft power resources' into 'soft power'. The process entails the target country making policies or exhibiting behaviour favourable to another country because the target public likes and supports certain of that country's assets. The action mechanism here is as follows. The direct reason why the government of a target country will support the country with soft power lies in its need to maintain the stability of its own regime. When the domestic public of the target country has an extremely positive attitude towards the source country of the soft power, the stability of that regime will face great pressure from the domestic public should the target country's government blindly adopt negative policies. This is Audience cost theory [20–22].
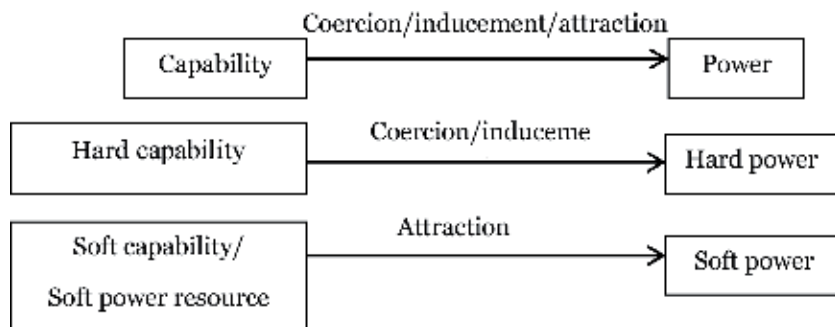
Figure 1.
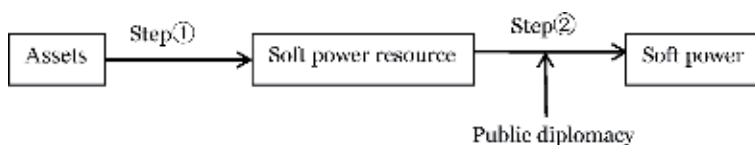*The relationship between (soft/hard) capability and (soft/hard) power.*

Figure 2.
Nye's relation between public diplomacy and soft power.

But the problem is that, whether according to the definition of public diplomacy or the actual work of public diplomacy carried out by every country, public diplomacy will not get involved in this step at all. A core difference between public diplomacy and other forms of diplomacy is that the direct object of public diplomacy is the people, rather than governments, of other countries.

In fact, as a diplomatic practice, public diplomacy is generated and exists based on the assumption that the attitude of the people of a country will influence the policies of the government. Thus, as a supplement to traditional diplomacy, and also as distinct from traditional diplomacy, public diplomacy only focuses on changes of public attitudes in the target country, whose people it is that exert pressure on their government to change its attitude. By definition, once a country's diplomatic work involves direct contact with other governments, it will be classified as traditional diplomacy, or government diplomacy, instead of public diplomacy. In this sense, as long as it is public diplomacy, it cannot appear in step ②. Empirically speaking, therefore, the actual practice of public diplomacy in countries throughout the world is limited to work that targets the public of other countries.

Step ① refers to the process of transformation from 'assets' to 'soft power resources'. According to Nye's definition, 'soft power resources' refer to those assets that the public of other countries likes or supports, and which are therefore attractive to them. Assets (such as a certain culture, political values or policy) themselves will not change. The reason why assets can transform into 'soft power resources' is that the public opinion of other countries towards these assets changes from 'not knowing' and 'not liking' to 'knowing' and 'liking'. Thus, the transformation from 'assets' into 'soft power resources' is, in fact, the change of attitude of the public of other countries towards certain of the implementing country's 'assets'. Such a change in attitude is exactly what public diplomacy, with the public as the implementing object, should and can achieve.

To be specific, the countries implementing public diplomacy can clarify and explain their policy positions through various information channels, such as information release and international broadcasting. They may thus prove to the peoples of target countries the legitimacy of their policies through information campaigns and personnel exchanges which demonstrate that their values are the same at home and abroad. Through cultural exchanges and other activities, these countries can also enable the people of target countries to learn more about implementing their culture, thus creating conditions for the production of attractive effects. In short, public diplomacy can turn assets that are not 'soft power resources' into new soft power resources.

In a nutshell, public diplomacy itself only involves interaction with other countries' publics; interaction with other countries' governments is not included. This determines that public diplomacy can work only in Step ① rather than Step ②.

In addition, if the function of public diplomacy is to change the behaviour of the government of the target country, then such a function lacks particularity. The ultimate goal of all diplomacy is to pursue changes in the behaviour of the target government. As just one of many diplomatic tasks, however, public diplomacy obviously needs its own unique goals and functions. If the function of public diplomacy also includes achieving a change in the behaviour of the target country's government, then, as a subclass of diplomacy, public diplomacy becomes indistinguishable from other subclasses of diplomacy, which negates the need for it to exist in its own right. From the perspective of the uniqueness of diplomatic work, therefore, the function of public diplomacy should be distinct from that of traditional diplomacy.

To conclude, the relationship between public diplomacy and soft power is not, as Nye believes, to transform soft power resources into soft power, but to transform general assets into soft power resources (**Figure 3**).
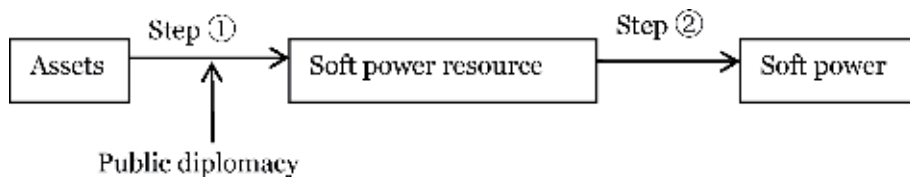
Figure 3.
Author's relation between public diplomacy and soft power.

Since the function of public diplomacy is to create soft power resources, and soft power resources refer to those assets that are accepted or favoured by the people of the target country, the success of a public diplomacy project is judged according to whether or not it improves or enhances the people of the target country's evaluation of one aspect of the implementing country. In other words, what we actually measure is whether or not public diplomacy expands a country's soft power resources.

3. Functional boundaries and influencing factors of public diplomacy

Given that the basic function of public diplomacy is to create soft power resources, could it also play a role in all problem areas by changing the perception or evaluation of the people of target countries? And if such restricted areas do exist, can the function of public diplomacy be fully realized in areas where it could play a role? The answer to all of these questions is clearly no. This is the utility boundary, and possible influencing factor of public diplomacy.

First, public diplomacy is likely to be of little use in the 'high politics' of territorial security. Whether the public diplomacy of the US in the Middle East since the turn of the twenty-first century or the publicity of the Chinese and Japanese governments against each other's people in recent years with regard to the Diaoyu Islands issue, the effect is not ideal. Obviously, it is not due to the US's public diplomacy work that people in the Middle East do not recognize the legitimacy of the US's invasion and interventions in Iraq, Afghanistan, or even Libya, and nor do the Chinese and Japanese people object to the territorial claims of their own governments due to the publicity work of the other government.

This reminds us that communication and mutual trust are ineffective when it comes to territorial security, especially territorial disputes, where one party gains a zero-sum conflict at the expense of the other. It will be difficult to persuade their people to accept 'legitimate' interference in their territory and to give up their claims to territory and rights no matter how convincingly countries tell their own stories. Public diplomacy is of little use, therefore, when it comes to the 'high politics' of territorial security.

Second, in the field where public diplomacy could play a role, its effect will still be affected by the following factors. The first is the inevitable structural contradiction between a country's rising power and that of other countries. The negative impact of this factor on the effect of public diplomacy is typified by China's public diplomacy towards Japan. Global View 2008 surveys taken in Chicago showed that the Japanese had the lowest level of favourable views on China, behind those of South Korea, Indonesia and Vietnam. 89% of Japanese respondents said they were either 'somewhat' or 'very' uncomfortable with the idea of China's 1 day becoming the leader of Asia [14].

The key reason lies in the semi-structured interviews with Dinnie and Lio. When asked, 'What are the key challenges facing China in its attempts to build a positive reputation within Japan?', one Japanese journalist interviewee admitted,

'The Japanese people and their elected representatives, sensitive to China's growing strength and acutely aware of Japan's deficiencies, are unnerved by China's growing power and Japan's economic dependence on China'. Another interviewee, a director of one of Japan's cultural and political institutes, agreed that there was 'fear in Japan of China getting bigger and Japan smaller, that's the heart of the matter. It's hard for China to deal with this' [23].

