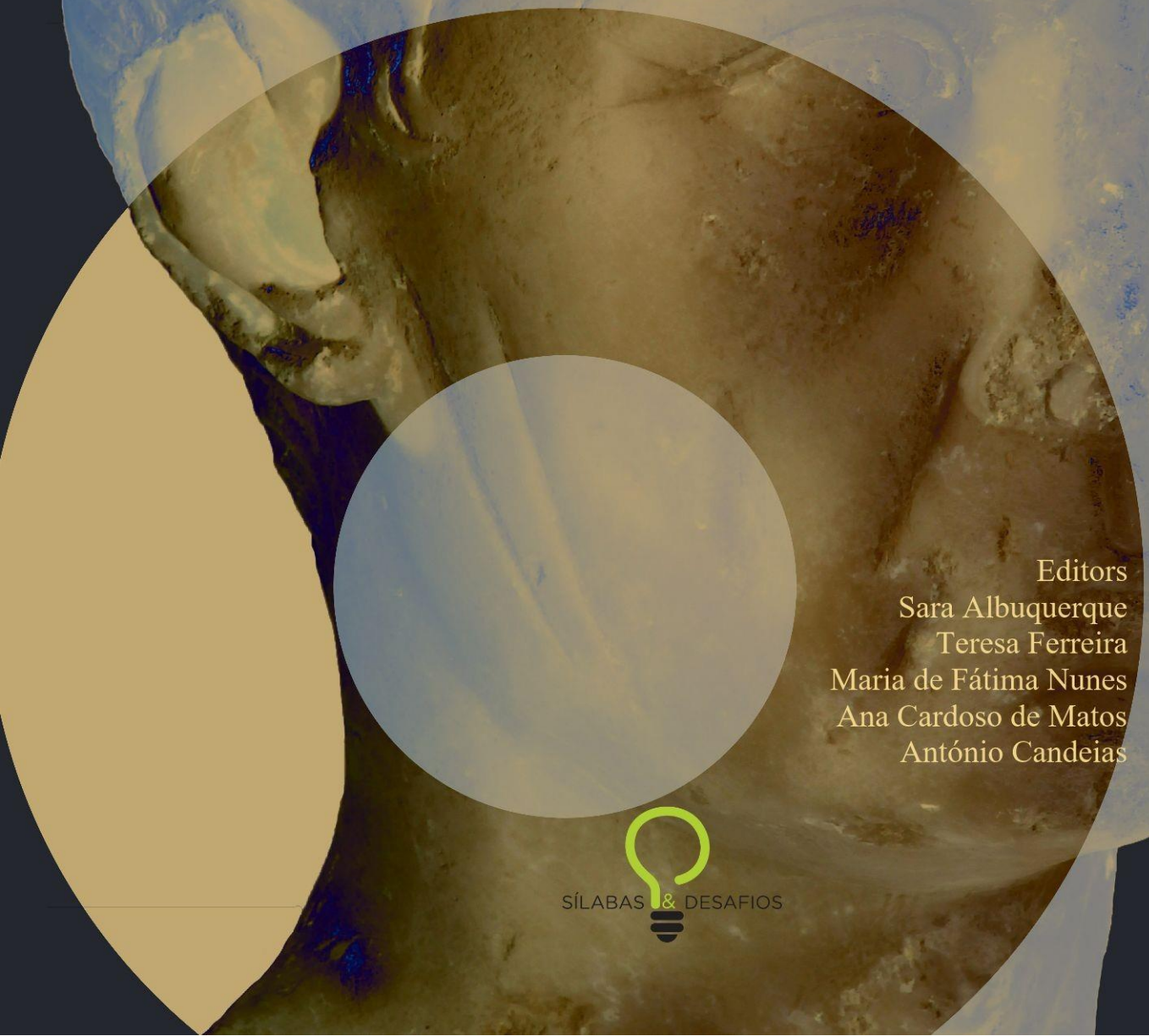
WEB OF KNOWLEDGE

A LOOK INTO THE PAST, EMBRACING THE FUTURE



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Preface

The International Multidisciplinary Congress - *Web of Knowledge: A look into the Past, embracing the Future* was held by IHC-CEHFCi, HERCULES Laboratory and CIDEHUS, University of Évora and took place in Évora, Portugal, from 17 to 19 May 2018.[1]

The Congress brought together researchers and scientists from different backgrounds intersecting the Exact Sciences with the Social Sciences revealing the visible and invisible networks. By fostering the exchange of knowledge and experiences in the study of the past, the Congress laid the framework for the present day science on which to map the future *Web of Knowledge*.

A high-quality scientific programme was prepared, joining together experts from different fields covering a wide range of topics from Social Sciences, Arts and Humanities to Science and Technology. As a result of the quality of the panels and debates, the Organizing Committee decided to publish a digital and open access volume with blind peer-reviewed papers. This volume publishes a total of thirty-five contributions which reflect the innovative and multidisciplinary research occurring at the moment in different fields of knowledge, promoting visibility and networks of knowledge.

Sara Albuquerque, Teresa Ferreira, Maria de Fátima Nunes, Ana Cardoso de Matos & António Candeias (eds.). 2019

[1] http://www.wok.uevora.pt/

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Fields of Rome. Lusitania, the Mediterranean connectivity, the Roman Empire and the loss of knowledge.

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ABSTRACT: Complex societies can fade away, bringing to oblivion much of the knowledge produced. Starting from a case study - the diachronical process identified in the ongoing archaeological excavations in the Roman villa *in Horta da Torre (Fronteira municipality, Alentejo, Portugal), and the research project developed since 2012, we try to identify some of the patterns happened in the past. Also, we can perceive how complex and stratified was the Roman rural landscape, as so fragile and unstable were the settlements that followed.*

1. FIELDS OF LUSITANIA: THE ROMAN LANDSCAPE

1.1 The Roman villa in Horta da Torre (Fronteira): a space for convivium in Lusitania

Somewhere in the middle of the 5th Century A.D., a grand aulic room in the extreme East of a significant residential complex was utterly abandoned. The place underwent a peaceful and systematised process: no evidence of destruction or violence was found during the archaeological excavations ongoing since 2012.

The room has a little more than 90m^2, with a unique planimetry, carefully designed and decorated. It has a robust double apse, perfectly aligned with the main entrance; this strong structure inside was utterly void, with a gateway allowing the entry of water, to be contained inside the structure. From there, the water flowed into the interior of the main room thanks to another gateway, but also in small cascades through the existence of small holes in the wall. All these solutions were carefully planned, creating a complex and sophisticated scenario. Nothing new in the Roman horizon: in the literary sources, as the *villa Leontina* portraited by Sidonius Apollinaris (*Carm.* XXII 206-210) shows, we can see parallels in the 5th century Gaul.

The room had a *stibadium*, furniture where the guests sat during the banquets offered by the *dominus* (the owner of the *villa*). Watching the water flows, he could talk with his *socci*, the allies with whom negotiations could be arranged, as part of the Mediterranean *convivium*, because banquets took part of this ceremonial (Dunbabin, 2010). Diners sat in front of the whole room, carefully decorated with marble slabs around the wall's footers, and mosaic panels decorated with colourful *tesselae* that filled the upper area of the walls. Slowly covering the entire floor, the water created a vibrant brightness's that undoubtedly generated a multi-sensorial experience (Fig. 1).

Figure 1. Virtual 3D model from the *stibadium* room in Horta da Torre by A. Carneiro, C. Carpetudo & G. Lopes.

The coherence of the decorative programme, where symbols related to water filled the different elements, indeed reinforced the role of the *dominus* as a refined and cosmopolitan citizen, because the decorative plan formed part of the cultural *oikouméné* of the classical background.

The *villa* in Horta da Torre is a *unicum*, having close parallels in other provinces (El Ruedo, Cordoba), and also in other territories in the Western Roman Empire (Faragola, Ascoli). However, the entire surrounding region in nowadays Alto Alentejo is filled with several of these monumental units that managed the territory and centralised the economic exploitation of the countryside. Each has a unique architectural plan, with different decorative programmes, but all had the same role, managing the economic exploitation in the territory and creating

synergies with the local population. In the Fronteira municipality, six of these *villae* are known in only 150km^2, sharing the landscape and gathering the daily life and activity of the local populations.

We also have to consider that the tissue of rural settlement implied several other units. This territory has almost 50 sites of smaller dimensions, spotted in the archaeological field surveys (Carneiro, 2004; see also 2014, vol. II), with some more added in recent fieldwork.

In January 2018, a collaboration between the University of Évora and Leiden University, with funding provided by the *Prins Bernhard Cultuurfonds*, allowed new insight into this territory. An intensive field survey was made in selected zones, namely some around Horta da Torre, in its immediate *fundus* (Fig. 2).

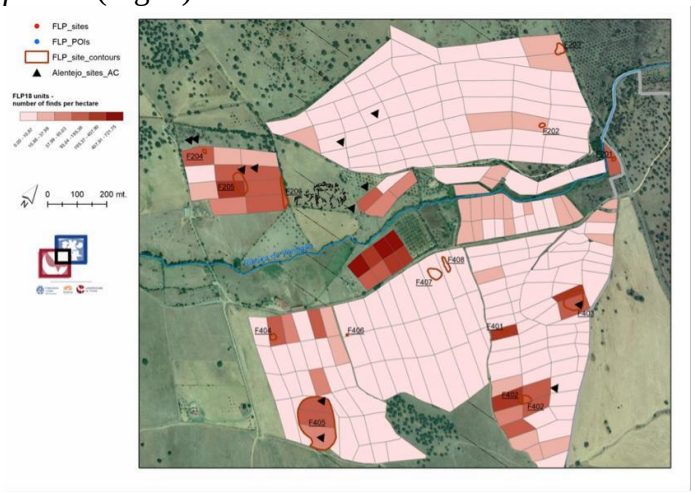

Figure 2. Survey results around the villa of Horta da Torre: Fronteira Landscape Project, T. D. Stek, J. García Sanchez, A. Carneiro & R. Kalkers.

The methodology was exhaustive: coverage within 50mx50m units, all of each with detailed geo-reference, with surveyors distanced within 10m each. Every archaeological item was collected, bagged, tagged with metadata indications (day, time, team, surveyor, type of sampling procedure) and processed in the laboratory so that we can have exact references of each element collected (García Sánchez, Stek, Carneiro, Kalkers, *in press*).

As for the results of only one month of intensive fieldwork were very intricate and multivariate, it is not the aim of this paper to present and debate them, but we could spot intense rhythms of change, from a Roman Republican landscape dominated by extensive fortified sites to an open-based network of sites dedicated to farming activities.

However, and especially concerning the core of this paper, a complex system of small, medium and huge-sized sites, that filled the landscape with a critical density of populated settlements was spotted in the field survey. Of course, we do not have a detailed chronology because the timetable is very open – we are dealing with the *Roman landscape*, which is the result of surface findings, and we do not have stratigraphies, so the result is a composite image – but it is evident that this is an intensively occupied landscape. Around Horta da Torre two more small sites have been identified, adding to more others and the burial space previously known, possibly satellites of the vast Roman *villa*, all of which depended from the vicinity of the Roman road connecting the capital of the imperial province of *Lusitania – Augusta Emerita* – to the Atlantic harbour, *Olisipo* (nowadays Merida and Lisbon, respectively).

This was a dense and specialised landscape, with productive sites surrounding a monumental and refined *villa*, benefiting from the economic surplus provided by the farming exploitation of the territory, and with the connectivity brought by the Roman road, linking the two main cities of the province. No wonder that these banquets had oysters served in delicate ceramic and glassware, as other aulic Roman *villae* in this territory (namely Torre de Palma, near 10km from Horta da Torre, in nowadays Monforte municipality). Luxury and refinement brought by the Mediterranean connectivity in nowadays Alto Alentejo, more than 100kms from the seaside.

However, in the gap of one generation, things would change radically.

1.2 The post-roman presence in Horta da Torre (Fronteira): a space for plundering

At the end of the 5th century (or in the first years of the following), nearly 30/50 years of the end of the last banquet, the Roman *villa* of Horta da Torre was going to be reoccupied. In the main room, the walls are still perfectly standing, with all the decorative program still preserved: marble slabs, the mosaics decorating the walls, and possibly the roof, which covered all the space.

We cannot entirely understand all the processes that happened in the site, but a carefully made excavation of the occupation levels above the pavements could spot some evidence.

A group of people occupied the room, and the pavement of *opus signinum*, a Roman mortar that has the capability of being waterproof (so resisting to the water that entered the room in the moment of the banquets), was perforated to place wooden posts to build a *longhouse*, a precarious shelter (Fig. 3). In this room, men and animals would be placed together: in the excavations of the ground level above the pavement, horse bones were found, not linkable with the Roman moment of occupation, but with this post-Imperial sequence.

These men plundered carefully and systematically all the compartments. For instance, excavating all levels in the stratigraphic sequence above pavements, we barely found a single coin; the scarce findings are spotted in revolved soils, due to modern agriculture.

Almost all the Roman pottery was cleaned, also the most relevant ceramics and artefacts. The marble slabs that covered the wall footers were spoiled, sometimes with violence, leaving some broken pieces as testimony. In the adjacent compartment, the small *perystilium* next to the double room, thrash was dumped: a darkish soil, filled with jawbones and truncated bones, filled the area, leaving a dark colour in the pavements, so intense that does not enable us to see the coloured frescoes in the walls. The most impressive element comes from the ceramics: the oven technology was so poor that the fragments dissolved in the water, with such rude clays that remind the local pre-Roman technology of the Iron Age. In 30/50 years, the technology has retrogressed almost one millennium.

Figure 3. 3D model of the cenatio of Horta da Torre, with postholes from the squatters' longhouse: Fronteira Landscape Project, T. D. Stek, J. García Sanchez, A. Carneiro & R. Kalkers; figure by A. Jansen & A. Carneiro).

We do not know the identity of these people. We cannot call them *barbarians* in the traditional way, because not a single exogenous element was found among the evidence of their poor material culture. We do not know if they were pagans or Christians; again, not an only clue about their faith or beliefs was found. Probably, they were a part of the pre-existent population, the peasantry that became unemployed with the crisis of the Roman global economic system (see Wickham, 2005, for an overview). What we can perceive is that, in no more than 50 years, the perception of the space and the forms of the human presence in this site radically changed. From a sophisticated and refined presence, where the *voluptas* created the *convivium*, we rapidly jump to a mere subsistence level, plundering all the materials that can be used or recycled.