The second factor is that of differences in political systems. It is in China's public diplomacy towards Europe that this factor has the most obviously negative impact. According to Dutch scholar d'Hooghe, Europe is deeply concerned about China's domestic conditions; much more so, it appears, than the United States. China's high favourability rating in Europe at the beginning of this decade rapidly declined after 2006. 'China-hype' has gradually transmuted into fear of a rising China and dissatisfaction with the slow pace of China's political reform and human rights situation [15].

Jhee's research also confirms the existence of national prejudice [14], which shows that people's evaluation of a country's political system is largely irrational. People tend to like a particular political system not because it works, but simply because their ideology and values align with it. On the other hand, cost-benefit considerations make it impossible for an executive to change his or her regime just to 'please' the people of the target country. This means that it is neither possible for China to change its own political system voluntarily nor to win the favour of Western people by demonstrating the effectiveness (superiority) of its own political system. In this sense, it is difficult to avoid completely the negative impact of the difference in political system on the public goodwill of the target country—that is, on the effect of public diplomacy.

The third factor is political relations between countries. A study the author conducted on the empirical evaluation of the effects of China's public diplomacy in six countries made clear that this factor has significantly influenced the public of the United States and of the United Kingdom's evaluation of China, but in different directions [24]. China-US relations have a negative impact on the favourable opinion of the American people towards China. The more positive China-US relations become, the less favourable the US public will feel towards China. Meanwhile, the political relationship between China and the UK has a positive impact on the favourable opinion of the British people towards China. Further research is undoubtedly needed as to why bilateral political relations should have such opposite effects. However, with regard to the issue of the effect of public diplomacy as subordinate to that of the level of political and security relations, this should be relatively certain.

All of the above variables are likely to influence (either drag down or improve) to varying degrees the goodwill of people in the target country towards the implementing country. Therefore, when these variables coexist with the public diplomacy activities themselves, we cannot assess whether or not the public diplomacy conducted towards the country is effective based simply on the decline or increase of favourable opinion, but need to control as far as possible the influence of these interfering variables through rigorous research design.

4. Measurement of the effect of public diplomacy

If defining the function and effect evaluation criteria of public diplomacy is to define 'what to measure', then we need also to know what methods are needed to measure the effect of public diplomacy, that is, 'the measuring tools', and how to measure the effect of public diplomacy through these methods, that is, 'how to measure'. There

are two main empirical methods of measuring the effect of public diplomacy: one is the sampling survey method, which is aimed at the general public, namely, the public opinion poll; the other is the unstructured interview with a small group of specific people. The non-structured interview, also known as the non-standardized interview, is either a semi-controlled or uncontrolled interview, which can be divided into four types: intensive interview, in-depth interview, objective statement, and symposium [25].

The public opinion poll method and the interview method are two common widely used empirical methods in modern social science research on which there have been many methodological works with regard to their design procedure and implementation steps in the general sense, but which are not discussed in this chapter. The author's specific concern is: when using these two methods to measure the effect of public diplomacy, which problems need to be resolved to ensure the accuracy of the measured results? In this regard, there are at least three aspects worth discussing.

First, who should be chosen for the investigation? Whether a public opinion poll or an interview, the first question involves the selection of respondents. The author's opinion is: pinpoint the direct audience of public diplomacy and extract from this group (as far as possible) the respondents through which to measure its effect. This is because the fundamental purpose of our survey is to see whether or not the people of the target country have changed their attitude towards a certain aspect of the implementing country due to a specific public diplomacy project on the part of the implementing country, rather than a general change in attitude.

Imagine country A conducting public diplomacy through the medium of international students there from country B. After a period of time, we want to know whether or not country A's public diplomacy activity has been effective, so we conduct questionnaires or interviews with workers in country B. In this case, even if the survey results show that workers in country B have never heard of such public diplomacy as conducted by country A, we should not consider it to be invalid, because country B's international students in country A may be much more familiar with such public diplomacy. Similarly, even if the survey results show that the attitude of workers in country B towards country A has improved, we should not assume that the public diplomacy aimed at international students from country B has been effective, because it is possible that the attitude of country B's international students in country A has deteriorated.

For example, the aforementioned interview study on the effect of China's public diplomacy on Japan is flawed to some extent as regards its design, as discussed here [23]. The two academics asked seven interviewees: 'What effect, if any, do you think the establishment of Confucius Institutes in Japan has had on China's reputation?" Obviously, the best and most convincing way of finding out whether or not establishing a Confucius institute in Japan will improve China's reputation is to ask Japanese students who are studying or who have studied at Confucius institutes in Japan. However, the article clearly identified the seven respondents, none of whom were or had been students at a Confucius institute in Japan. Claiming that China's public diplomacy efforts to promote Confucius institutes in Japan are ineffective, therefore, even though all respondents in the group said that they had not noticed or were only slightly aware of the existence of Confucius institutes, is both futile and unconvincing.

Second, which of the two methods of polling and interviewing should be chosen? As regards public opinion polling, it has the advantage of rapidly affording an understanding of the views of respondents on certain issues and timely reflecting changes in public opinion. At the same time, survey results can infer the general situation as a whole, so achieving high representativeness. The advantage of

the non-structured interview lies in its great flexibility, which gives full play to the enthusiasm of both interviewers and interviewees. The two sides can have in-depth, extensive conversations and discussions on relevant issues, events, and phenomena, from history to current events, from causes to effects, from motivations to behaviours, and from individuals to others and major social environments on given topics, so obtaining rich data that is not forthcoming from structured interviews and opinion polls.

In view of the characteristics and advantages of the two methods, whether to choose one or both of them for a specific study should be based on the research question and the desired final results of empirical measurement. If researchers want only to know which public diplomacy activities, or specific aspects of an activity, have had a positive effect and which have not, then polling is the preferred method. If researchers want to know the reasons for the effectiveness or ineffectiveness of a public diplomacy activity, or the actual psychological reaction of the activity target, they should consider the interview method. And if you want to understand both, it is best to combine the two methods.

Third, with regard to the interpretation and evaluation of the data, we must focus on the crucial matter of the potential impact of interference variables.

One potential dispute is that of whether measuring the effect of something requires excluding the effect of the interfering variable. Those who are extremely optimistic or who place great expectations on the functioning of public diplomacy may put forward the extreme view that public diplomacy must produce the desired change in the attitudes of the people of the target country despite the presence of other disturbing variables, such as those mentioned above, in order for us to consider it effective. Is that a reasonable view? Let us imagine another scenario: how do we determine whether or not the cooling function of an air conditioner is effective? One view is that assessing the cooling effect of air conditioning requires excluding all other factors that affect the temperature. According to this view, it is only when the doors and windows are closed, there is no direct sunlight or heat source in the room, all other possible variables remain unchanged and the indoor temperature drops a certain value (for example, 3°C) after the air conditioner has been on for a certain period of time (such as 10 min) that we can consider this air conditioning refrigeration as 'effective'.

Another view is that assessing the cooling effect of an air conditioner does not require controlling for the effects of other interfering variables. According to this view, whether or not the doors and windows are closed, there is direct sunlight or a heat source in the room, or there are other potential interference variables, and no matter how long the air conditioning has been on, the indoor temperature must drop 3°C before we can consider the air conditioning refrigeration as 'effective'.

Obviously, in real life even the pickiest consumer buying an air conditioner would not make such high demands of the manufacturer as listed in the second view above with regard to its refrigeration effect. That being the case, there is no reason to expect public diplomacy to be effective in the presence of interfering variables. In other words, it makes sense to say that a country's public diplomacy towards a country is effective (or ineffective) only when the influence of other interfering variables is excluded. For example, we try to measure the effect of public diplomacy through public opinion poll data, which may be influenced by factors other than public diplomacy. Therefore, the interpretation and evaluation of these data must take into account the potential influence of interference variables.

When analysing the trend of the effect of public diplomacy over a period of time, the inflection point of poll data is often an important empirical basis for scholars to analyse any change in its effect. At the same time, however, it is at the inflection point that interference variables are most likely to exist. Therefore, when

analysing the inflection point, we should not judge whether a country's public diplomacy becomes effective or ineffective based solely on the data trend ensuing from it. Instead, we should focus on whether are not there are other interference factors at or before the inflection point that may affect the poll data.

5. Conclusion

Compared with the traditional inter-governmental diplomacy, the subjects and objects of public diplomacy are more extensive, the specific diplomatic forms more diverse, and the implementation period of some forms of public diplomacy is longer. These are the characteristics of public diplomacy that determine our need to strengthen the evaluation of its implementation effect in the process of carrying it out, thus to timely adjust the direction and implementation of public diplomacy strategies, reduce resource waste, and improve diplomatic efficiency. Effective evaluation of the effect of public diplomacy requires a determination of the evaluation criteria. The most common practice today is to associate the effects of public diplomacy with soft power, whereby the evaluation of a country's public diplomacy is based on whether a country's soft power towards other countries has improved. This chapter challenges that view and holds that the basic function of public diplomacy is to transform the assets of a country into soft power resources that attract the target country, rather than turning soft power resources into soft power, as mentioned by Joseph Nye. In other words, the success of a public diplomacy effort is judged by whether or not it improves or enhances the public of the target country's evaluation of the implementing country.

When evaluating the effectiveness of a country's public diplomacy, we should also avoid making excessive demands of it. For instance, public diplomacy is probably of little use in the 'high politics' of territorial security. Even in fields where public diplomacy can play a role, the power competition between countries, differences in political systems, quality of political relations, and other factors will lower the target country's evaluation of the implementing country. In carrying out empirical research, we should carefully control for these interfering variables and avoid miscalculating the actual effect of public diplomacy. Therefore, researchers should focus on improving their research design in order to make empirical evaluation results more reliable. Rigorous empirical research is the most powerful guarantee of consistent pinpointing and rectifying of problems arising in public diplomacy practice.

Author details

Cao Wei
Department of International Politics, University of International Relations, Beijing, China

*Address all correspondence to: cwangel@163.com

IntechOpen

References

[1] d' Hooghe I. China's Public Diplomacy. Leiden: Brill; 2014. pp. 18-19. DOI: 10.1163/9789004283954_003

[2] Melissen J. The new public diplomacy. In: Melissen J, editor. The New Public Diplomacy: Soft Power in International Politics. New York: Palgrave Macmillan; 2005. pp. 3-27. DOI: 10.1057/9780230554931_1

[3] Hocking B. Rethinking the 'new' public diplomacy. In: Melissen J, editor. The New Public Diplomacy: Soft Power in International Politics. New York: Palgrave Macmillan; 2005. pp. 28-43. DOI: 10.1057/9780230554931_2

[4] Snow N. Rethinking public diplomacy. In: Snow N, Taylor PM, editors. Routledge Handbook of Public Diplomacy. New York: Routledge; 2008. pp. 3-11. DOI: 10.4324/9780203891520

[5] Seib P, editor. Toward a New Public Diplomacy: Redirecting US Foreign Policy. New York: Palgrave Macmillan; 2009. DOI: 10.1057/9780230100855

[6] Kravec NG. Should public diplomacy be privatized? In: Rugh WA, editor. The Practice of Public Diplomacy: Confronting Challenges Abroad. New York: Palgrave Macmillan; 2011. pp. 209-226. DOI: 10.1057/9780230118652_13

[7] Pamment J. New Public Diplomacy in the 21st Century: A Comparative Study of Policy and Practice. New York: Routledge; 2012. DOI: 10.4324/9780203096734

[8] Nye JS Jr. Soft power. Foreign Policy. 1990;**80**:153-171. DOI: 10.2307/1148580

[9] Nye JS Jr. Soft Power: The Means to Success in World Politics. New York: Public Affairs; 2004. DOI: 10.2307/20033985

[10] Nye JS Jr. Think again: Soft power. Foreign Policy[Internet]. 2006. Available from: http://www.foreignpolicy.com/articles/2006/02/22/think_again_soft_power [Accessed: 12 January 2020]

[11] Nye JS Jr. Public diplomacy and soft power. The Annals of the American Academy of Political and Social Science. 2008;**616**:94-109. DOI: 10.1177/0002716207311699

[12] Nye JS Jr. The Future of Power. New York: Public Affairs; 2011

[13] Finlay CJ, Xin X. Public diplomacy games: A comparative study of American and Japanese response to the interplay of nationalism, ideology and Chinese soft power strategies around the 2008 Beijing Olympics. Sport in Society. 2010;**13**(5):876-900. DOI: 10.1080/17430431003651115

[14] Jhee B-k. Measuring soft power in East Asia: An overview of soft power in East Asia on affective and normative dimensions. In: Lee SJ, Melissen J, editors. Public Diplomacy and Soft Power in East Asia. New York: Palgrave Macmillan; 2011. pp. 51-64. DOI: 10.1057/9780230118447_4

[15] d' Hooghe I. The limits of China's soft power in Europe: Beijing's public diplomacy puzzle. In: Lee SJ, Melissen J, editors. Public Diplomacy and Soft Power in East Asia. New York: Palgrave Macmillan; 2011. pp. 163-190. DOI: 10.1057/9780230118447_9

[16] Rawnsley G. Approaches to soft power and public diplomacy in China and Taiwan. The Journal of International Communication. 2012;**18**(2):121-135. DOI: 10.1080/13216597.2012.695744

[17] Hall I, Smith F. The struggle for soft power in Asia: Public diplomacy and regional competition. Asian

Security. 2013;**9**(1):1-18. DOI:
10.1080/14799855.2013.760926

[18] Baldwin D. Power and
international relations. In: Carlsnaes W,
Risse T, Simmons B, editors. Handbook
of International Relations. London:
Sage Publications; 2002. p. 178. DOI:
10.4135/9781848608290.n9

[19] Dahl RA. The concept of power.
Behavioral Science. 1957;**2**(3):202-203.
DOI: 10.1002/bs.3830020303

[20] Fearon JD. Domestic political
audiences and the escalation
of international disputes. The
American Political Science
Review. 1994;**88**(3):577-592. DOI:
10.2307/2944796

[21] de Mesquita BB, Siverson RM. War
and the survival of political leaders:
A comparative study of regime
types and political accountability.
The American Political Science
Review. 1995;**89**(4):841-855. DOI:
10.2307/2082512

[22] Baum MA. Going private: Public
opinion, presidential rhetoric, and the
domestic politics of audience costs in
U.S. foreign policy crises. The Journal of
Conflict Resolution. 2004;**48**(5):603-
631. DOI: 10.1177/0022002704267764

[23] Dinnie K, Lio A. Enhancing China's
image in Japan: Developing the nation
brand through public diplomacy.
Placing Branding and Public Diplomacy.
2010;**6**(3):203. DOI: 10.1057/pb.2010.20

[24] Wei C. The efficiency of China's
public diplomacy. Chinese Journal of
International Politics. 2016;**9**(4):
399-434. DOI: 10.1093/cjip/pow012

[25] Fang Y, editor. Course in Social
Research Methods. Beijing: Peking
University Press; 1997. pp. 268-294

Chapter 19

China's Use of Public Diplomacy in the United States: From World War II to the Twenty-First Century

Sally Burt

Abstract

This chapter examines China's use of public diplomacy in World War II. By sending personal representatives to the United States to lobby the American public on China's behalf, Chiang Kai-shek was able to negotiate favorable public opinion in the United States that influenced US policy makers. There were direct attempts to influence the outcome of the 1944 presidential election. Diplomatic moves were made to influence the candidate the Chinese saw as most likely to win that election and support given toward his victory. We can compare this to the influencing of elections in the United States by foreign powers in 2016 and the use of modern public diplomacy. Through this exploration, this chapter will show that the conduct of public diplomacy to influence a foreign state is neither a new phenomenon nor is it an inherent problem. The way states manage their broader diplomatic relations to protect their own national interest is the key.

Keywords: China, United States, foreign interference, elections, diplomacy

1. Introduction

Public diplomacy is a concept that has come into sharp focus in academic debate. Recent events, such as the interference in the 2016 US election have drawn attention to the use of public diplomacy to influence the outcomes of the democratic process. The notion that a foreign power can infiltrate social media and internet-based communications in order to impose its own agenda on another population rightly causes concern. This occurrence highlights the ease with which governments can interact with the public of a foreign country in the cyber age. It is this concept, a government conducting diplomacy with a foreign public, rather than through the more traditional government to government channels, that has drawn the attention of scholars. Understanding public diplomacy and the ways in which governments can persuade other states to support their interests through gaining favorable public opinion will provide great insights into the functioning of modern diplomacy. One needs to be aware, however, that the concept of public diplomacy, while relatively new in the academic nomenclature is neither a new activity and nor is it born out of the cyber age. Long before the internet, states were interacting with foreign societies through channels with the public and trying to persuade them to support policies that worked in their favor.