What happened in Horta da Torre is not a unique example. With more carefully excavations, parallels in other sites are emerging. This phenomenon is nowadays called *the squatter occupation*. However, this concept has recently been redefined, because it was not a single and particular moment: it happened systematically in a vast majority of the western rural landscape, in a broad diversity of sites and regions (Lewit, 2009).

In the turning of the 5th to the 6th century, living in the rural landscape had changed a lot. And the connections with the Mediterranean are no longer visible. The world became far-reaching larger.

2. THE END OF A COMPLEX SOCIETY AND THE LOSS OF KNOWLEDGE

Again we must emphasise that this is not the place to debate such a complicated process like the transition of the Roman Empire to the Early Medieval Age; or to discuss the concept of *Late Antiquity* as it was proposed by Peter Brown and, soon after, Averil Cameron; or to examine the Gibbonian perspective of the *Fall of the Roman Empire*, then smoothed by the *transition* perspective in the historical debate in the end of the past millennium, subsequently criticized and rejected by the radical proposal made by Bryan Ward Perkins.

In this paper, the most relevant element is to perceive *change*. Of course, we can always invoke some examples of continuity, even with comfort and the maintenance of connectivity circuits with the Mediterranean, which were spotted in this region. But, in a general overview, we can perceive that the 5th century and the subsequent periods will mark the end of a complex society, evolving since at least one millennium.

The result would be the process of change, shifting to a completely different society.

The Roman conquest was the end of an enduring process connecting the Southwest of the Iberian Peninsula to the Mediterranean circuits, ongoing since the beginning of the first-millennium b. C. Phoenicians, with their trade, ships and written culture, brought influences that created a mosaic of cultural influences with different impacts in the indigenous communities.

Throughout the Iberian Peninsula, territories react differently, depending on their vicinity to the channels of external influence: along the navigable rivers or in the coast, traders and diplomats brought external influences, causing different *stimuli* locally visible in the archaeological evidence. In some areas, these contacts would lead to the creation of proto-urban settlements, throughout negotiation and trade dynamics, although other extended areas either remained uninvolved or only residually benefited from different and unequal contacts with these external agents.

The Roman conquest will be the next step in the process: for the first time, all the Iberian Peninsula will be under the same political power, but the Roman process would not standardise all the local communities (During, Stek, 2018, for several examples). Nowadays, the concept "*Romanization*" is being

more and more questioned (Scheidel, 2014), seems evident that the Roman power intended more to cooperate with some local elites, leaving large contingents outside of the process –the 'people without history' presently discussed in many post-colonial perspectives (Gardner, 2013).

However, the "*Roman landscape*" formed by the *villae* as the main units will dominate most of the rural landscape, especially growing along the 3rd and 4th centuries, when the climax of the system arises. In this phase we can see the *emulatio* process, with the creation of local copies, trying to graft the symbols of the *oikouméné*, adopting the common values of the classical culture. From the Eastern Mediterranean to the Atlantic façade, we can see the same patterns, sometimes locally mixed with some identity values, creating the "*glocalisation*" process, with hybridisation mixing different paradigms. It is the highlight of the process, with rich mixtures merging in different directions.

As we can see *Lusitania* nowadays, the local elites perceived the opportunities. Integration brought new ventures, and throughout urban and rural landscapes, local elites-built residences that materialise their power and influence, sometimes reaching broader circles. However, as we can also see by the archaeological and epigraphical record, a vast mass of people remains outside, in peripherical circles that maintain their archaic prototypes.

The balance between these elites, searching for these higher paradigms, and the rest of the population would enlarge throughout the Late Roman period, due to the process of land concentration (*latifundia*). New paradigms arrived, as we can see in the Lusita- nian mosaics: *strong men* and new leadership, more authoritarian, would arise, as we perceived the emergence of a more muscular culture.

The end of the process can be seen in places like Horta da Torre. These sophisticated sites, filled with cultural and iconographical references, sometimes imported from the other half of the Mediterranean basin. As the example of the sculptures from the Roman *villa* of Quinta das Longas, in Elvas, made from the nowadays Turkish marble from Aphrodisias. These places, where the local elites received their partners, exhibiting their opulence and culture, were reoccupied, but at this time in an entirely different manner. Among ruins, people searched for the materials of the ancient *otium* culture, or bury their deceased, like in another Roman *villa* in Fronteira, named Monte de São Francisco, where a grave was excavated in 2015, very close to the Roman buildings (Fig. 4).

Again, a hybrid culture is in the creation process, using a common visual culture, because the old symbols are going to be reused. And another step in the process will come (again) from the Eastern Mediterranean basin: the Christian religion will have a moment of coexistence with the pagan iconography, but in the next phase, we can see open conflicts and the suppression of the ancient culture.

Figure 4. Grave in Monte de São Francisco, excavation in 2015 by A. Carneiro.

In this way, a sophisticated universe would change, and people would live among ruins and memories, adapting to *change* and transforming their places with their natural resilience - as they always did. The loss of knowledge happened in the past, bringing radical changes into complex societies, involving the *loss of comfort* that was one of the main characteristics in the Roman Empire. Walls and fences were useless, and authoritarian leaders, with their reaction against the future, were incapable of reacting to change.

The end of the Roman Empire and their archaeological evidence in *Lusitania* shows us how the process of loss of knowledge can appear in moments of crisis, bringing profound and definitive changes into society.

3. BIBLIOGRAPHY

Carneiro, A. 2004. Povoamento romano no actual concelho de Fronteira. Coimbra: Edições Colibri.

2014. *Lugares, Tempos e Pessoas. Povoamento rural romano no Alto Alentejo*. Coimbra: Centro de Estudos Clássicos e Humanísticos da FLUC

Dunbabin, K. M. 2003. *The Roman Banquet. Images of conviviality*, Cambridge: CUP.

During, B, Stek, T. D. (ed.) 2018 *The archaeology of imperial landscapes. A comparative study of empires in the Ancient Near East and Mediterranean world.* Cambridge, CUP.

García Sanchez, J; Stek, T. D.; Carneiro, A.; Kalkers, R. *forthcoming*. Recent research on the Late roman *villae* (Horta da Torre and Monte S. Francisco) and the countryside of North Alentejo.

Gardner, A. 2013. Thinking about Roman Imperialism: postcolonialism, globalisation and Beyond? *Britannia*: 1-25.

Lewit, T. 2009. Pigs, presses and pastoralism: farming in the fifth to sixth centuries AD. *Early Medieval Europe* 17 (1): 77-91.

Scheidel, W. 2014. The Shape of the Roman World: Modelling Imperial Connectivity. *Journal of Roman Archaeology* 27: 7–32.

Wickham, C. 2005. Framing the Early Middle Ages. Europe and the Mediterranean 400-800. Cambridge: CUP.

School objects and their contribution to dance education

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ABSTRACT: This reflection aims to compile the different school objects found during an ongoing research, which purpose is to determine the Escola Superior de Dança path. Preliminary and deductive reflections may arise from this object list and from the experience as a former student and as a current teacher in this institution. Within the scope of dance education and in the higher education context, we believe that the Escola Superior de Dança path may also be determined through the use that teachers and students do of school objects, believing that education improvement is also based on the ability to use and re-use them nowadays.

1. INTRODUCTORY NOTE

This article aims to briefly present and explain some of the school objects found during the research conducted under the research project "The Escola Superior de Dança path, in the Higher Education context, through the mapping of school objects". The selection of these school objects, showed below, tries to be representative of the scientific areas that largely, but not exclusively, compose the 3-Year Undergraduate Degree in Dance of the School of Dance. Whenever possible, even though in an early stage, we will try to draw some inferences about the particular use of each object.

2. BRIEF HISTORY OF ESCOLA SUPERIOR DE DANÇA

However, first it is important to clarify the context of the ongoing research. Thus, this research was conducted in the Escola Superior de Dança of Instituto Politécnico de Lisboa (IPL), hereinafter refereed as ESD. The ESD was established in 1983 when the artistic education was reformed. This is one of two dance schools in Portugal with higher education offer, and the only one in the polytechnic system. Its activities started in the National Conservatory building, together with other artistic schools. In the mid-90's, it moved to Palácio do Marquês, also in Bairro Alto neighbourhood. Nowadays, and most recently, a brand-new building is expected. In the meantime, since March 2018, it is temporarily located in the Campus of Instituto Superior de Engenharia de Lisboa of IPL (Escola Superior de Dança, 2018).

Over its more than three decades of higher education in dance, ESD underwent several reforms of its education offer as a result of its reconfiguration. In the mid-80's, outlined by the Decreto-Lei [*Decreed-Law*] n. 310/03, on 1st July, the Bachelor's Degree in Dance opened with two branches: Education – targeting dance education and teacher education; and Performance – aiming to train interpreters/ ballet dancers and creators (Portaria [*Ordinance*] n. 648/86, on 31st October). Ten years later, in a first stage, the Specialized Studies Higher Course (also named CESE) opened and, later, in 1998, as the result of the publication of the Portaria [*Ordinance*] n. 413-A/98, on 17th July, it was possible to award the 4-Year Undergraduate Degree in Dance, with two branches like the previous Bachelor's Degree. In the mid-2000's, with the adaptation of the studies' plan to the Bologna Treaty, the Degree in Dance (DD) course was restructured and the Interpretation/Creation branch became dominant (Despacho [*Order*] n. 1255/07, on 25th January). From this point forward, several other courses emerged such as the Master's Degree in Methodologies of Dance Education and the Master's Degree in Contemporary Choreographic Creation, which were eventually closed. Only the Master's Degree in Dance Education (MDDE) is currently running. This new conversion of the higher courses establishes a progression between these two degrees and moves towards a more generic initial training and later the specialization.

However, and going back to the scientific areas, it is important to clarify that DD has three great areas,

namely Interpretation/Creation, Analysis and Contexts, and Project. If, on the one hand, the Interpretation/Creation and Project areas focus on practical Curricular Units (such as Dance Techniques, Repertory Studies or Composition, among others), on the other hand, Analysis and Contexts assemble the theoretical and theoretical-practical domains (such as History of Dance, Anthropology of Dance, Anatomophysiology, Kinesiology, etc.). It is in this subdivision that some researched school objects will be presented. These objects aim to improve the teaching-learning process, creating other links of identification, perception, reflexion, autonomy, creativity capable of stimulate new ways of thinking and acting on behalf of the technical and artistic development of the students (Mogarro, 2012/2013).

3. RELATIONSHIP OF THE SCHOOL OBJECTS

3.1. In the scope of the theoretical and theoretical-practical curricular units

To explain the trajectory of the ESD it is necessary to analyse the school objects in "action"; in this way, when "they are in the context of their use that make the teachers and the students, they become powerful instruments to illuminate the pedagogical practices, in the classroom and daily routines" (Mogarro, 2012/2013, p. 88).

In the scope of the theoretical curricular units, the human skeleton prototype (Figure 1.), used in the Anatomophysiology and Kinesiology classes, stands out. Due to its fragile characteristics, this object has been replaced over the years. However, it is the same archetype used since the beginning of ESD. Therefore, and although the research results are still unknown, we believe that this object is still used today due to the fact that the curricular units are still taught by the same teacher and that the object clearly illustrates the characteristics and the identification of the bone system (in full-scale), which has remained the same in the human body for hundreds of years.

Figure 1. The human skeleton prototype

Other of the objects used, in a Production module of the Project curricular unit's, is a model of a theatre stage (Figure 2.). Like the skeleton, in this case in a smaller scale, it shows the basic structure of a theatre stage with removable parts (for example, drapery, scenery, lighting sticks). Although the morphology of the theatres has been readjusted over the years, particularly at the end of the 20th and 21st centuries, a traditional organisation still exists, which broadens the options chosen by choreographers, directors, among others. Thus, this is an object, which has been used for over a decade.

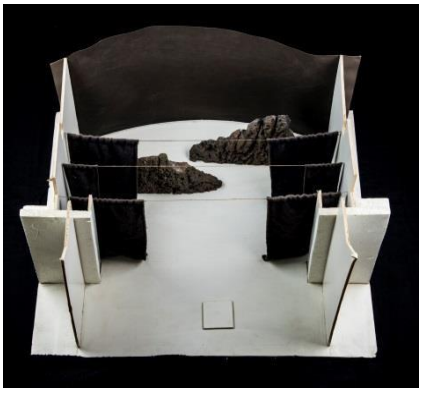

Figure 2. Model of a theatre stage

3.2. In the scope of the practical curricular units

Targeting the practical classes and particularly the ones, which are the basis of the ballet dancer or interpreter training, the barre is used in the classic dance technique classes. The barre can be made of wood or metal and is usually fixed on a wall of a dance studio, but it can also be portable. Barres are placed a little above the waist and allow students to support themselves when doing isolated exercises working different parts of the body. There is an individual notion of this body core and strength training, which later allows a more conscious core work of the ballet dancer, this is, without the barre support. So, there is a previous work of psychomotor development with barre support that promotes the body development and its actions, later linked to the performance (Kassing & Jay, 2003). Although it has been used for about 400 years, a highly systematized and formalized technique, the barre can also be used in other techniques with this central objective of the individualized work of the body, developing psychomotor skills, fundamental to the performance.

As dance education in contemporaneity is ruled by processes of movement transmission and/or by democratic processes, in which the student has an autonomy guided by a teacher, it is important to talk about the object explored in the class Seminars-Conferences in MDDE and occasionally in other curricular units of DD. This tool, named "Mind and Movement" (Figure 3.), was developed by the English choreographer Wayne Mcgregor. He built a box with a set of cards, which systematized his

methods and processes, creating a guide to convey his work (and legacy), as Almeida (2009) states "(…) to bring to surface nuances of the past that may be forgotten and sometimes are unattainable in other forms of documentation" (p.216). This tool guides the user in using the sensations and the images leading thus to different performative results from the different instructions written in the cards, creating a wide range of actions and ways of operating concerning contemporary interpretation and creation (Leach & deLahunta, 2015).

Figure 3. Box: "Mind and Movement"

4. CONCLUSIONS

Many other objects were found in this research that can be framed in work categories and student records (Cordova, 2016) and even others that can be found in virtual platforms (Kessel, 2014), namely support textbooks and student registrations in curricular units of Anatomophysiology, Kinesiology, Movement Notation and Analysis, and Dance Pedagogies and Methodologies on which theoretical and theoretical-practical curricular units are based. VHS and DVD videos and, with the development of the new technologies, online videos (for example, youtube and vimeo) are objects of support of the curricular unit Repertory Studies, since they have "become" school objects after they had become a record tool of a dance product or a process. As Máximo-Esteves (2008) referrers "(…) they are the methodological tools that teachers use more often to record observation data" (p.88). In addition, we selected others such as of dance notation scores, a record and "visualization" version used in the pre-technology era, or models of benchmark diagrams of the technique of classic dance. Contrary to the prototype of human skeleton, this downsizes the perspective of a dance studio to a scale where it is possible to have a global view of all directions used in the performative practice and in the subject learning from a particular vocabulary that allows the clearly identification of certain movements (Foster, 2006).

However, all these objects have a vital role, namely supporting the student development, triggering their skills of reflection, analysis, identification, perception, autonomy, creativity for a later transposition to the body according to different performative acts (Kassing & Jay, 2003). As arts education is highly changeable, it is expected that the finding and the approach of the different school objects may also be different over the almost 40 years of dance training in ESD. Many generations of teachers went through ESD; many education perspectives were scientifically improved… But all of them play a role in the history of a national reference institution that can be mapped, as it is the aim of this research. It is true that the working instrument and tool in dance – the body – has remained the same. It is also true that there has been an obvious evolution in dance throughout its history and in its contexts like the ritual dances, contemporary social and theatrical dances. However, one speculates that the teaching approach is different as a result of an inevitable evolution not just in the scientific areas but also in the artistic areas. It is under this light that this research finds its focus, understanding the "how was it?" and "how is it?" through future interviews conducted to teachers and students of different generations. If, on the one hand, "the same reality may be approached in numerous ways" (Godinho, 2007, p.10), on the other hand, what defines the school object is its intentionality (Souza, 2007). But would we all innovate throughout our process as teachers? Would we change our approaches, but keep our objects? Would the change of objects grant a better teaching-learning process? Or would the approach to the same objects reveals an intimate relationship between the past and the present, this is, the contemporaneity set by Agamben (2009)? Surely, teachers use objects in order to solve an identified problem, since "all pedagogical problems are about finding a suitable procedure to guide the students in their training process" (Batalha, 2004, p.123). There are many questions to be answered and that currently hover over this research. Therefore, believing in this contemporaneity, it is important to invoke the anthropologist Vieira (2011) in the education and cultural diversity context stressing that "in the contemporary world the old and the new, the local and the global, the modern and the traditional, the universal and the particular coexist, producing a cultural heterogeneity connected to individuals no longer defined by unified and stable entities, but by opposite and continuously displaced entities" (pp.144-145).

5. REFERENCES

Agamben, G. 2009. O que é contemporâneo?. Chapecó: Editora Argos.

Batalha, A. 2004. Metodologia do Ensino da Dança. Cruz Quebrada: FMH Edições.

Cordova, T. 2016, ‘Redações, cartas e composições livres: O caderno escolar como objeto da cultura material da escola (Lages/SC - 1935)’. In História da Educação, vol. 20, no. 49, pp. 209-226.
Escola Superior de Dança. 2018. Origem. Consultado em março 20, 2017, em https://www.esd.ipl.pt/origem/.
Foster, S. 2006. Dancing Bodies. In Desmond, J., Meaning in Motion – New Cultural Studies of Dance. London: Duke University Press.
Godinho, M. 2007. Controlo Motor e Aprendizagem: Fundamentos e Aplicações. Cruz Quebrada: FMH Edições.
Kassing, G. & Jay, M. 2003. Dance Teaching Methods and Curriculum Design. Champaign: Human Kinetics.
Kessel, Z. 2014. A memória escolar no virtual: Ambientes Virtuais de Aprendizagem (AVA), lugares de registro da memória e da cultura escolar, Tese (Doutoramento em Educação: Currículo), Pontifícia Universidade Católica de São Paulo, São Paulo, Brasil.
Leach, J. & deLahunta, S. 2015. Dance ‘Becoming’ Knowledge. Leonardo, volume In press. DOI: 10.1162/LEON_a_01074
Máximo-Esteves, L. 2008. Visão Panorâmica da Investigação-Acção. Porto: Porto Editora.
Mogarro, M. 2012/2013. Património educativo e modelos de cultura escolar na história da educação em Portugal. In Cuestiones Pedagógicas, no. 22, pp. 67-102.
Souza, R. 2007. ‘História da cultura material escolar: Um balanço inicial’. In M. L. Bencostta (ed), Culturas escolares, saberes e práticas educativas: Itinerários históricos, Cortez, São Paulo, pp.163-189.
Vieira, R. 2011. Educação e Diversidade Cultural – Notas de Antropologia da Educação. Porto: Edições Afrontamento.

Cecchetti Diagram: A new present

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ABSTRACT: This text is the result of our participation in the panel *Show me how it was: Dance practices and memory*, at the International Congress *Web of Knowledge*, organized by the University of Évora. It emerges from the research project entitled "ESDMAP: the path of Higher School of Dance in the context of higher education, through school objects mapping" (developed by HSD for the 2nd edition of the Annual Contest for Investigation Projects, Development, Innovation and Artistic Creation 2017, held by the Polytechnic Institute of Lisbon). Based on a school object used in the daily teaching and learning process – the Cecchetti diagram -, it was possible to identify the context in which it was used, throughout the history of HSD; to relate it with dance practices teaching; to recognize the obtained gains that give a performative dimension and a new present to the 'starting point' object.

1. INTRODUCTION

The background is the development of a research project from Higher School of Dance (HSD) entitled "ESDMAP: the path of Higher School of Dance in the context of higher education, through school objects mapping". This occurred within the scope of the 2nd edition of the Annual Contest for Investigation Projects, Development, Innovation and Artistic Creation 2017, financed by the Polytechnic Institute of Lisbon.

Generically, the project aims to explore the connection between HSD and its historical background and material memory, taking as a reference the school objects that echo that memory.

2. THE OBJECT AND WHY WE CHOSE IT

We selected Enrico Cecchetti's diagram from the digital collection of school objects already mapped. The diagram was reproduced and referred in Barbara Fewster's second-year textbook, in the volume related to *centre work*, on pages 1(ii) and 4.

This object is part of the educational material for Barbara Fewster's methodology (methodological referential adopted by HSD since 1986, for classes related to classical dance technique). The choice for this object is also associated with its importance as an improved instrument for educational practices, such as teaching and learning of 'body positions and directions in space'. This topic is a specific part of classical dance technique teaching and learning, included in Vocabulary Analysis I curricular unit, 1st curricular semester, at the Graduate Degree in Dance.

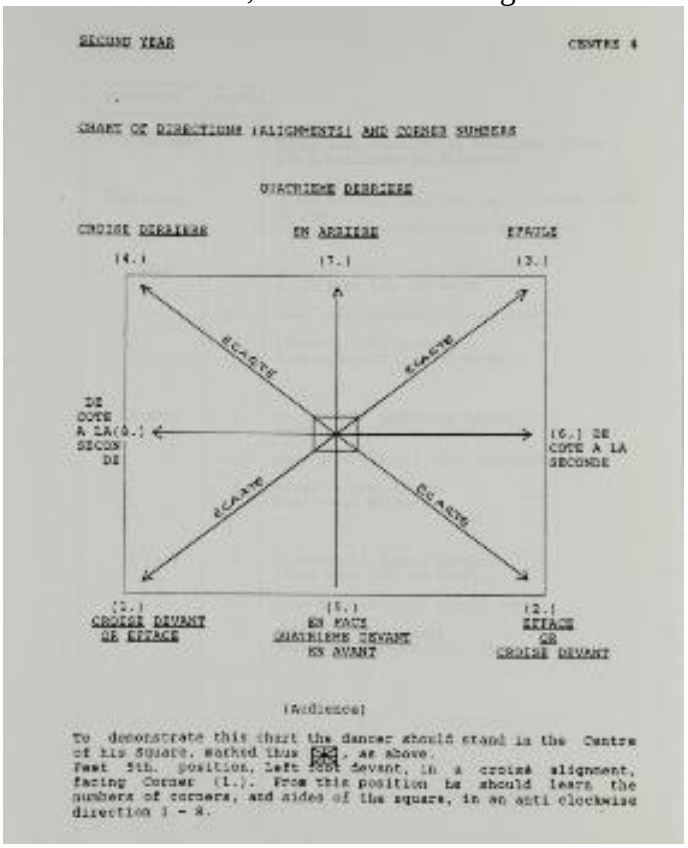

Figure 1. Cecchetti Diagram. From Fewster, B. 1988. *For the study of classical ballet: Fourth year program* (Revised 1994). Lisboa: Escola Superior de Dança, p. 4.

3. HISTORICAL FRAMEWORK AND EDUCATIONAL CONTENTS

This diagram was created in 1922 by the dancer, choreographer and ballet master Enrico Cecchetti (1850-1928). It is a reference for the dancer's spatial positioning, in correspondence with the stipulated numbering of an imaginary square. The dancer is positioned in the centre of this square, and after the internalisation and incorporation moment, it is possible to 'transport' the body to any space, without losing its correct alignment towards the audience, those who are watching and observing.

In fact, the diagram is an imaginary square liable to transfer to the classroom or the stage. This square has dashed lines that unite the corners (diagonals) and each of the side faces (left/right and front/back). In the interception of these lines is the centre, where the dancer is positioned.

Therefore, the identification of the reference points presupposes that the dancer is in the centre of the room, turned to the face assumed as the front (the audience).

The numbering is sequential, counterclockwise, beginning with the 4 square vertices or dance studio corners (1, 2, 3, 4) and the 4 faces (5, 6, 7, 8) respectively, i.e. after the right/front corner (1), left/front corner (2), left/back corner (3) and right/back corner (4), comes the numbering of the faces: front/audience (5), face/left (6), back (7) and face/right (8).

Several authors (Minden 2005, Warren 1989, Kersley & Sinclair 1997) refer to different diagrams adopted by different school around the world.

This codification allows the standardisation of terminology of the various directions adopted by the dancer in space, according to its positioning towards these points (*en face, croisé, eff*accé or *écarté*). The codification links the designation of the alignments with the direction of the movements executed in space (*devant, derrière* or *à la seconde*).

The students and dancers use similar diagrams such as the one we chose, to move consciously and in a universally recognised manner, as happens with the terminology for classical dance technique (*pliés, pirouettes, atittudes, assemblés* or *cabrioles*).

4. GOALS

After defining and justifying this option and by the purposes of the research project 'EDSMAP: the path of Higher School of Dance in the context of higher education, through school objects mapping', it was possible to outline the guidelines for the study of the selected object. We believed it could become an instrument 'to enlighten the pedagogical practices developed within the classroom' (Mogarro 2012/2013, p. 88). Also, it should allow us to 'uncover the less visible aspects of the school's history' (Lawn 2013, p. 224), thus contributing to preserving its memory.

The guidelines for this study agreed with the research project goals:

1. To identify the context in which the artefact was used, within the history of Higher School of Dance
2. To establish its relation with the dance practices teaching
3. To identify the obtained gains, through the students' work
4. To recognise a performative dimension and a new present to the 'starting point' object

5. PRELIMINARY RESULTS

In line with goals 1 and 2 and starting with a school object used in the daily learning and teaching process, it was possible to identify the context in which this artefact was used in the history of Higher School of Dance, between 1986 and 2016. We could establish its relation with dance practices teaching, sorting chronologically the disciplines where it was used.

The relevant changes of the study plans published in legal texts and registered during the period of the investigation were considered a changing point.

At first and in consonance with goal 3, it was also possible to identify and register the transmission of the diagram's content:

a) 'Traditional' expositive transmission of contents and concepts, in the studio, by the teacher ((Fig. 2)
b) Required experimentation of the diverse directions and positions in space, already identified, which leads to the students' corresponding incorporation (Fig. 3).

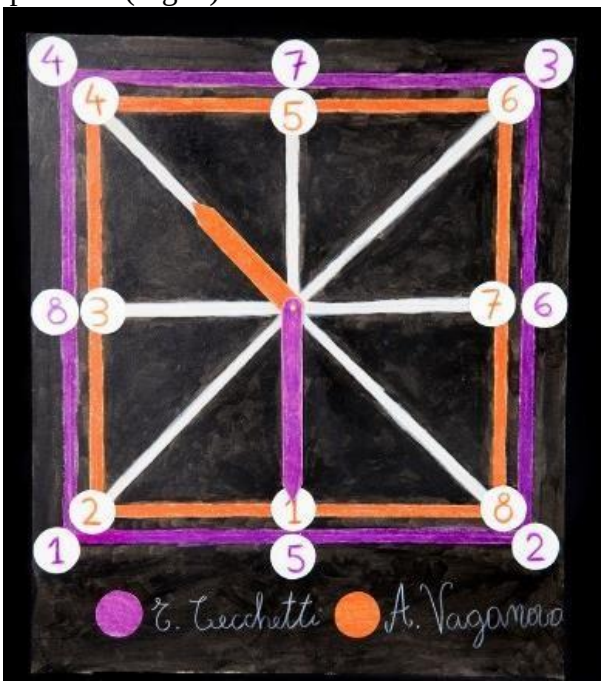

Figure 2. Teacher reproducing the components of Cecchetti diagram

Figure 3. Illustration of directions of the body in space, according to Cecchetti diagram

Our study allowed us to understand that this object was remodelled and reinvented at different moments in time and space. New theoretical and methodological approaches were used within the classroom, such as: reproduction of the diagram on the ground, with suitable shape and size to allow the students the correct positioning and the execution of the stipulated alignment; encouragement of the students' ability and creativity, by building diagrams with different materials and sizes, therefore enhancing the richness and heterogeneity of their basic training.