China is one of the commonly studied states in the public diplomacy literature. With China's rise in recent decades and its move back into the global community, it has become the focus of scholarly attention on many fronts. In an attempt

to understand the rise of China and how it is being achieved, the use of public diplomacy by the Chinese government comes under scrutiny. This is due in part to the development of Joseph Nye's theory of soft power and his work in relation to Sino-US power relations in the hard and soft power realms. China is indeed an interesting case to study in these areas. It is important, though, for that modern use of public diplomacy to be put into a broader and more historical context in order to really enlighten the debate about modern elements of public diplomacy that are of concern. During World War II, China used very effective public diplomacy to win support from the United States for aid and favorable strategy during the war, but it also led to China's inclusion as one of the few major players in the creation of the post-war international relations infrastructure. In more recent times, China has turned to public diplomacy again as a strategy to gain favorable attitudes towards its foreign policy but with much less effect. Examining the history of China's public diplomacy in the United States sheds light on some of the concerns facing modern iterations of public diplomacy and cyber technology.

This chapter will define public diplomacy and examine how China uses it now. After commenting on its effectiveness in modern times, a reflection will be made on how China has used it in the past and its effectiveness then will be explored. This will provide a structure for the evaluation of modern public diplomacy and what is different as opposed to just appearing so. The history of Chinese public diplomacy in the United States shows that new technologies and methods of engaging with a foreign public are not necessarily making it more effective. States have been using public diplomacy to gain favor for their foreign policy and interests in other countries for a very long time. Foreign interference in elections is also not a new concept and this has been occurring for centuries. Although new technology and the cyber age appear to make these things more effective, it is not necessarily the case. This is not to say that foreign interference should not be a concern and that the lack of transparency and accountability with which it can occur in the cyber age should not be recognized and addressed. The issues around how best to manage the use of these new technologies and the norms that should be established around public diplomacy need to be explored within the proper context of what is occurring in more recent times in relation to public diplomacy. The way states manage their broader diplomatic relations to protect their own national interest is the key. Strategies to ensure their own interests are protected and supported by the political system and the public need to be developed with a clear understanding of what the real issues and challenges are in order that they can be addressed.

2. What is public diplomacy?

Public diplomacy is the use of media and propaganda in order to influence the public in another country to have a favorable attitude towards your state. According to the Chinese Assistant Foreign Minister in 2004, "[t] he basic goal of public diplomacy is to enhance the exchanges and interaction with the public in order to guide and win the understanding and support of the public for foreign policies" [1]. Other scholars have defined it as "an instrument used by states, associations of states, and some sub-state and non-state actors to understand cultures, attitudes, and behavior; build and manage relationships; and influence thoughts and mobilize actions to advance their interests and values" [2]. In an increasingly interdependent global environment, it is crucial that states have widespread support for their foreign policies in order to be seen as legitimate and credible in the international community. Gaining influence among the public of different states is a way of establishing that broad support.

Propaganda is a closely related concept to public diplomacy. Propaganda is the intentional attempt to sway individuals or groups of people into believing a certain perspective or way of thinking about an event or policy. These two concepts are similar, although as diplomacy is only related to foreign affairs, public diplomacy might be conducted with the use of propaganda, however, not all propaganda will have diplomatic relations as a focus. Since World War II, propaganda as a concept has loaded perception behind it. It has adopted the connotations of evil intent, for which it was used during that conflict. Propaganda in itself is not inherently bad, but it is generally thought of as such in common thinking. Ultimately, though, the aim of propaganda and of public diplomacy can be the same. The objective is to gain support from foreign states for one's own foreign policy and respect for its national interests.

Public diplomacy is also connected to the concept of "soft power" that was developed by Joseph Nye in the early 1990s. Nye defined soft power as the ability to gain cooperation from another state in achieving one's desired outcomes. As opposed to using "hard power" of military and economic strength, soft power uses culture, values and shared beliefs and attitudes to persuade, rather than force, another actor in working towards your desired outcomes. The way to do that, according to Nye, is to communicate with other countries and their citizens and engage in cultural exchanges in order to build up the attractiveness of your own values and culture to another society [3]. Or, in other words, conduct public diplomacy. Public diplomacy, then, is a means of creating soft power, while soft power is the actual ability to influence policy.

Public diplomacy as a concept is not new, though the language and nomenclature is relatively so. Although public diplomacy was first being discussed by political scientists at the beginning of the twenty-first century, states have actually been conducting public diplomacy in various forms since the state system and diplomacy was developed. With globalization and the spread of global communication, discourse across state boundaries and between non-state actors, as well as the general public, of different countries became much easier. This phenomenon also facilitated public diplomacy and made communication with the people of a foreign state much easier. Along with Nye's theory on soft power, these interactions created interest in the study of public diplomacy and it became the subject of scholarship in its own right.

There is, however, still much work to be done on the concept of public diplomacy and its related theories. As technology continues to advance and create new opportunities for means of cross-border interaction, public diplomacy progresses with it. Governments are developing strategies around the use of public diplomacy as recognition grows for the need to conduct diplomacy in this way. By examining the use of public diplomacy in certain contexts, and historically, we can gain a better understanding of the concept and its development over time. We can also put the current debate about public diplomacy, and the use of new technologies to "interfere" in foreign powers' politics into a clearer perspective.

In China, public diplomacy is a challenging concept. The nature of its political regime means that it is difficult to grasp the idea of a separate public view from a government view. The idea of trying to persuade the general public of something in order to achieve political ends does not sit well with the Communist authoritarian regime. China, over many decades of Communist rule, has focused on obtaining political and economic power and then expected that that will translate into respect from the international community and other great powers. It is only in recent times, as global networks and media have begun to infiltrate international relations that China has begun to explore and give serious effort and resources to the development

of public diplomacy [1]. The United States controlled the rhetoric around China's rising power in the international community and was able to create doubt about China's peaceful intentions. China was framed as a threat to the Liberal world order that democratic states had worked so hard to establish in the aftermath of the Cold War. Eventually Chinese government officials could see the need to respond to the United States' narrative and to promote its own perspective through public diplomacy in order to be taken seriously on the global stage [4].

For the purposes of this chapter, the term public diplomacy will be used to describe the concept of government's interacting and communicating with a foreign power's citizens in order to influence their attitudes in favor of their interests and policies. Direct public to public diplomacy will not be the focus of the discussion that follows. The means by which communication takes place between the government of one state and the public of another can vary and this chapter will explore the different methods that governments use for this purpose. The motive under study will be the use of a foreign state's public to gain favor for a country's foreign policy and interests. This can be achieved either through political pressure brought about by shifting public opinion or by influencing the political process itself through influencing election outcomes or legislators in order to gain support for a change in policy or legislation.

3. How does China use public diplomacy?

China's recent record of using public diplomacy is scratchy at best. There are some countries that have developed a favorable attitude toward China's influence and welcome the benefits, particularly economic benefits, that China's involvement in their state brings. Latin American, African and some Asian states see China as a positive force in their countries [5]. This is not generally the case in the West. China's interference in local politics and economics is viewed as a challenge to the recognized order and something to be controlled and limited. Chinese military activities and perceived aggression to build its military prowess has been viewed by many Western states as a rising threat, making them wary of embracing Chinese influence. Although ancient China is often viewed by those in the West as being mysterious and virtuous, under the current Communist regime, China is seen as a threat to the dominant Liberal global order.

The Tiennamen Square incident and the global response to it exposed China's lack of understanding about how to work with international media and the international community more broadly, and it also created a focus on China as the next threat to the Liberal world order after Russia's capitulation. In the aftermath of 9/11, when Middle Eastern Islamic Extremists provided a new threat focus, the Chinese government was given an opportunity to shift global thinking about China. Although China's hard power had grown over the last two decades, little had changed in terms of the international perception of China. The expectation had been that increasing a state's hard power would eventually and automatically lead to respect and recognition from the international community. This, however, did not occur. In the early twenty-first century, Wen Jiabao began to see the need for a concerted effort towards establishing Chinese soft power and the need for a focus on public diplomacy in order to achieve this. It was recognized that there was a need to gain support from ordinary people for China's foreign policy in order to establish credibility and legitimacy in the international community more broadly. Branches were created within the Ministry for Foreign Affairs to focus on public and mass diplomacy [6].

A range of activities were undertaken in order to advance China's public diplomacy. One major program has been the establishment of Confucius Institutes in 64 countries around the world. These institutes have the purpose of promoting the study of Chinese language and culture. The Chinese have come to the view that the biggest barrier to friendly perceptions of China relate to the gap between Western and Chinese language and culture. In order to address this, in 2004 the Chinese government established Hanban (the Confucius Institute Headquarters) to found institutes around the globe to teach foreign citizens about Chinese culture, provide classrooms for language training and to encourage cultural exchanges for foreign students [7]. Confucius Institutes are joint ventures between foreign universities and Chinese partner universities. Chinese universities are ultimately controlled by the Chinese department of education and therefore, are influenced by government. Confucius Institutes can, then, be seen as a channel of communication and interaction between the Chinese government and foreign publics.

The extent to which the Chinese government is able to interact with foreign university students has grown as part of a concerted effort to establish opportunities for cultural exchanges. By engaging at this level, the Chinese government is able to counter the narrative established by Western society about China's intentions and the threat it poses to Western values. Instead of allowing the West to monopolize the message in global politics, China is now attempting to influence those engaging in the discourse and to have some control over the narrative [1]. That level of control and influence by the government over what in Western societies would be considered to be best left as independent discourse makes societies like the US nervous and suspicious of these channels of engagement.

China has some issues in using the mass media for creating alternative messaging and interacting with foreign publics. Due to the nature of the use of the media in China, and its authoritarian regime, the Chinese government is not shrewd at handling the international media. There have been efforts to expand the reach of Chinese newspapers and Chinese national television into foreign markets to provide some media reach. The extent of the Chinese diaspora can be seen as a great asset for the Chinese government as it allows a broader network of cultural exchange and provides avenues for spreading Chinese media [4, 5, 8]. Chinese public diplomacy, however, is seen by Western societies as being too top down and driven too closely by the Chinese government. This limits the effectiveness of Chinese public diplomacy, particularly in the age of the internet and the ease with which person to person communication can occur even across borders. People to people communication exposes the extent to which the Chinese government controls the message and it is seen as illegitimate and non-authentic.

Wei [9] has conducted a thorough examination of the effectiveness of Chinese public diplomacy. By establishing the objectives of Chinese public diplomacy and evaluating the level of positive feeling towards China in foreign societies, Wei found that in the short term, Chinese public diplomacy is not very effective. The rise in China's military strength and capability is seen in most Western countries as a threat, and this perception is hard to overcome. Russia was the only state considered in the study that was unconcerned by increasing Chinese military power. Interestingly, Wei's study found that economic factors do not have as significant a positive influence as one might expect. The economic benefits of interactions with China are clearly outweighed by concern about the threat perception. Wei acknowledges that the study explores the short-term effectiveness of Chinese public diplomacy and that the impact of longer-term strategies, such as the investment in Confucius Institutes, will only be able to be measured in a much longer time frame.

4. How has China used public diplomacy in the past?

Although the concept of public diplomacy has been named such only in recent years, it has been an activity of governments for decades and indeed centuries. The rise of democracies has seen public diplomacy become an active tool of states to influence public opinion, which in turn leads government policy, in directions that are favorable to their interests. In wartime this can be a particularly useful tool, as it allows for states to influence the strategy, or policies of other states to assist their own wartime aims. Allies are keen to assist each other and cannot afford to create open disharmony or show disunity to the enemy. During World War II, the United States had many Allies and it was a uniquely complex war being fought on many fronts against a coalition of enemy powers. This meant that compromise and careful strategic planning had to govern every decision about where materiel and supplies were sent and what operations would be fought at what time. Amongst the competition within the Allied camp, China was just one voice and the war being fought on Chinese soil was viewed as a backwater battle that lacked the urgency of the war being fought in Europe. Politicians in the US had to manage the expectations of the different Allies as well as that of the American public in terms of what could be done towards achieving victory.

During World War II, China struggled to assert its place among its great power Allies and to force or shame them into providing China support in resisting Japan. Many in the West, including in the United States, were skeptical of China's proclaimed potential to reach great power status in the post-war world, despite its inclusion as one of the Big Four of the United Nations. In order to sway US public opinion and policy-makers, Chiang Kai-shek sent his Foreign Minister, T.V. Soong, and his wife, Madame Chiang, as personal representatives, to Washington. Stationing these significant figures in the US created political pressure and allowed active public diplomacy. Through their physical presence among the American people and Franklin Roosevelt's advisors, Soong and Madame Chiang along with other Chinese representatives gained a better sense of public sympathies and fostered an understanding of China among ordinary US citizens. They hoped to turn that sympathy, and the popularity of China's cause, into financial and military aid and favorable policy decisions. Other factors, such as Japan's actions and the international situation played a role in the development of the pro-China sentiment, but could not prevent the waning of US support after 1944. Until then, though, the Chinese were quite successful in gaining the sympathy of the US public to back their cause.

After several prominent American officials had visited China between the beginning of 1941 and end of 1942, it had become apparent that Chiang and his close advisors were able to influence those politicians to look favorably on China and its plight. One of the prominent Americans to visit China was Wendell Willkie, who was a Republican politician. In 1940, Willkie had contested the presidential election, opposing Franklin Roosevelt. Although he had been unsuccessful, it was widely believed that he would try again in 1944 [10]. According to the US Ambassador in China at the time, Clarence Gauss, the Chinese government was firmly of the opinion that Willkie would win the election in 1944 and would be the US leader sitting at the peace talks to bring an end to World War II [11]. That being the case, the Chinese wanted to maximize their influence over him. They certainly gained his favor during his visit, as on his return to the US, during a press conference he stated "...one of the difficulties facing me [in remaining objective] is that one falls so much in love with the Chinese people that it is difficult to form a critical and fact-finding judgement" [12]. If Chiang wanted to increase his influence on US officials, gaining favorable public opinion for China would be an excellent means to achieve this.

Willkie's comment suggested that contact between the Chinese people and Americans could be used to sway them. Although American officials were coming to China and being influenced through that contact, bringing the Chinese people to America might also be an effective means to expand the reach. Generalissimo Chiang and Chinese officials were convinced that being present with the President and his closest advisors was the best way to gain persuasive power over US foreign policy decisions [13, 14]. China began a campaign of influence and engagement with the US public that today would be termed public diplomacy. Officials saw the potential of interacting with the American public directly in order to win favor for its policies and for greater aid and war supplies. The aim was to use the pressure of public opinion to persuade US officials to support China more openly. To do this Chiang decided to send several of his key officials and prominent figures to the United States. He even found an excuse to send his wife, who had a reputation for her beauty and ability to be persuasive and had already successfully won over several US officials using her wiles.

Madame Chiang Kai-shek, who held no responsible position in the government other than being the Generalissimo's wife, toured the United States from February until April 1943. She worked both in public and behind the scenes. As the President's personal guest, she stayed at the Roosevelt family estate in Hyde Park, and then in the White House. Her public engagements included addressing each house of Congress, making a speech at Madison Square Garden before a boxing match, and finished with a night of pageantry and speaking at the Hollywood Bowl in Los Angeles [15]. As Chiang Kai-shek remained in China to oversee the war effort and command his troops, Madame Chiang was given access to platforms to address the American people that protocol would not have allowed if he had come to the US with her [16]. Both Chiang Kai-shek and FDR were fond of personalized diplomacy and sidestepping formal diplomatic channels. They believed that more could be achieved with a private conversation than by using the usual diplomatic formalities [17]. Madame Chiang promoted China's interests through educating the American public about the similarities between the two peoples and by exposing them to herself as the embodiment of modern China. She spoke about democracy, Christianity, justice and cultural plurality, and the plight of China in fighting Japanese oppression, themes that were designed to show that China was not as different or as backward as their long-held stereotypes made out. Madame Chiang was educated in the United States and spoke fluent English. She was the personification of Sino-US relations. From the early days of the war with Japan, Madame Chiang had been writing in the American press and media about China and its causes. Her trip to the US was the opportunity for those familiar with her work to see her in the flesh [16].