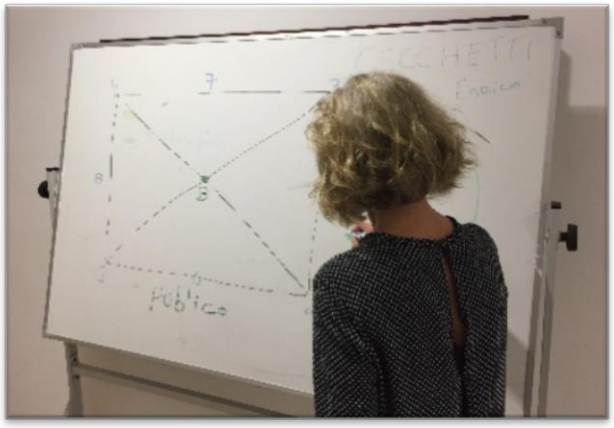

Figure 4. Example of the diagram's reinvention and use

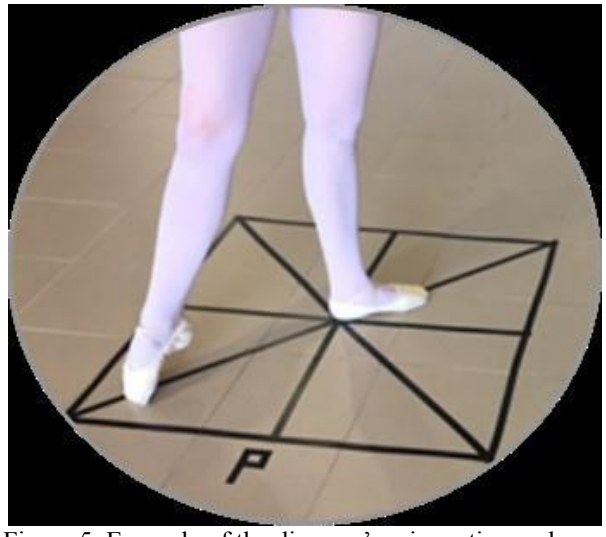

Figure 5. Example of the diagram's reinvention and use

We could verify that the object was not only reproduced in plain, although creative ways, but also in three-dimensional models. These reproduced the lines that intercept the points and recreate the traditional theatre – the space for which this diagram was originally created -, and revealed a concern to give the object a purpose, which was to become a new object for new learning.

Figure 6. Stage model with the reproduction of Cecchetti's and A. Vaganova's diagrams

Regarding goal 4 and taking into consideration what was already mentioned, we could verify that throughout this timeframe, new forms were experimented to transmit, understand and dominate the programme content 'positions and directions in space'.

6. FINAL REMARK

In the end, it was possible to relate our 'starting point' object, the Cecchetti diagram, with a performative dimension and a new present. Several factors contributed to the obtained gains of the learning and teaching process, such as: the identification of new approaches to transmit the content 'positions and directions of the body in space' and strategies to optimize its memorization; the perception of the strategies to preserve the historical memory of the

object; the contribution of new approaches to future activities of the students, helping them to be the creators of new learning and teaching processes.

Through the study of our object, we contributed to explore the relation between Higher School of Dance and its historical background, as well as its material memory. As Rodrigues (2011, p.28) refers, "one of the best ways to preserve the memory is to produce knowledge about it".

7. REFERENCES

Fewster, B. 1988. *For the study of classical ballet: Forth year program* (Revised 1994). Lisboa: Escola Superior de Dança.

Kersley & Sinclair (4th ed.) 1997. *A dictionary of ballet terms*. London: A & C Black.

Lawn, M. 2013. Uma pedagogia para o público: O lugar de objetos, observação, produção mecânica e armários-museus. Linhas, 14(26), 222-243.

Minden, E.G. 2005. *The ballet companion*. New York: Fireside Books.

Mogarro, M. J. 2012/2013. Património educativo e modelos de cultura escolar na história da educação em Portugal. *Cuestiones Pedagógicas* 22, 67-102.

Rodrigues, M. A. 2011. Centro de memória e informação do esporte: Uma política de preservação da memória do esporte mineiro. *Cadernos de História*, 12(16): 25-37.

Understanding a nation's culture through the magazine *A Construcção Moderna*

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ABSTRACT: The study of the most relevant periodic magazines of the 20th century is a significant project carried out by the project RIC - Revistas de Ideias e Cultura (Magazines of Ideas and Culture), with the challenging aim of providing access to the entire collections of the most significant Portuguese dedicated publications. Acknowledged by the editorial board as an important source of ideas and culture, the architecture team is dedicated to exploring concepts, understand modern perceptions and expressions of the art of designing and building, and identify technical developments in the construction of our architectural legacy. The first Portuguese magazine dedicated to architecture, A Construcção Moderna, is the starting project, at a work in progress stage, this paper addresses the project, the magazine significance and the research methodology design.

1. THE RIC PROJECT

The project *RIC - Revistas de Ideias e Cultura* – (Magazines of Ideas and Culture) aims to provide access to complete collections of periodic publications of the 20th century that discussed ideas and cultural issues. To achieve this aim, a judicious selection of the most relevant has been conducted. The online database, with easy access to search complete collections through specific indexes (http://www.ric.slhi.pt/) has been considered of great value to research. In addition, the *Magasin* offers further relevant documents related to each one of the magazines. The open access to the most relevant Portuguese cultural and architectural movements' magazines from the 20th century offers the possibility to study them, which may induce new research interests.

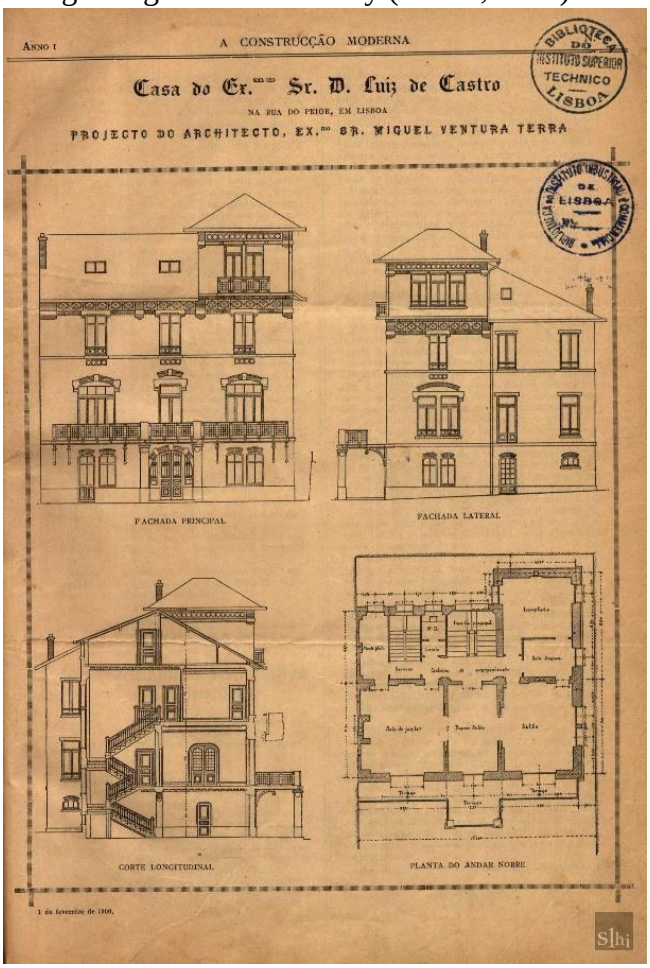
A Construcção Moderna (Fig. 1), the first architecture magazine selected by the *RIC*, is the first publication dedicated to architecture in Portugal, printed between 1900 and 1919. Providing opinion articles on issues such as architecture, construction, arts, history, materials, engineering and cultural events, the study of these contents can shed some light on the modern ideas that shaped the socio-cultural atmosphere of an era (Mesquita, 2011). Other historically important magazines were published in the first half of the 20th century, such as: *A Architectura Portugueza* (1908-1929); *Arquitectura* (1927-1936); *Arquitectura Portuguesa, cerâmica e edificação – Reunidas* (1936-1951); and *Revista Oficial do Sindicato Nacional dos Arquitectos* (1936-1942).

Figure 1. Front page. In A Construcção Moderna, Year 1, 1900.

The team aims to display the architectural research potential of the developed tool, which may support new research questions and contribute to developing further knowledge on culture and architecture in Portugal, in the 20th century.

2. A *CONSTRUCÇÃO MODERNA*

The magazine *A Construcção Moderna* was issued between February 1st, 1900 (Fig. 2) and July 25th, 1919, and published every two weeks in a total of 542 issues. The magazine's editorial board was composed by: the typographer Nuno Colares (1850-1928), the engineer José Maria Mello de Mattos (1856-1915) and the architect Rosendo Garcia de Araújo Carvalheira (1864-1919), which reveals an understanding of the link between technical and artistic knowledge in construction in the 1900's (Mesquita, 2011). *A Construcção Moderna* has been acknowledged as a pioneer experience and a significant contribution to the architectural culture at the beginning of the modernity (Nunes, 2011).


ANNO I — A CONSTRUCÇÃO MODERNA

Casa do Ex.mo Sr. D. Luiz de Castro

NA RUA DO PRIOR, EM LISBOA

PROJECTO DO ARCHITECTO, EX.mo SR. MIGUEL VENTURA TERRA

FACHADA PRINCIPAL

FACHADA LATERAL

CORTE LONGITUDINAL

PLANTA DO ANDAR NOBRE

1 de fevereiro de 1900.

Figure 2. The first architecture project to be published. In *A Construcção Moderna*, February 1900, n.º1, p. 1.

In its first issue the editorial team clearly stated their aims: to fill a gap in the dissemination of art and techniques in the construction field, opened to international events by addressing aesthetic, technical and scientific knowledge; by disseminating works of art; by promoting the multidisciplinary debates in times of transformation imposed by industrial civilization; by contributing to the definition of competences and attributions of the various professional groups linked to construction; and finally by considering decorative arts relevant to modern times.

A Construcção Moderna addressed multidisciplinary discussions regarding not just construction and decorative arts (Fig. 3), but also a wide range of themes, from fine arts and architecture history, sanitary and hygienic needs, and technical developments, from transportation to electrical novelties. This brought to the interested professionals a range of new materials and construction systems that were being developed in Portugal and abroad. Finally, it informed the readers about conferences and exhibitions related to modern construction. These are the reasons why Nunes (2011) has considered that the magazine *A Construcção Moderna* introduced in Portugal the modern architecture.


36 A CONSTRUCÇÃO MODERNA

que representa o momento maximo resistente de uma viga uniformemente carregada, mostra-se que, não variando as dimensões transversaes da viga, não se altera o seu momento de resistencia $\frac{I}{v}$; mas, ainda que fique constante o peso por metro corrente, se duplicarmos I, o coefficiente de resistencia R é quatro vezes menor.

Por aqui se vê que do bom senso do constructor e das circumstancias especiaes é que depende a fixação da largura dos edificios de que temos tratado até agora apenas na generalidade.

Em artigos subsequentes nos occuparemos pormenorisadamante de alojamentos para cavallos, bois, ovelhas, porcos, aves domesticas e coelhos, embora, por circumstancias que não podemos prever, tenhamos que alterar a ordem que acabamos de indicar.

VIRGULTA.

MOBILIARIO PORTUGUÊS

No seu *Culto da Arte em Portugal*, lembra o sr. Ramalho Ortigão, em mais de uma passagem, a riqueza do mobiliario das antigas casas fidalgas do país e fundadamente allude aquelle illustre escriptor á copia de objectos de arte applicada que possuiamos; pois que cêrca de tres quartas partes do seculo XIX.º foram consagradas á venda e exportação para o estrangeiro de innumeras riquezas accumuladas em annos de conquistas e de viagens e ainda não estamos completamente exaustos de preciosidades artisticas de outras eras.

Demais, a par do que perdulariamente desapparecia para as mãos dos collecionadores estrangeiros, tambem destruiamos não pouco, applicando talha de egrejas na construcção de molduras de espelhos, misulas de sacristia se transformaram em fechos d'arcos de portas de bandeira circular, antigas columnas de altar ornamentam agora angulos de guarda fatos e não poucos livros encadernados em rubras percalinas cheias de doirados resuando modernismo barato por toda a parte, figuram em estantes de austero carvalho enegrecido pelos annos e que talvez outr'ora fosse rotula de côro em convento de freiras, teia de egreja ou ornato de altar.

Assim tivemos, ao acabar do seculo XIX.º esse mobiliario feito de applicações, que tinha como resultado, só com um movel, occupar todo um aposento das nossas acanhadas habitações da actualidade, de maneira que o mobiliario não parecia ser construido para nosso uso, mas que nós outros é que tinhamos nascido para o encargo de admirar bocados de trastes velhos.

Camas havia, que não deixavam logar em redor de ellas para collocar nem sequer uma cadeira e secretarias, de tal feitio monumentaes, que os escriptorios, a que se destinavam não comportavam nem sequer uma estantesinha de livros. De outras vezes, eram os guarda loiças que iam para as salas de visitas, cheios de porcelanas, que estavam ainda a pedir que as deixassem mais algum tempo no forno, para lhes secar melhor a pasta ou na muffla para acabar o vidrado das cores.

A este luxo de ferro velho artista, escapado de feira da ladra, brigando com os nossos habitosa

Figure 3. An article of applied arts. In *A Construcção Moderna*, March 1903, n.º89, p. 36.

3. WORK IN PROGRESS

The main objective of this project is to make publicly available this important part of Portuguese culture by creating an accessible and intuitive way to use a large database, enabling the correlation of information within each magazine and with other subject magazines included in *RIC* project, and already available (such as the magazine *A Águia*, available in http://ric.slhi.pt/A_Aguia/revista).

The aim to provide access to the scanned magazines' pages but also to a search engine online requires an extensive work of reading, identification and contextualization of the themes addressed in the

published articles. The gathered information from each magazine, as part of the database, allows the correlation between each one of the existing indexes. This creates the possibility to create maps of ideas, history and culture of the century in study and particular of the architecture development at the time.

3.1. Methodology

Following the *RIC* guidelines, the qualitative methodology designed for *A Construcção Moderna* (Fig. 4) follows a sequential order: to thoroughly read each issue, identifying the main topics, and the writing of a brief description of the topic(s) presented in each article. The database provides six fields: authors, subjects, concepts, quoted names, quoted works and, finally, geographical locations (Fig. 5). All this information is to be confirmed in the second reading of each article, with special attention given to the subjects and concepts, as they derive from the central theme. The biographical information on the authors is checked in the Dictionary of Portuguese architects written by Pedreirinho (2017). After this identification, the gathered data is inserted in the database fields, in a dedicated record for every single article. Finally, all the information is analysed and reviewed by the architecture team of the *RIC* project.