The aim of her trip to the United States was to promote China's interest and encourage public support for US policies that aided those interests. Madame Chiang and other Chinese officials were convinced of the importance of having influential people in Washington, D.C. They felt that being present with the American people was the best way to gain persuasive power over US foreign policy decisions [13]. Her time in the US was a success in terms of achieving those aims. She had enthusiastic support and encouragement for her mission from some prominent Congressmen who even tried to lobby the President and others on her behalf. Despite this, or perhaps because of it, Lauchlin Currie, one of President Roosevelt's advisors, wrote to John Carter Vincent, the key State Department Officer in charge of relations with China, that officials in the capital were "a bit peeved about her speaking tour" and were sick of hearing the same thing every time she spoke [18]. He noted in March 1943 that "[s]ome people here [in Washington] are still pretty sentimental about China and do a lot of worrying as to whether or not 'the Chinese' will be displeased

at this or that" [18]. Madame Chiang's presence in Washington gave her access to the President and to see firsthand the impact of public opinion on his decision-making. This allowed her to find ways to secure promises from him [19]. These promises were often broken later but at significant points they convinced the Chinese that they had American favor. Her presence also added weight to the President's statements about China made during her time in the US, particularly when those comments were made at a joint press conference [20].

Madame Chiang was the first woman and first Chinese national to address the Joint Houses of Congress, which she did on 18 February, 1943. She opened her speech by saying that "[i]n speaking to Congress I am literally speaking to the American people" [21]. Madame Chiang focused on the discussion of the plight of the Chinese people in fighting the Japanese. American public opinion, government policy and military staff had all begun to adhere to the "Hitler First" policy that put the war in the Pacific in second place to the defeat of the Germans in Europe. Madame's aim was to shift Congress's thinking towards giving greater and more urgent support to the Chinese. She espoused the shared values of the people of China and the United States and through retelling stories of her own connections to the US was able to demonstrate the bond between the two countries. Beyond persuading Congress about the need to give greater assistance to China, she also built greater cultural understanding and warm feeling towards the Chinese people.

By addressing Congress directly, she was able to shame them into action on repealing the Chinese Exclusion Act. The exclusion laws had been passed in 1882 and they prevented Chinese immigration to the US for all but the most elite Chinese citizens. The laws had originally been a response to the fear of the Chinese "invasion" of California in the 1880s. Public opinion at that time had been very anti-Chinese. People saw workers from China as stealing their jobs, undermining their claims for work rights and lowering their wages. As the labor movement gained in sophistication they lobbied Congress to restrict the influx of cheap foreign labor [22]. Repeal had been discussed for years but there were always reasons to delay action. Madame Chiang's visit, however, made further delay impossible. Her performance while presenting her speech to Congress, which moved US representatives and drew long standing ovations and also received a great deal of positive press, was irresistible. She made it near impossible for Congress to deny the pleadings of a state that was an ally and shared so much in common with the US. These moves also led to more favorable public opinion towards supporting China with materiel and supplies as well as strategy. There was pressure on Congress from the American public to do more for China despite what the war strategists and military officials might have thought was in the best interests of the United States and the Allied cause more generally.

Madame's visit was not welcomed by all. Her level of access and influence (or interference) troubled some in Roosevelt's administration, and very likely the President himself was annoyed with her insistence, at a time when the conduct of the war was more and more in the hands of the bureaucracy and shaped by international factors. Chinese public diplomacy during the war was not necessarily resulting in policy outcomes that were in the US's interest. The level of influence that the Chinese were able to gain from interacting and speaking to the American public directly was very effective in many ways. Madame Chiang was a particularly effective public diplomat. She was charming, graceful and elegant. She was also clever and cunning and knew how to manipulate her audience.

There was also evidence that Madame Chiang tried to interfere with the 1944 US presidential election. Republican Wendell Willkie had run against Franklin Roosevelt in the 1940 presidential election and lost. In late 1942, he embarked on a world tour that included a trip to China. During his time in China, Willkie came

to know and love the Chinese people through Chiang and his government officials. Chiang Kai-shek and Madame Chiang were taken with Willkie and believed he was sympathetic to China's plight. Willkie was full of promises of support for Chiang and his regime, particularly in their demand for more munitions and troops [11]. Chiang's eagerness to befriend Willkie was a result of the fact that he believed Willkie would run for president again in 1944 and win. When it became obvious that the Chiang's charms had worked on him and the extent of his willingness to promote China's cause in the United States became apparent, more active steps were taken to assist Willkie's cause.

According to one newspaper and magazine publisher and media owner, Madame Chiang had made it clear to him that she wanted to support Wendell Willkie to win the 1944 election and that she would spend whatever it took to make that happen. Gardner Cowles reported in his memoirs that he had had a private dinner with Madame Chiang where the conversation had taken place [23]. The US Ambassador to China, Clarence Gauss, reported that the Chiang's were confident it would be Willkie sitting at the post-war peace table and that this would very much serve China's interests [11]. At official functions in China, Chinese delegates referred to Mr. Willkie as the next President of the United States and even introduced him as such [24]. It was clear there was deep support for Wendell Willkie and his election campaign and beyond what would be expected in the established norms of diplomatic practice.

Madame Chiang was not the only representative Chiang sent to the US. Chiang had appointed her brother, T.V. Soong, as a special representative to Washington in mid-1940. After Pearl Harbor, he was appointed Chinese Foreign Minister. Chiang had earlier appointed the respected liberal scholar Hu Shi as Ambassador to Washington but his role was to conduct official government to government relations. Madame Chiang and T.V. Soong were clearly sent with a different role in mind. They were to speak to the American people and to engage them in the story and plight of China. Winning the sympathy of the public through a concerted public diplomacy campaign was seen as the most effective way to serve China's interests.

T.V. remained in Washington to manage this public diplomacy campaign. He soon became friendly with FDR's closest advisors and Washington insiders, including prominent Americans who formed what later became known as the China Lobby. Being in the US also gave Soong direct access to the American public and he made speeches drawing attention to China's plight. On October 10, 1942, the anniversary of Sun Yat-sen's Republican Revolution, Soong told an audience at Carnegie Hall in New York City that China was fighting the way George Washington fought during the American revolution, that China was struggling for its democratic freedom and that it was determined to contribute to the post-war world order as a champion of justice and freedom. He argued that China should, therefore, sit on an executive council of the United Nations Organization as an equal with the US and other Allies [25]. He also wrote articles for various newspapers and journals with similar themes and advocating policies that were sympathetic to China (see, for example, [26]). As with Madame Chiang's visit, the level of access Soong had to public audiences and to key government officials, and the President himself was only possible because of his presence in the United States and this was clearly the aim of his being there.

Public opinion polls showed dedicated support for the Chinese (or at least the Chinese in China, not for Chinese-Americans or for Chinese immigration). In June 1942 only 9% of respondents to a poll conducted by the Bureau of Intelligence believed that China was doing the least of the Allies to win the war, while 11% believed that the US was doing the least. The same poll found that Americans believed that China was the least likely of the Allies to make a separate peace, even less likely than Britain [27]. The Chinese representatives in the US

presented the core message that China had been valiantly struggling in a horrific war against the Japanese and had done so single-handedly for many years before the Allies had entered the conflict. Another key message was that the Chinese were like Americans and they could work together. Evidence of the success of this message can be found in responses to the question "will our Allies cooperate with us after the war?" asked in May 1942. Eighty-three percent of respondents believed that China was the most likely to cooperate [28]. In September 1943 the US Ambassador to China, Clarence Gauss, who was himself skeptical of the Nationalist government, recognized that Chinese "propaganda" in the United States had influenced many Americans to see nothing wrong with China or the Chinese war effort. The public held the US government and misguided policy responsible for anything that went wrong with the war in Asia [29].

By late 1944 there was less optimism about China's future and its relationship with the US in the post-war world. Officials, the press and the military concluded that political problems in China would complicate the post-war relationship. Japan's massive Ichigo offensive in Eastern China combined with the resignation of the US Ambassador in China and the recall, at Chiang Kai-shek's insistence, of the US General commanding Chinese forces, exposed China's weaknesses. Those short-comings had been hidden by the propaganda and concerted lobbying of Chinese officials that portrayed China as a strong nation of democratic, hardworking and peace-loving people.