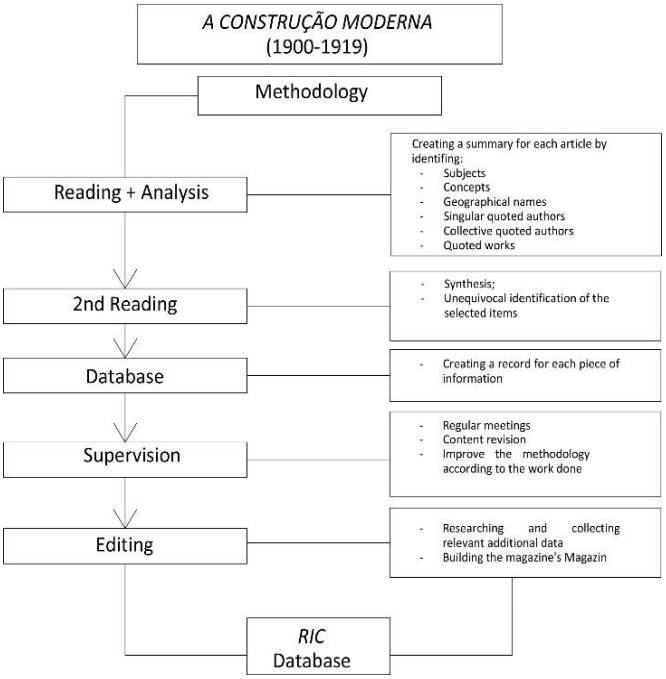
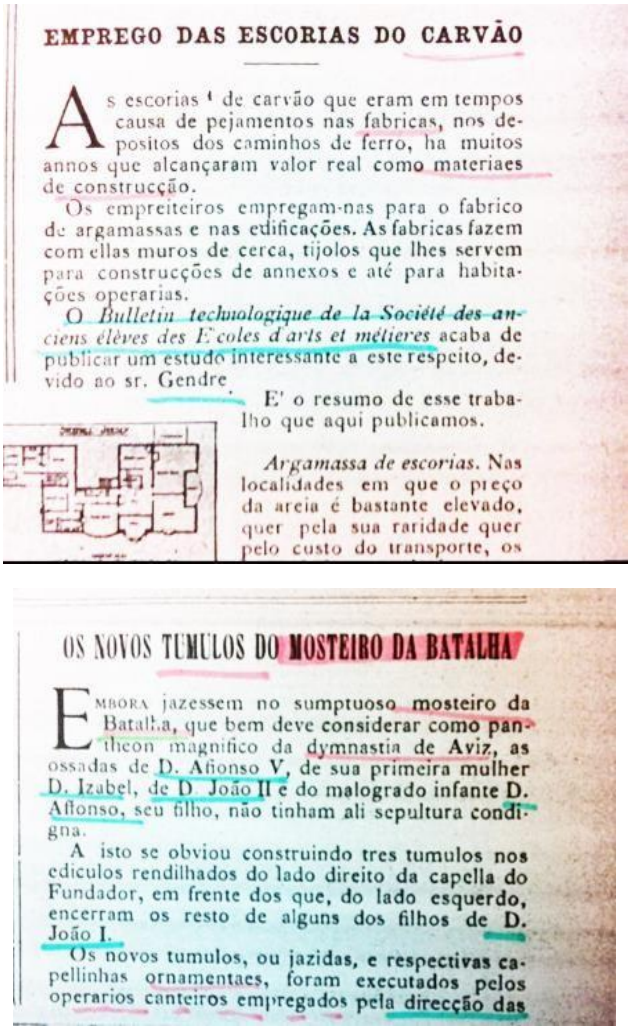


Figure 4. *A Construcção Moderna*: methodology designed according to *RIC* guidelines.

3.2. Preliminary findings

The ongoing work is starting to highlight a group of recurrent topics in the issues read so far (170 in a total of 542), such as architecture projects, technical discussions related to construction and urban infrastructures, and arts, such as applied arts, literary works, theatre and international exhibitions.



EMPREGO DAS ESCORIAS DO CARVÃO

As escorias de carvão que eram em tempos causa de pejamentos nas fabricas, nos depositos dos caminhos de ferro, ha muitos annos que alcançaram valor real como materiaes de construcção.

Os empreiteiros empregam-nas para o fabrico de argamassas e nas edificações. As fabricas fazem com ellas muros de cerca, tijolos que lhes servem para construcções de annexos e até para habitações operarias.

O *Bulletin technologique de la Société des anciens élèves des Ecoles d'arts et métiers* acaba de publicar um estudo interessante a este respeito, devido ao sr. Gendre.

E' o resumo de esse trabalho que aqui publicamos.

Argamassa de escorias. Nas localidades em que o preço da areia é bastante elevado, quer pela sua raridade quer pelo custo do transporte, os

OS NOVOS TUMULOS DO MOSTEIRO DA BATALHA

Embora jazessem no sumptuoso mosteiro da Batalha, que bem deve considerar como panthcon magnifico da dymnastia de Aviz, as ossadas de D. Affonso V, de sua primeira mulher D. Izabel, de D. João II e do malogrado infante D. Affonso, seu filho, não tinham ali sepultura condigna.

A isto se obviou construindo tres tumulos nos ediculos rendilhados do lado direito da capella do Fundador, em frente dos que, do lado esquerdo, encerram os resto de alguns dos filhos de D. João I.

Os novos tumulos, ou jazidas, e respectivas capellinhas ornamentaes, foram executados pelos operarios canteiros empregados pela direcção das

Figure 5. A qualitative approach to the magazine contents. In *A Construcção Moderna*. Top image: September 1902, n.º70, p. 117; Bottom image: October 1902, n.º73, p. 132.

In the magazine *A Construcção Moderna*, articles about architecture published what is now considered historic references, regarding new programs and typologies, in addition to domestic architecture. They also published projects for public buildings such as commercial and finance houses (warehouses, banking buildings, cafes, Fig. 6), healthcare facilities (hospitals, sanatoriums, asylums), school buildings and industrial schools, leisure spaces (theatres, casinos) and industrial facilities (manufacturing units). Technical articles disseminated knowledge that contributed to the material and technical progress of the country, introducing new materials and construction processes. Urbanism, promoted in

opinion articles, regarding hygiene and health in the public space, expressing the problems faced in the daily life. Articles on applied Arts, discussed the Academism, Art Nouveau, Gothic Revival and Eclecticism. The debate on monumental heritage and its safeguard has been found to be present in several issues (Fig. 7) offering an international perspective on the topic. The legislation was another subject published in this magazine namely by discussing Building Regulations.

Casa do ex.mo sr. Antonio Maria Pimenta

A CONSTRUIR EM COIMBRA

Projecto do architecto, sr. Raul Lino

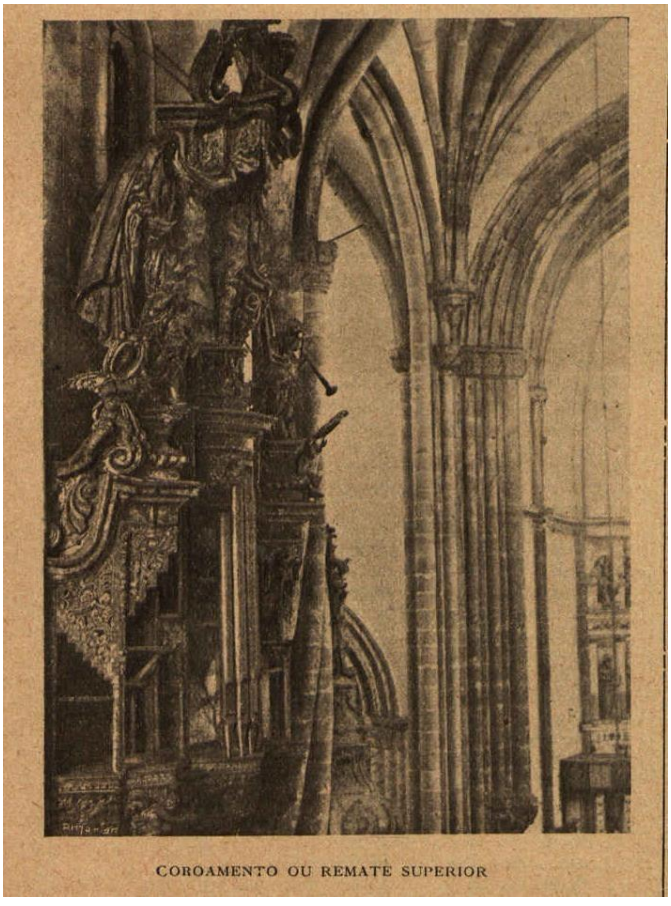
A construcção de que hoje nos occupamos, uma das que o nosso illustre collaborador se encarregou de projectar para Coimbra, obedece, como todas as do mesmo auctor, a uma orientação privativamente sua, como os nossos leitores terão tido occasião de notar pelos outros trabalhos já publicados na nossa revista pelo mesmo distincto architecto.

Os arcos das janellas e os maineis da escadaria são de tijolo rebatido.

O friso, que corre por cima das janellas, em torno do edificio, é de azulejo.

A construcção, importa, em Coimbra, onde os materiaes e mão d'obra, são baratos, em quantia bastante inferior á que seria se fosse feita na capital ou arredores.

Figure 6 Architecture and construction themes: private house. In A Construcção Moderna, March 1903, n.º 90, pp. 43.



COROAMENTO OU REMATE SUPERIOR

Figure 7. Heritage and safeguard discussions. In *A Construcção Moderna*, August 1902, n. º68, p. LIII.

4. FINAL CONSIDERATIONS

Due to the fact that the first architecture magazine in Portugal was *A Construcção Moderna*, it will be the first to be made available on *RIC*'s website. The publishing of technical and cultural content at the beginning of the 20th century has been recognized as of cultural relevance in broad spreading knowledge on construction practices while simultaneously aiming to end the national isolation regarding the developed European scene (Mesquita, 2011).

The online access to these records, along with a search engine that provides tools to question the database, will contribute for a thorough understanding of the subjects and concepts discussed in this magazine. Although *A Construcção Moderna* is already considered an indispensable source of knowledge for the study of the early 20th century architecture and construction issues, the availability of this tool will undoubtedly unveil new lines of inquiry, new research questions and it will, consequently, contribute to future research on culture and architecture in Portugal.

5. NOTES

The editorial board for the magazine *A Construcção Moderna* is composed by the director of the *RIC* and curator Luís Andrade; published by *Seminário Livre de História das Ideias* and *Fundação Mário Soares*; edited by the architecture team with Sofia Aleixo and Luís Andrade; with executive edition by Pedro Lisboa; and the descriptors Sofia Aleixo and Patrícia Faustino.

6. REFERENCES

A Construcção Moderna. 1900-1919. Lisboa.

Mesquita, M. D. 2011. *Revistas de Arquitectura: Arquivo(s) da Modernidade*. Casal de Cambra: Caleidoscópio.

Mesquita, M.D. 2008. *Uma leitura do património através de uma revista de arquitectura do primeiro quartel do século XX*. In Conservazione del Patrimonio Architettonico e Urbano e cura di Roberto Mingucci e Mario Centofanti. *DISERGNARECON:* ISSN 18285961. Itália: University of L'Aquila (Vol. 1, n.2).

Nunes, P. S. 2011. *A Cultura Arquitectónia em Portugal na dobra do século XIX: Sinais da influência estrangeira nas páginas d'A Construcção Moderna (1900-1919).* In Revistas de Arquitectura: Arquivo(s) da Modernidade. Caleidoscópio: Casal de Cambra: 230-253.

Pedreirinho, J. M. 2017. *Dicionário dos Arquitectos activos em Portucal do século I/ à actualidade*. Edições Afrontamento: Porto (2 ed.).

RIC – *Revistas de Ideias e Cultura* (s/d), in http://www.ric.slhi.pt

1920's economic housing in the magazine A Architectura Portugueza

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ABSTRACT: In the beginning of the 20th century, industrialization was at the origin of a lack of housing for those who were leaving the rural plural and heading to the city in search for work. The awareness of the increasing population and the housing crisis found an echo in the architects through the periodic Portuguese press dedicated to architecture issues. The magazine A Architectura Portugueza, issued between 1908 and 1929, published architecture projects and opinion articles that addressed this social problem. Since the architect's social responsibility is reflected in their own projects, the analysis of the published works, assisted by the RIC project, is believed to provide an understanding of the stance of this professional class in this period.

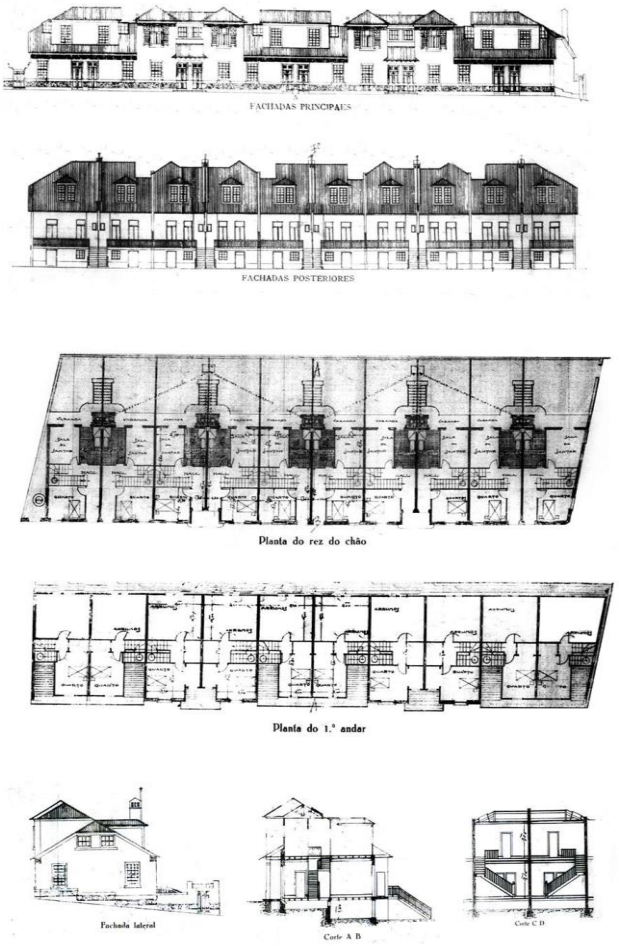


Figure 1. Project of a group of ten dwellings, by the Architect José Ferreira Penêda. In A Architectura Portugueza, December 1926, nº12, p. 3

1. THE PROBLEM

At the beginning of the 20th century, in Portugal, the shortage of economic houses was a growing problem. At the origin of this problem was the increasing population in urban areas due to the rural exodus of those who were heading into the cities in search of work provided by industrialization.

This need for housing to accommodate a new working class found a response in the private sector, by developing a rental market, using precarious housing with minimal areas, without the minimum conditions of hygiene and health. Lands that remained unbuilt so far were occupied with the *ilhas* in Oporto, and the *pátios* in Lisbon (Teixeira, 1992). These houses were built by the workers themselves, in a land of their working factory owner with limited resources and capital, or by the owner himself, resulting in low-quality dwellings. In Lisbon, *pátios* were never built as much as *ilhas* of Oporto, as Teixeira (1992) points out: "in 1905 there were 233 *pátios* in Lisbon, with a total of 2278 dwellings and housing 10,487 people. Some years before, in 1899, there were in Porto 1048 *ilhas*, with 11129 houses and
50.000 inhabitants" (p.69).

Informed by experts' knowledge on medical care and wellbeing, architects soon started to develop solutions to solve the problem, namely by promoting better living conditions through materializing hygienic measures in the domestic interior space (Serra-no, 2011).

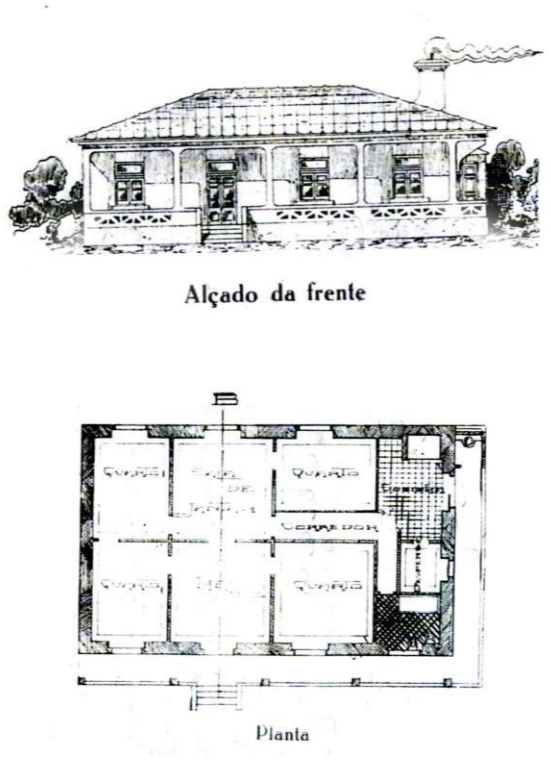


Figure 2. Project of an Economic House for S. Martinho do Porto, by the civil engineer António Birne Pereira. In A Architectura Portugueza, October 1928, nº10, p.6

Figure 3. Economic neighborhood of Ajuda, Lisboa, 1934. In Tiago, 2010, p.270

Figure 4. Economic neighborhood of Arco do Cego, Lisboa, 1934. In Tiago, 2010, p.270

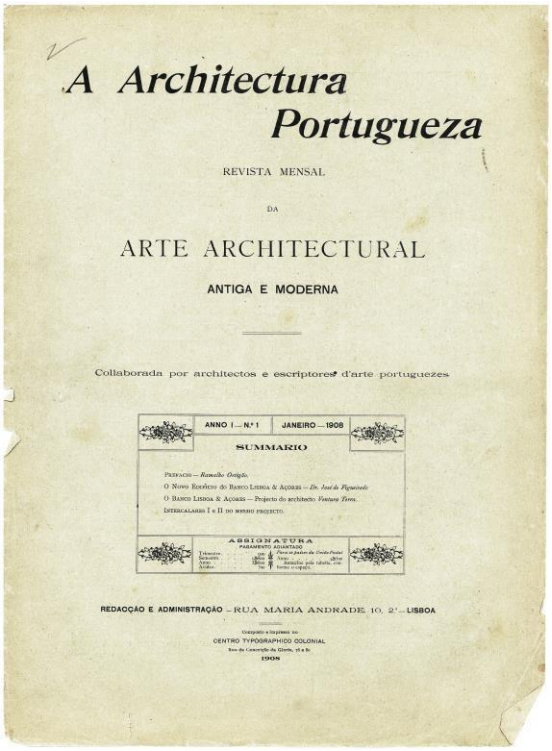
Furthermore, architects also developed a broader debate on health promotion by sharing the knowledge gained at international congresses in articles published in architecture and construction magazines such as *A Construcção Moderna* (1900-1919), *Annuario da Sociedade dos Architectos Portuguezes* (1905-1911) and *A Architectura Portugueza* (1908-1929) (Mesquita, 2010). As a result, architects raised their awareness of the rising problem of urban hygiene and economic housing.

2. THE SOLUTION

In spite of a notable interested in establishing new laws and regulations in the beginning of the 20th century, which dealt with issues related to the housing quality of construction, ventilation and plumbing, the Spanish flu outbreak that occurred during World War I relaunch the debate, after having caused in Portugal a high number of victims until 1919 (estimated in more than 100 thousand) (Teixeira, 1992). As a response to this problem, the state launched a program on economic housing (Figure 1, Figure 2). In 1918, the Republic issued the Decree No. 4137 (Tiago, 2010), on the promotion of the construction of social neighbourhoods, in a context of economic, political and social difficulties due to Portugal's participation in World War I. In this very year the projects for economic housing began, such as: the *Bairro da Ajuda* (Fig. 3) soon followed by the neighbourhood of the *Arco do Cego*, both in Lisbon (Fig. 4). However, the construction of these neighbourhoods would only be concluded in the *Estado Novo* period between 1934 and 1935.

In 1929, the *Sociedade dos Architectos Portuguezes* (1903-1933) participates in the jury for a public tender for the elaboration of project-type of economic houses, promoted by the Society of Economic Houses. Raúl Lino (1879-1974), represented the Society in this jury which highlights the importance of the subject at the time (Ribeiro, 2002). Tavares (2015) observes, in that same year the publication of the proceedings of the II Congress of CIAM subordinated to the topic of "The Minimum House" in the weekly newspaper Notícias *Ilustradas*, questioning a group of young architects on "what would be the most urgent work to do? "(França, 1985, p. 118-119). Among the interviewees, the architect Pardal Monteiro (1987-1957), argues that the priority should be given to the construction of neighbourhoods of economic houses. During the 1920's, the program of economic housing played a decisive role in the planning and the construction of the city of Lisbon. A special concern on beauty was also expressed through the design of the buildings façades as it aimed to build an identity and to avoid the "de pressing typical character of working neighbourhoods, constituted by monotonous alignments of uniform and

unadorned houses" (Pereira, 1994, p.522). These issues reflect the social role of the architect in the transformation process of the city itself, as it accommodates economic housing for an emerging working class.


A Architectura Portugueza

REVISTA MENSAL

DA

ARTE ARCHITECTURAL

ANTIGA E MODERNA

Collaborada por architectos e escriptores d'arte portuguezes

ANNO I — N.º 1 JANEIRO — 1908

SUMMARIO

REDACÇÃO E ADMINISTRAÇÃO — RUA MARIA ANDRADE 10, 2.º — LISBOA

CENTRO TYPOGRAPHICO COLONIAL

1908

Figure 5. Front page. In A Architecture Portugueza, January 1908, nº1


Anno I Lisboa, Janeiro de 1908 N.º 1

A ARCHITECTURA PORTUGUEZA

Revista mensal de construcção e de architectura pratica

REDACÇÃO E ADMINISTRAÇÃO — RUA MARIA ANDRADE, 10, 2.º — LISBOA

PREFACIO

Figure 6. Editorial board objectives. In A Architectura Portugueza, January 1908, nº 1, p.2

3. ARCHITECTURE MAGAZINES

The study of *A Architectura Portugueza* magazine can contribute to filling a theoretical void within the Portuguese architecture's history of the beginning of the 20th century since there is a lack of published books on this topic (Figueiredo, 2007). In particular, the study of *A Architectura Portugueza*, can help to understand the thinking, arguing and building between 1908-1929 (1st series), in the article published in a total of 114 issues (Fig. 5). Thus, the design of a research aiming to understand modern perceptions and expressions of the art of designing and building, and to identify technical developments in construction of our architecture legacy can find in this architecture magazine a relevant source of information.

With the aim to respond to the problem of the working classes, architects developed proposals and discussed the topic in the magazine *A Architectura Portugueza*. The study of the social housing published in this magazine is believed to provide a relevant contribute to establishing an understanding on the position of the professional class, on the promotion of well-being and comfortable housing in economic dwellings.

The analysis of the published works may widely benefit from the use of the *RIC* project. The study of the 20th century's Portuguese architecture magazines can shed some light on the modern ideas that shaped the socio-cultural atmosphere of this period. With opinion articles on issues such as architecture, construction, arts, history, materials, engineering, cultural events, artists, from Portugal and abroad, the study of such historical records may reveal new concepts and ideas about modern perceptions and theoretical and technical movements of architecture, art, design, building and urbanism (Mesquita, 2011).

4. THE RIC PROJECT

The visible and usable component of the *RIC* - *Revistas de Ideias e Cultura* (Magazines of Ideas and Culture) is a website that provides access to full collections of the most relevant magazines of the last century that discussed ideas and cultural issues in Portugal (see http://www.ric.slhi.pt/).

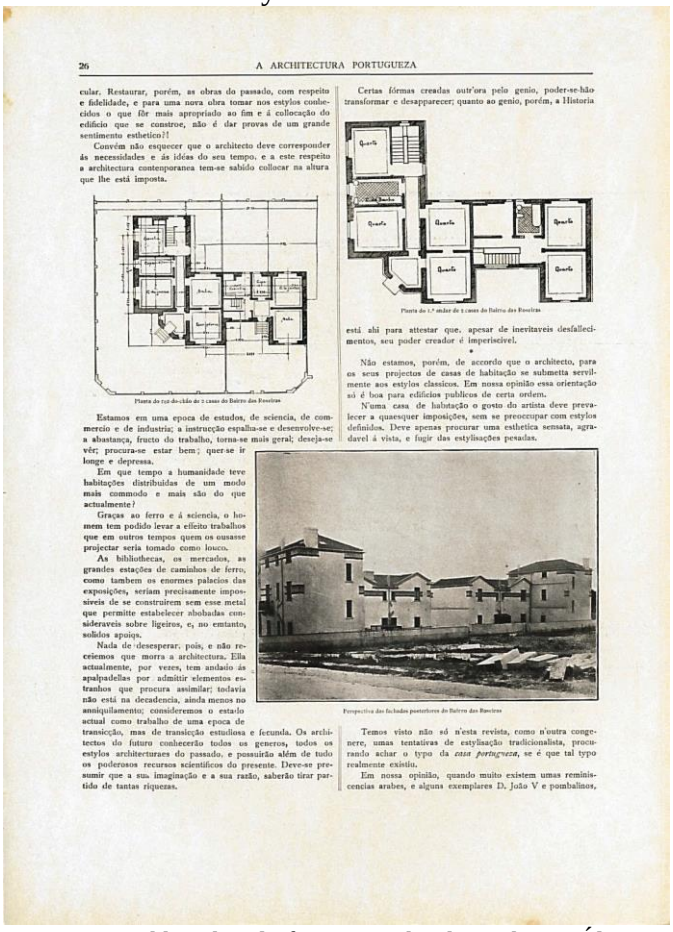
Acknowledged as an important source for research, and recognizing the relevance of architecture for society, *RIC* research team have recently embraced this cultural area. Therefore, *RIC* provides a tool that contributes to the study of economic housing as addressed by the architects. Following the on-going work of *A Construcção Moderna*, the next magazine to be included in the *RIC* program is *A Architectura Portugueza*, and a research using the issues published in the 1st series (1908-1929) will be conducted.

In 1908 (Fig. 6), the magazine editorial clearly expresses its objectives:

- *to provide a service in line with the technological progress of architecture through the dissemination of articles on the housing hygiene, contribu-*

tions to the use of new materials' and construction techniques, as well as the new electrical equipment and modern furniture, besides aiming also to promote the smaller arts such as joinery, locksmithing and sculpture (nº1, p.2).

The remarkable quality of its graphic elements, such as the project drawings and photographs (Fig. 7), "make the *A Architectura Portugueza* an essential documentary repository for the study of the architectural culture in Portugal in the first quarter of the 20th century" (Gomes 2003, p. 238). This statement supports a research approach as a case study in which the study of economic housing can bring new knowledge to architecture history.



26 A ARCHITECTURA PORTUGUEZA

cular. Restaurar, porém, as obras do passado, com respeito e fidelidade, e para uma nova obra tomar nos estylos conhecidos o que lhe mais apropriado ao fim e á collocação do edificio que se constroe, não é dar provas de um grande sentimento esthetico?!

Convém não esquecer que o architecto deve corresponder ás necessidades e ás ideas do seu tempo, e a este respeito a architectura contemporanea tem-se sabido collocar na altura que lhe está imposta.

Planta do rez-do-chão de 3 casas do Bairro das Roseiras

Estamos em uma epoca de estudos, de sciencia, de commercio e de industria; a instrucção espalha-se e desenvolve-se; a abastança, fructo do trabalho, torna-se mais geral; deseja-se vêr; procura-se estar bem; quer-se ir longe e depressa.

Em que tempo a humanidade teve habitações distribuidas de um modo mais commodo e mais são do que actualmente?

Graças ao ferro e á sciencia, o homem tem podido levar a effeito trabalhos que em outros tempos quem os ousasse projectar seria tomado como louco.

As bibliothecas, os mercados, as grandes estações de caminhos de ferro, como tambem os enormes palacios das exposições, seriam precisamente impossiveis de se construirem sem esse metal que permitte estabelecer abobadas consideraveis sobre ligeiros, e, no entanto, solidos apoios.