Between 1941 and 1944 Chiang Kai-shek's personal and official representatives in the United States influenced policy-makers and the American public and used public diplomacy (without it being named as such) to shift US foreign policy towards the assistance of China's interests. The political pressure generated by the lobbying of US officials and the American public by Chinese representatives in the US influenced policy-makers and the public. Their physical presence in the United States gave these Chinese officials frequent and wide-spread access to both of these key groups. Chiang's tactic of sending both his wife and brother-in-law to the US did influence some US policy in the short-term. Chiang's personal position and that of his regime was reinforced for the duration of the war. Although longer term these outcomes may have not lasted, China's use of public diplomacy during World War II was very effective.

5. What is different about modern public diplomacy?

In modern times public diplomacy can be conducted in a much more discreet and far less transparent way. Using the internet to shape public opinion and even influence elections allows foreign powers to engage in diplomacy directly with the people of another country without the knowledge of or by making the government aware of their efforts. The question, though, should be does this make it any more effective? Transparency would create reassurance, but it would not necessarily prevent the efforts of foreign powers to influence the citizens of another country. Surely it is the intent of the behavior that is of greater concern than the means used to influence others.

Jan Melissen in the *Oxford Handbook of Modern Diplomacy* argues that engaging with foreign publics has become a more necessary condition to conducting successful diplomacy. Public diplomacy is merging with traditional diplomacy to create a "new public diplomacy" [30]. This thinking may be driven more of a transformation of forms of public diplomacy and the new appearance of it than the reality of any seismic shift in diplomatic practice. Madame Chiang in the 1940s was very much aware of the need to address the American people directly and use them as

a channel to shift their government's thinking. Even before the internet and mass cross border communications, the need to gain public favor was recognized and important resources allocated to achieving that end. The Chinese sent several key representatives to the United States for visits and to reside for the duration of the war. They found ways to interact with the American public directly and to use US public opinion to sway Congress and the administration into supporting policies that aided China's cause.

China's more recent efforts at public diplomacy have been less effective than these earlier activities. There is merit, then, in exploring what it is that makes China's public diplomacy less effective. The study conducted by Cao Wei, then, is worthy of investigation. In a study exploring Chinese public diplomacy in six countries, including Russia, Japan, France, Germany, the UK and US, Wei found that very little positive impact on favorable public sentiment toward China. In fact, the growth of Chinese military power caused concern in all of these societies, except Russia, that outweighed any efforts at public diplomacy in these states. Even friendly economic relations did little to assist foreign publics in their receptiveness to Chinese diplomatic charm. Wei found three possible reasons for this. Firstly, there is a bias against China that comes from the difference between the political system and culture of China and Western countries. Secondly, China's military power is a disadvantage. Few countries are happy about increasing military power of another, apart from very close allies. Third, China's proficiency at conducting public diplomacy is inadequate [9]. Wei is not alone in this conclusion (though perhaps in the specificity of the reasons why). Other scholars agree with the conclusion that China's public diplomacy is largely ineffective and that much work needs to be done in terms of both the messaging of that diplomacy and the activities used to spread that message for it to sway Western societies in favor of China's policies (see, for example, [5, 8]).

If China is using modern methods of public diplomacy and yet being no more effective in their influence, then it is not these modern methods that should be a major focus of concern. The intent, effectiveness and receptibility of the message should be a greater concern. China's public diplomacy during World War II was very effective in achieving the aims of Chiang Kai-shek's regime. Admittedly, China was operating under an ostensibly democratic regime. The extent to which China under Chiang was more democratic than the current regime is the subject of a longstanding academic debate that cannot be espoused in detail here. Certainly, though, Chiang and his officials were skilled at presenting the message that his government and the Chinese people were totally committed to democracy, freedom and equality and so shared those values with the people of the United States. Ultimately it was this message, and not so much the methods used to convey them, that allowed Chinese public diplomacy in the 1940s more effective.

Moving beyond influencing public opinion, and even governments, to direct interference in an election can be seen as a breach of diplomatic good faith. Defining the boundaries of legitimate public diplomacy that involves trying to influence policies and people and interference in the outcome of an election poses a challenge to the development of international norms for diplomacy. It is related to the advancement in technology and the rise in new areas of diplomacy, such as cyber diplomacy. As the internet becomes the newest realm of global commons, the international community needs to think more deeply about how to establish norms and regulate behavior to match the capabilities that cyber technologies allow.

Public diplomacy and the norms of international relations suggest that it is improper for one state to sew discord and disharmony in another. The internet and the ability to easily "break into" public discourse in another country have led to increasing concerns in recent times about the ability for a foreign power to do just that. Not only are the methods available to do this seen as making it easier, but it

is also possible to do it without detection. The anonymity the internet has allowed for the source of news stories and communication with a foreign public means that there is a lack of accountability for the messages within that communication. Russia's interference in the 2016 US presidential election has sparked a debate about what should be tolerated as rights to privacy and free speech on the internet and the need to intervene to secure the rights of the state. While most media have rules and restrictions on its ownership, use, and funding, the internet has so far escaped thorough regulation. This is now being reviewed.

There is evidence that the Russians used paid advertisements, clearly targeting specific groups and electorates using metadata gathered from Facebook and other internet social media. Russian sources also created "fake news" and planted stories on the internet that were not true in order to sway voters against voting for Hillary Clinton. The Democratic National Campaign was also hacked into and sensitive information about their campaign strategy and the candidate was accessed. As Baines and Jones point out in their article about the subject, influencing foreign elections is not a new phenomenon, but this was an extraordinary level of interference. The methods used to influence the election also constituted an attempt to undermine democracy altogether rather than just trying to sway the outcome [31]. This intent does pose a threat to society and could qualify as an act of espionage or worse.

It is not just the interference in elections that poses a threat to modern democracies. The ability to sway the legislative branch can have a greater impact on the policies of a country. As laws are made by legislators that are influenced by a broad set of interests, if foreign states are able to add their interests into the mix then favorable policies will follow. There has long been a struggle between Congress and the presidency over who has control for foreign policy [32]. In order to offset some of the advantages that the presidency has with its use of the State Department, Congressmen often visit foreign states or make themselves available for foreign officials to gather information about foreign affairs. This method of gathering information, however, is problematic in that it opens the door for misinformation or propaganda that does not necessarily serve US interests [33]. This well describes the events detailed above in Sino-US relations during World War II, but it also continues to be a vulnerability of the US political system. It is not, however, a new problem arising from the newly formulated concept of public diplomacy or new public diplomacy. If anything, this is an issue that has existed since the founding fathers established the United States.

The use of the internet and digital means to reach a population has increased the potential "threat" of foreign interference but foreign interference of and in itself, like the term propaganda, is not a negative concept. It is the perspective taken about the intent of the interference and the objectives of foreign countries in using their influence that should be the focus of concern. The methods used to conduct public diplomacy have less impact on the effectiveness of influence over a foreign public than the message being sent. The best protection for a state against negative influences that can impinge on its interests is to ensure robust principles and systems exist within its society. An informed and questioning public, an open and transparent media and elected officials who measure the performance of their duties on how well they serve the public interest are all much more important than preventing foreign access to the internet and social media.

6. Conclusion

This chapter has examined the use of public diplomacy by China across different time periods of history. This examination reveals that public diplomacy, despite

being the focus of recent study by a range of scholars, has been a long-practiced activity of states in order to influence other states towards policies and attitudes that are favorable to their interests and aims of foreign policy. In World War II, China very effectively used methods of engagement with the people of the United States, such as personal addresses to audiences, newspaper and magazine articles and public appearances. China was able to gain the sympathy of the American people for its war aims and convinced them of the need for greater support from the US government. Some Chinese officials were even involved in trying to influence the outcome of the 1944 US elections so that a president more sympathetic to China's plight would be sitting at the peace table at the end of the war. Exploring these events and the means the Chinese used to work towards their objectives sheds light on more recent studies of these topics.

The digital revolution has created an environment where political messages can more easily cross state boundaries and there is greater opportunity for government officials to interact with foreign publics directly. The cyber world, more importantly, provides anonymous access. There is a lack of transparency and accountability in the use of social media and internet news sites to connect with people in a different state. That lack of transparency is a cause for concern. It is the specter of a foreign authoritarian regime being able to undermine the legitimate government in democratic states that keeps government officials awake at night. There is a clear need to work towards greater accountability in the cyber world and to develop regulation and norms around cyber diplomacy. This is a task that is urgent and necessary. Creating a strong and robust regime for the digital world and cyber diplomacy will not, however, create a "safe" political environment free of foreign interference. Not that all foreign interference is inherently negative. The motives and intent behind the interference is the key to its virtue. The best defense against dangerous foreign interference that is targeted to break down democratic principles is to strengthen the democratic model that is in place.

A well informed, educated public that has access to good information, questions what they read and are told, scrutinizes decisions and arguments and has access to a free and open media is a good start towards protecting democratic values and regimes. China's more recent public diplomacy lacks the effectiveness of its earlier efforts. In World War II, China could claim its support and championing of American values of freedom, equality and democracy. That is no longer true and the American public can determine for itself the values of the Chinese government. The fear brought about by the rise of China's military power outweighs the messages being sent by Chinese government officials to foreign publics through its diplomacy. There are many other factors at play that determine the effectiveness of China's influence over the American people and those in the West more generally. The means and methods of the conduct of public diplomacy, then, is not the area for greatest concern. Rather any studies of modern public diplomacy should focus on the intent and objectives of a state's public diplomacy and how effective the diplomacy is in achieving those aims. There will always be a line to cross from public diplomacy into espionage and damaging another society with diplomacy that should always be the subject of regulation and frameworks to ensure that line is not crossed. In itself, however, gaining access to the public of a different state and trying to influence it towards supporting one's interests and foreign policy is not something we should work to avoid. We should be careful that the debate about public diplomacy and its utility stays on course for delivering good outcomes for the international community and is not distracted down byways of fear.

Author details

Sally Burt
University of New South Wales, Canberra, Australia

*Address all correspondence to: skburt@outlook.com

IntechOpen

References

[1] Wang YW. Public diplomacy and the rise of Chinese soft power. The Annals of the American Academy of Political and Social Science. 2008;**616**:257-273

[2] Gregory B. American public diplomacy: Enduring characteristics, elusive transformation. The Hague Journal of Diplomacy. 2011;**6**(3/4):353

[3] Nye J Jr. Soft power and American foreign policy. Political Science Quarterly. 2004;**119**(2):255-270

[4] Po-Chi C. Cyber public diplomacy as China's smart power strategy in an information age: Case study of anti-Carre four incident in 2008. International Journal of China Studies. 2012;**3**(2):189-217

[5] Creemers R. Never the Twain shall meet? Rethinking China's public diplomacy policy. Chinese Journal of Communication. 2015;**8**(3):306-322

[6] Kejin Z. The motivation behind China's public diplomacy. The Chinese Journal of International Politics. 2015;**8**(2):167-196

[7] Hanban website. Available from: http://english.hanban.org./ [Accessed: 20 January 2020]

[8] D'Hooghe I. How to Understand Public Diplomacy: An Analytical Framework in China's Public Diplomacy. Boston: Brill Nijhoff; 2015. pp. 16-46

[9] Wei C. The efficiency of China's public diplomacy. The Chinese Journal of International Politics. 2016;**9**(4):399-434

[10] Barnes J. Willkie. New York: Simon and Schuster; 1952. p. 295

[11] Enclosure to a memorandum to the President from Cordell Hull on Gauss's report on Willkie's visit to China,

October 8, 1942. Presidential Safe Files, Box 173, Folder. Willkie W; October 1942-1944. p. 3

[12] Enclosure number 4 of a memorandum to the President from Cordell Hull, December 2, 1942. Presidential Safe Files: Subject Files, Box 173, Folder. Willkie W.; October 1942-1944. p. 3

[13] Chiang K-S, Mme. Cable to Lauchlin Currie from National Military Council. October 12, 1942. Currie Papers. Box 1 Folder: Correspondence (Codename SEGAC); 1942

[14] Mme Chiang K-S. Letter to Lauchlin Currie from Madame Chiang. Currie Papers. Box 1 Folder. 29 November 1941

[15] Pakula H. The Last Empress: Madame Chiang Kai-shek and the Birth of Modern China. New York: Simon and Schuster; 2009

[16] Leong K. The China Mystique. Berkeley: University of California Press; 2005. p. 134

[17] Burt SK. The Ambassador, the General, and the President: FDR's mismanagement of interdepartmental relations in wartime China. Journal of American-East Asian Relations. 2012;**19**(3-4):288-310

[18] Vincent JC. Letter to John Carter Vincent from Lauchlin Currie. Currie Papers. Box 1 Folder. Correspondence. 29 March 1943

[19] Chargé in China (Atcheson) to the Secretary of State, Chungking, July 17, 1943. In: US Department of State, Foreign Relations of the United States: Diplomatic Papers 1943 China. Washington, DC: United States Government Printing Office; 1957. pp. 429-433

[20] The Acting Secretary of State to the Chairman of the Munitions Assignment Board, (Hopkins), Washington, D.C., March 2, 1943. In: US Department of State, Foreign Relations of the United States: Diplomatic Papers 1943 China. Washington, DC: United States Government Printing Office; 1957. p. 660

[21] Soong M-L. Address to the House of Representatives and to the Senate. Congressional Record. 1943;**89**(1):1080-1081

[22] Lee E. At America's Gates: Chinese Immigration in the Exclusion Era 1882-1943. Chapel Hill: The University of North Carolina Press; 2003. pp. 23-30

[23] Cowles G. Mike Looks Back: The Memoirs of Gardner Cowles. New York: Gardner Cowles; 1985. p. 90

[24] A letter to Lauchlin Currie, Chungking. Lauchlin Currie Papers. Box 1, Folder: Correspondence: Davies, John Paton. Hoover Institution. 6 October 1942

[25] A copy of the speech was sent to Harry Hopkins by Paul Hoffman, Chairman of the United China Relief organisation in a letter dated November 9, 1942. Harry Hopkins Papers. Box 331, Folder: Book 7 Chinese Affairs; 1941-1942

[26] TV Soong Papers. Box 35, Folders 9-11—Speeches and Writings, Hoover Institution on War, Revolution and Peace, Stanford University, California

[27] The results of a June 10, 1942 poll conducted by the Office of Facts and Figures in the Bureau of Intelligence (under the Department of Justice) are contained in a letter to Harry Hopkins from Oscar Cox. Harry Hopkins Papers. Box 137, Folder: Cox, Oscar; June 15, 1942

[28] The results of a May 1942 poll conducted by the Office of Facts and Figures in the Bureau of Intelligence (under the Department of Justice) are contained in a letter to Harry Hopkins from Oscar Cox. Harry Hopkins Papers. Box 137, Folder: Cox, Oscar; 15 June 1942

[29] Letter to Stanley Hornbeck from Ambassador Clarence Gauss. Stanley Hornbeck Papers. Box 175, Folder: Gauss, Clarence; September 4, 1943

[30] Melissen J. Public diplomacy. In: Cooper AF, Heine J, Thakur R, editors. The Oxford Handbook of Modern Diplomacy. Oxford: Oxford University Press; 2013

[31] Baines P, Jones N. Influence and interference in foreign elections. The RUSI Journal. 2018;**163**(1):12-19

[32] Crabb C, Holt P. Invitation to Struggle: Congress, the President and Foreign Policy. Washington, DC: CQ Press; 1984

[33] Tromblay D. Congress and counterintelligence: Legislative vulnerability to foreign influence. International Journal of Intelligence and Counterintelligence. 2018;**31**(3):433-450

Edited by Daniela Turcanu-Carutiu

This book presents research efforts in the field of heritage. According to the principle "Open Minds-Open Science", the approach of the researchers helps us to define, establish and affirm heritage in the cultural, social and political dimension of today's world based on what we have achieved and be specific to the realities of the 21st century. Cultural heritage is made up of many big and small things. It is preserved through books, artifacts, objects, images, photographs, art and oral tradition. Sometimes we can touch and see what a culture is, other times it is intangible. From this point of view, this book, Heritage, is transdisciplinary, and contains the most diverse topics related to culture, art, nature, science, diplomacy and cultural policy.