Nada de desesperar, pois, e não receiemos que morra a architectura. Ella actualmente, por vezes, tem andado ás apalpadellas por admittir elementos estranhos que procura assimilar; todavia não está na decadencia, ainda menos no aniquilamento; consideremos o estado actual como trabalho de uma epoca de transicção, mas de transição estudiosa e fecunda. Os architectos do futuro conhecerão todos os generos, todos os estylos architecturaes do passado, e possuirão além de tudo os poderosos recursos scientificos do presente. Deve-se presumir que a sua imaginação e a sua razão, saberão tirar partido de tantas riquezas.

Certas fórmas creadas outr'ora pelo genio, poder-se-hão transformar e desapparecer; quanto ao genio, porém, a Historia

Planta do 1.º andar de 3 casas do Bairro das Roseiras

está ahi para attestar que, apesar de inexitaveis desfallecimentos, seu poder creador é imperissivel.

*

Não estamos, porém, de accordo que o architecto, para os seus projectos de casas de habitação se submetta servilmente aos estylos classicos. Em nossa opinião essa orientação só é boa para edificios publicos de certa ordem.

N'uma casa de habitação o gosto do artista deve prevalecer a quaesquer imposições, sem se preoccupar com estylos definidos. Deve apenas procurar uma esthetica sensata, agradavel á vista, e fugir das estylisações pesadas.

Perspectiva das fachadas posteriores do Bairro das Roseiras

Temos visto não só n'esta revista, como n'outra congenere, umas tentativas de estylisação tradicionalista, procurando achar o typo da *casa portugueza*, se é que tal typo realmente existiu.

Em nossa opinião, quando muito existem umas reminiscencias arabes, e alguns exemplares D. João V e pombalinos,

Figure 7. Neighbourhood of Roseiras, by the architect Álvaro Machado. In A Architectura Portugueza, July 1910, nº 7, p. 26

5. FINAL CONSIDERATIONS

In summary, by the beginning of the 20th century, there is a lack of studies regarding the publishing of economic housing projects and debates in architecture magazines. The *A Architectura Portugueza* magazines published between 1908 and 1919 has not yet been studied from this perspective and the availability of a research tool as *RIC* is in itself a very useful tool.

Research on this topic is needed to understand the relevance given to the topic in this period, and the architectural solutions, proposed for the problem of economic housing.

6. REFERENCES:

A Architectura Portugueza, 1ª série, 1908-1929. Lisboa.

Decreto nº4:137 de 25 de Abril da Presidência do Ministério. Diário do Governo: Série 1, Nº 87, 1918. Accessed at https://dre.pt/application/file/404408

França, J.A. 1985. *A Arte em Portugal no Século XX, 1911-1961*.Venda Nova: Bertrand Editora

Figueiredo, R. 2007. *Arquitectura e Discurso Crítico em Portugal (1893-1918)*. Lisboa: IHA/Estudos de Arte Contemporânea, Faculdade de Ciências Sociais e Humanas - Universidade Nova de Lisboa. Colecção Teses. Lisboa: Edições Colibri.

Gomes, M.M.C.A. 2003. *A Cultura Arquitectónica em Portugal: 1880-1920: Tradição e Inovação*. Lisboa: Universidade Técnica de Lisboa, Doctoral Theses

Mesquita, M.D. 2010. *Publicações de Arquitectura entre a Monarquia e a Primeira República*. In JA, Out.-Dez. nº 243: 9-12.

Mesquita, M.D. 2011. *Revistas de Arquitectura: Arquivo(s) da Modernidade*. Casal de Cambra: Caleidoscópio.

Pereira, N.T. 1994. *Pátios e vilas de Lisboa, 1870-1930: a promoção privada do alojamento operário*. In Análise Social, vol. XXIX (127): 509-524.

Ribeiro, A.I. 2002. *Arquitectos Portugueses - 90 Anos de Vida Associativa (1863-1953)*. Porto: FAUP - Faculdade de Arquitectura da Universidade Porto.

Serrano, I. 2011. *A Higiene e Salubridade na Arquitectura através d'a Construcção Moderna*. In Revistas de Arquitectura: Arquivo(s) da Modernidade. Casal de Cambra: Caleidoscópio: 370-381.

Tavares, M.F.G. 2015. *Habitações Económicas: Federação de Caixas de Previdência – Arquitectura e Modos de Actuação no Exercício de Projecto*. Porto: Faculdade de Arquitectura do Porto, Doctoral Theses. Acessed at https://repositorio-aberto.up.pt/handle/10216/104131.

Teixeira, M.C. 1992. *As estratégias de habitação em Portugal, 1880-1940*. In Análise Social, vol. XXVII (115): 65-89.

Tiago, M.C. 2010. *Bairros Socias da I República: projectos e realizações*. In Ler História, nº 59: 249-272

RIC – *Revistas de Ideias e Cultura* (s/d), in http://www.ric.slhi.pt

Mediation to access cultural heritage information: Portugal and Brazil (2006-2016)

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ABSTRACT: In the current context of the information and knowledge society, the mediation exercised by information professionals plays a decisive role in the appropriation of information by those who need it. As an operative concept of Information Science (IS), mediation has been the subject of research in the area of user studies. Thus, the objective of this work is to know and map the interest that IS has shown by the theme and to assess its importance, through a qualitative and quantitative analysis of the scientific production of the last ten years in Portugal and Brazil.
In methodological terms, a review of the literature was carried out, followed by a case study of analytical and exploratory character, with data collection of scientific production between 2006 and 2016, was included in the Scientific Repository of Open Access of Portugal (RCAAP) and in the Brazilian Portal of open access scientific publications (Oasisbr).
The results point to a small scientific production in the field of Information Science, but there is a marked difference in the results for Brazil, which leads the studies in the area, especially between 2011 and 2014.

1. INTRODUCTION

Given the importance of cultural and heritage information as a source for the identity of peoples and individual citizenship and identity of peoples, structures and practices that facilitate their access and use are essential. In this context, the idea of mediation, that is, an intervention between two parties, carried out by a third party, is configured. As an operative concept of Information Science (IS), mediation does what is necessary in this scientific area - to study the users and provide them with services suited to their needs (Rodrigues & Crippa, 2011). In recent years, mediation has been the subject of study of IS in different areas, in particular, those directly associated with culture, heritage, information, and reading.

Concerning the mediation of information, Almeida Júnior and Bortolin (2007) clarify that this is "toda ação de interferência – realizada pelo profissional da informação –, direta ou indireta; consciente ou inconsciente; singular ou plural, individual ou coletiva; que propicia a apropriação de informação que satisfaça, plena ou parcialmente, uma necessidade informacional" (p.6). Hence, Silva (2010) stresses the centrality of the information professional in the institution that provides services (be it archive, library, museum or documentation centre), as disseminator of information, decisive for the process of knowledge and decision making by citizens.

In the last thirty years, we have witnessed a growing relevance of cultural mediation, both in political discourses and in practices that seek to bring the public closer to art and culture, following the principles of "cultural democratization" (Quintela, 2011). In this context, cultural actors and institutions began to study and seek to understand the interests of each individual, aiming for greater involvement of the population in cultural matters and recognizing the heterogeneity of their audience. We understand cultural mediation as a complex process, which involves not only communicating and interpreting, but also creating spaces for dialogue and reflection (Pereira, 2015).

Likewise, with the adoption of specific legislation for the protection of heritage, the latter's understanding "como um meio de coesão social, um promotor de cidadania, um instrumento de definição de identidade " (Nunes, 2015, p.16). Thus, the concept of heritage mediation encompasses the transmission of knowledge and its enjoyment and protection, especially through mediation carried out in the context of museology and its educational practices (Antonello & Kobayashi, 2015).

As far as mediation of reading is concerned, we believe that this is a cross-cutting task for the whole society, where parents, writers, publishers and

booksellers, teachers, and librarians are particularly relevant, and the latter two represent specialized mediation. It is the duty of all libraries to provide access to information and reading, doing it in a democratic and quality way, since a reading society does not arise spontaneously, but rather depends on sociocultural policies and devices (Rasteli & Cavalcante, 2013). In order to meet the information needs and to implement practices that foster the development of citizens' reading capacities, the librarian stands out as a mediator, whether it be explicit reading promotion actions or implicit technical work (Almeida Júnior & Bortolin, 2007; Redigolo & Fujita, 2015).

Thus, we can affirm that access to cultural and heritage information, mediated by an information professional, generates more able and participative citizens, and mediation can be seen as a relevant process of inclusion and emancipation of the human being (Rasteli & Cavalcante, 2013). In this context, we have as general objective to know and to map the interest that IS has shown by the subject of the mediation; specifically, we intend to carry out a qualitative and quantitative analysis of the scientific production in Portugal and Brazil during ten years (2006-2016) and verify its importance.

2. METHODOLOGY

To answer the objective and as methodologies, we selected a literature review and case study of an analytical and exploratory character, with data collection in the Scientific Repository of Open Access of Portugal - RCAAP (https://www.rcaap.pt/) and in the Brazilian Portal of scientific publications in open access - Oasisbr (http://oasisbr.ibict.br/vufind/), because they are national scope repositories that, in both countries, collect the information of the repositories of the establishments of teaching. We did an advanced search, covering the period 2006-2016 with open access publications, specifically papers and academic papers. As search terms, we used "mediation of information", "cultural mediation", "heritage mediation" and "mediation of reading" in the title and subject fields. What presided over the choice of terms was their use as a form of access to cultural and heritage information. As for the fields surveyed, we opted for the two in which the use of terms would reflect the determinant focus of the study.

After a careful analysis of the results obtained and the elimination of duplicated records, we calculated a universe of 2833 documents, related to the two portals and the thematic area of search of IS, and, regarding the terms used for research, our sample was reduced to 221 documents. It should be noted, however, that some documents have been retrieved simultaneously using the terms "mediation of information" and "cultural mediation", "mediation of information" and "mediation of reading" and "mediation of reading" and "cultural mediation". Having said this, we delimitated the study to the following sample: 78 articles; 94 master's dissertations; 19 PhD theses; 4 works carried out to obtain a bachelor's degree; 4 assignments to obtain a bachelor's degree; 3 books and book chapters; and 19 conferences. We found that the selected sample was obtained mainly in the "mediation of information" research (52% of the sample), followed by "cultural mediation" (29%), "mediation of reading" (9%) and, finally, "heritage mediation" (4%).

In addition to the quantitative analysis, we performed a qualitative analysis, considering as physical mapping indicators, the resources or repositories of origin of the scientific production as well as the scientific areas within which they were developed; as an indicator of chronological mapping, the annual evolution of scientific activity; and as a qualitative indicator, the QUALIS 2015 classification (https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/veiculoPublicacaoQualis/listaConsultaGeralPeriodicos.jsf), attributed to the scientific journals where the articles were published. In the qualitative study, studies were not carried out to obtain the degree (given the academic differences between the two countries), books and chapters of books and conferences, since this type of documents does not allow us to carry out a qualitative analysis.

3. FINDINGS

According to the results, we found that IS's interest in mediation is rather small (5.5% of the universe surveyed), but that there is a growing trend between 2011 and 2014 (see figure 1), which welcomes 2/3 of the studies retrieved.

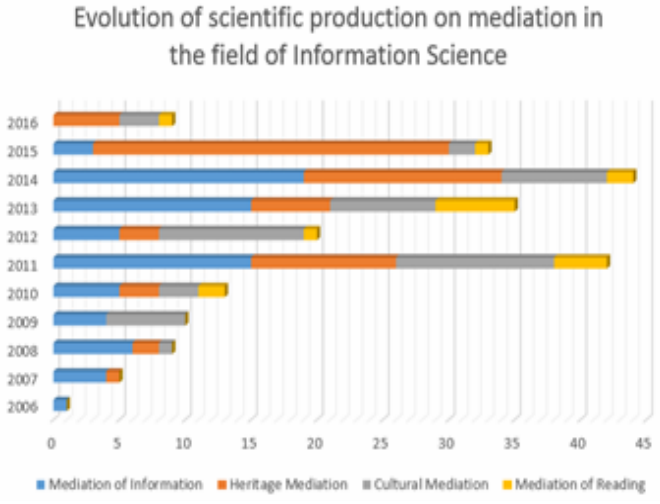


Figure 1 - Evolution of scientific production on mediation

Brazil shows greater interest in the subject (84% of the sample), whereas in Portugal the numbers are

smaller (16% of the sample). Thus, it will be possible that this issue is not significantly reflected in qualitative terms, particularly in the evaluation of scientific journals.

Regarding the scientific journals (see figure 2) where research outputs were published in mediation of information, heritage mediation, cultural mediation and mediation of reading in the field of Information Science, it is worth mentioning the following:

- "Informação & Informação" magazine, with a total of 14 articles published, presents the largest number of articles (15%), followed by the "XVI Encontro Nacional de Pesquisa em Post-Graduação em Ciência da Informação" and "ENANCIB – Encontro Nacional de pesquisa em Ciência da Informação", journals *ex aequo* with 9 published articles;
- "Other" journals were considered in journals where only one scientific paper was published.

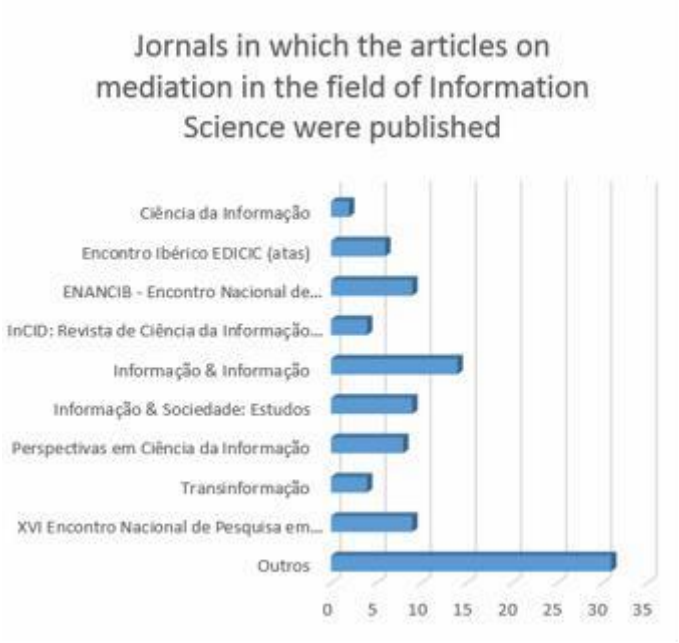


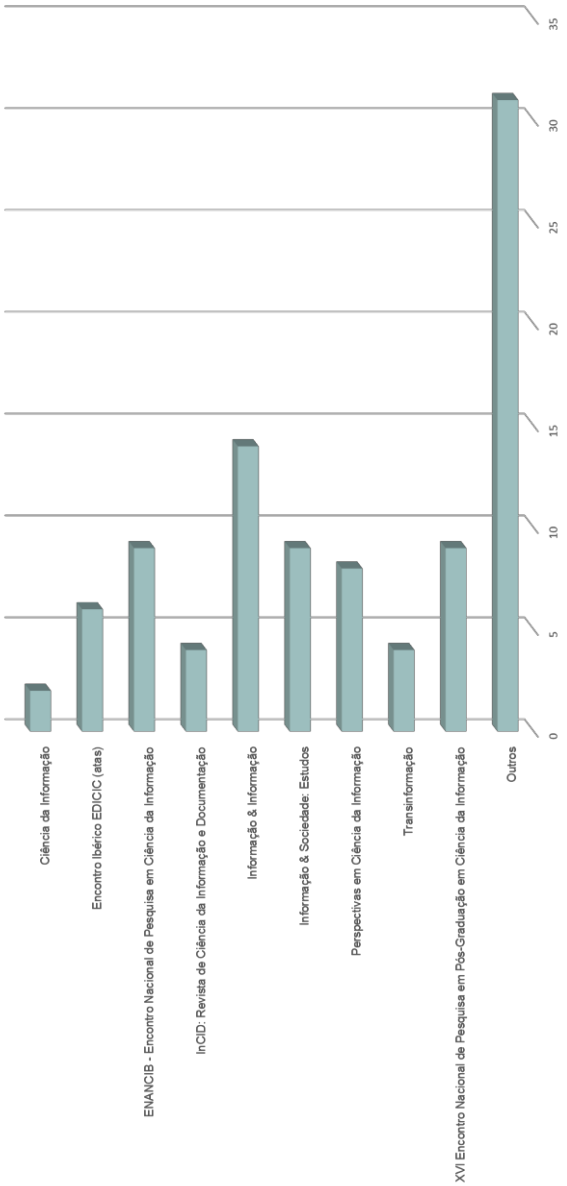
Figure 2 - Journals in which the articles were published

The number of scientific publications registered in Brazil seems to benefit from the existence, since 2005, of a Working Group on mediation, circulation and use of information in the National Association of Research and Graduate Studies in Information Science (Ancib). The association is also responsible for the biennial meeting of ENANCIB - ANCIB National Research Meeting, whose minutes present an interesting number of publications on the subject.

4. CONCLUSION

We conclude that there is a lack of mediation research and that these results seem to show that the academic work does not reflect the importance that the theme presents for IS, information systems and professionals, and, more importantly, for citizens.

The present investigation has limitations in the countries and in the portals chosen for analysis, however, in view of the repercussions that mediation has on access to cultural and heritage information, it assumes as a relevant alert to the researchers and a contribution with possible practical implications in the study of this issue in the scope of IS.



5. REFERENCES

Almeida Júnior, O. & Bortolin, S. 2007. Mediação da Informação e da Leitura. Paper presented at the *IISeminário em Ciência da Informação - UEL*, Londrina. Accessed in 12 July 2018. Retrieved from http://eprints.rclis.org/13269/

Antonello, G.D. & Kobayashi, M.C.M. 2015. Patrimônio Cultural: uma experiência pelo programa institucional de bolsa de iniciação à docência (PIBID). Paper presented at the 8.º Congresso de Extensão Universitária da UNESP, São Paulo. Accessed in 12 July 2018. Retrieved from http://hdl.handle.net/11449/142090.

Nunes, A.S.S.C.P. 2015. *Comunicar património em instituições patrimoniais e culturais: uma proposta para a formação de profissionais de mediação e educação* (Master's thesis). Accessed in 12 July 2018. Retrieved from http://repositorio.ul.pt/handle/10451/25935.

Pereira, A. 2015. *Avaliação das práticas de mediação cultural: o caso do Museu Casa do Infante* (Master's thesis). Accessed in 12 July 2018. Retrieved from https://repositorio-aberto.up.pt/handle/10216/81349.

Quintela, P. 2011. Estratégias de mediação cultural: Inovação e experimentação no Serviço Educativo da Casa da Música. *Revista Crítica de Ciências Sociais* 94: 63-83. Accessed in 12 July 2018. Retrieved from http://rccs.revues.org/1531.

Rastelli, A. & Cavalcante, L. 2013. A competência em informação e o bibliotecário mediador da leitura em biblioteca pública. *Encontros Bibli: Revista Eletrônica de Biblioteconomia e Ciência da Informação* 18(36): 157-180. Accessed in 12 July 2018. Retrieved from Doi:10.5007/1518-2924.2013v18n36p157

Redigolo, F. & Fujita, M. 2015. A leitura profissional do catalogador e seu papel como mediadora da informação. *Informação & Informação* 20(3): 356-376. Accessed in 12 July 2018. Retrieved from Doi: 10.5433/1981-8920.2015v20n3p356

Rodrigues, B. & Crippa, G. 2011. A recuperação da informação e o conceito de informação: o que é relevante em mediação cultural? *Perspectivas em Ciência da Informação* 16(1): 45-64. Accessed in 12 July 2018. Retrieved from http://portaldeperiodicos.eci.ufmg.br/index.php/pci/article/view/995

Silva, A.M. 2010. Mediação e mediadores em Ciência da Informação. *PRISMA.COM* 9:1-37. Accessed in 12 July 2018. Retrieved from http://revistas.ua.pt/index.php/prismacom/article/view/700/pdf.

Law change and public discussion: from C-section to natural birth in Brazil, a case study

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ABSTRACT: The set of rules that conducts a society is intrinsically tied to its culture and morals. From this point, it is understandable that any alteration made on a given regulation is to be accompanied by intense public debate. To better analyse this premise, we focus on an emblematic and relatively recent case: the radical change on childbirth policy in Brazil. In this article, it is proposed a multiple basis approach in order to articulate a wider and deeper idea on how dialogues are held when it comes to childbirth in the interest of comprehending both potential cultural and social impacts as well as medical and legal actual effects. The purpose is to present an improved perspective on how the debate around the cultural aspects of childbirth after the medical-legal transition Brazil underwent, affecting the settlement of the new paradigm.

1. INTRODUCTION

Law and society are two entities that evolve in a paired form, one contributing to the improvement of the other. Furthermore, being a social fact (that is, an occurrence of human behaviour in society), law cannot be dissociated from communal life, as a maxim of legal science: "ubi societas, ibi jus" (where society, the law) (Krüger et al. 1906). This, however, does not happen single handily. As social life is conducted by what is deemed as right, fair and legitimate by local legislation, it is correct to assert that the law also originates from socialization, seeking to adjust itself in space and time in agreement to what is dictated by civil understanding, as needed. We reach better understanding of one element by studying the other, as in a net of complementary knowledge.

Within the present context, interpersonal connections have been largely affected by the development of digital social networks. In such platforms, the way of interacting promotes public integrated debate between its users, who are mutually influential.

In an interview, Zigmunt Bauman mentions the fact that present sociological knowledge no longer focuses on great entities, but rather studies individuals (Pallares-Burke, 2004). This implies the consideration of social interactions between these individuals, culminating in the matter of mediatic relations, for the reason that it is the territory where a great share of the communications occurs.

Comprehending that a thorough study should incorporate other aspects in order to obtain a more holistic vision on the matter, we must clarify that this article is not exhaustive. Some examples of what we deem important to take into consideration are the works of Hjarvard (2012) and Latour (1996).

Such an integrated analysis, associating different sciences in the pursuit of fulfilling gaps that only one branch cannot achieve, makes possible both the understanding of the current moment and the insight on what the continuity of this scenario can lead to (regarding law, communication, health, society and more).

Nonetheless, given the general aspect of how virtual platforms of communication are proper fields for reciprocal influence between users and for the expansion of public discussions, this paper emphasizes the issue of birth giving in Brazil, given this is an issue that involves many aspects that go beyond the clinical and health realms, bringing us to reflections that include social, economic and cultural aspects, a rich field to analyse how public discussion tessellates the public and its wider interests. The mediation between the several agents that may coexist in the different fields of expertise grant us an interesting gaze of a phenomenon that reaches both intimate and public aspects.

2. PROBLEM CHARACTERIZATION

In times of interconnected spheres of discussion, we may ask ourselves how public conversation entwines

and influences the technic realms such as those of law and health. In Brazil, a flourishing advocacy on the regards of natural birth is seen in a country that used to have percentages of 52% of C-sections in public healthcare up to astonishing 88% on the private sector. The analysis of worldwide C-sections made by Betrán et al. (2007) puts Latin America and the Caribbean as the region of highest rate of C-sections and obstetric interventions, with a percentage of 29,2%. There is also evidence of increasing rates of obstetric interventions as discussed by Vogel et al. (2015). Even though the World Health Organization (WHO) does not impose a percentage of optimal C-section rate, we find that there are many aspects involved in birth delivery methods and the choice implicates consequences on newborns and mothers. Those will not be discussed directly in this article, but they are a part of the discussion prior and subsequent to the Normative Resolution 368 made by the National Health Agency (ANS, in Portuguese), known as the Birth Act (Agência Nacional de Saúde Suplementar, 2015a). This Resolution was the highpoint of a series of measures taken in the course of more than a decade in order to change the paradigm concerning birth giving. Starting from educative campaigns, going through policies of incentive and reward and going as far as to make mandatory the disclosure of the statistics regarding the number of C-sections, the Brazilian Nacional Health Agency (which regulates the private health insurances in the country), associated with the Brazilian government (which is also responsible for the publicly funded healthcare system - SUS), said to be trying in a more incisive manner to enforce the policy of reduction of unnecessary interventions and encouragement of natural childbirth, in accordance to the latest scientific discoveries worldwide (Agência Nacional de Saúde Suplementar, 2015b). The matter has been developing ever since, with ongoing innovations to better set the new policy.

These developments are not exclusive to Brazil. In 2007, a Venezuelan law included obstetric violence in the list of the forms of violence perpetrated against women, describing the ways it could happen and establishing penalties for it (La Asamblea Nacional de la República Bolivariana de Venezuela, 2007). This event was not broadly well received, with some people arguing that such measure allows expectants to deny engaging to some procedures, antagonizing the good medical practice; and that the government should concentrate its efforts in improving hospitals structure. Even though the lack of structure gets in the way of proper healthcare, the medical team, being the ones with the necessary information, cannot omit themselves in the duty to educate the expectant and respect the choices made. The situation in Venezuela shows a great resemblance to the present scenario in Brazil, being therefore a considerable reference in the deliberations on the subject.

Moreover, these same terms were later cited Dr. Rogelio D'Gregorio, Venezuelan obstetrician, in 2010, in an editorial of the International Journal of Gynecology and Obstetrics (D`Gregorio, 2010). The term "obstetric violence" gained other discussion spheres, and today is disseminated in internet forums, blogs and conversation amongst women. The term itself is an example of how law change can extrapolate the judicial and medical realm to gain a more amplified approach.

Both the Venezuelan case and the current situation in Brazil interconnect, showing the potential course that the question can lead to in other countries throughout Latin America. This demonstrates that the matter of legal change and public debate is linked and extensive when it comes to society. This is an example that shows the demand to study the subject on a broader and deeper way, and not only in its legal, medical or local dimensions.

3. METHOD AND ANALYSIS

To compose this article, we selected various corpuses, as descripted: for the mainstream media - the online reportages about childbirth and themes associated with it for the three most popular motherhood magazines, from 2013 to 2016 - *Revista Crescer* (80 articles), *Revista Pais e Filhos* (8) and *Bebê* (40), reuniting 124 articles; 14 survey responses from women that gave birth on the period from 2013 to 2015 ; 67 academic articles' abstracts, from 2013 to 2016, from the Congresso Paulista de Ginecologia e Obstetrícia and 41 entries of three popular motherhood blogs (Vila Mamífera, Cientista que Virou Mãe, Cais do Parto). The corpora were further analyzed by Iramuteq, a free software that provides statistical analysis on text corpus and tables composed by individuals/words, researching specificities from text segmentations.

The analysis debuted by the selected words tied to childbirth on each corpus (notably the words "parto", "normal" and "cesareana" and its synonyms), to see how they relate to other terms and how this whole distributes itself on each corpus. The analysis was then quantitative but also requested a degree of further reading and text interpretation, made by the *corcodancier* part of the software, that shows how specific words appear in the broader contexts of their paragraphs.

Starting from the medical corpus, we see that there is a recognition between the excess of C-sections and child/mother mortality. We also had the presence of medical articles that would contemplate socio-economic aspects around childbirth, such as the baby's father's presence, teenage pregnancy, rural vs. urban areas, etc. We chose to take two key-words associated with "parto" (birth giving) to this part of the study; the first one "C-section" and the second one

"normal". The former has appeared in the *corcodancier* related to subjects such as emergency C-sections, diabetic mothers, non-indication because of the risk of pre-mature babies, recognition of C-section excess and loss of women's protagonism, hospitals not being the only places to give birth. The subjects tied to "vaginal" are related to elevated risk of cases of puerperal infections, when compared to C-section births; the vaginal birth frequency and satisfaction levels; vaginal births after cesareans; analysis of episiotomy and forceps use in case of vaginal birth. As we may note, there is a preoccupation associated with the risks of C-section excess and discussion around practices that, in excess, might be considered as obstetric violence.

The range of subjectiveness widens when we look through mainstream mediatic approach about childbirth. We see the presence of emotions in the texts along with testimonials of childbirth - especially those of celebrities or readers. This is an important aspect, further explored by blog posts of mother's testimonials, considering technical aspects, practical reality and subjective view of the childbirth moment, along with advice for other mothers. We also see the mainstream information on medical practices (presence of "episotomy" and "forceps" on the reports) and the law change ("lei" is cited 22 times) and we also have the presence of other professions tied to the birth moment, words like "multidisciplinar" appearing on text.

In blogs and sites, we see a wider exploration of themes that go beyond childbirth, related to alternative therapies, ancestrality and many other subjects that do not concern directly by the medical or academic realm. There, we also see discussions around social movements, public policies - invitations to public audiences about childbirth themes - and a deeper orientation on the procedures to guarantee the choices of childbirth. In sites and blogs, we see a very good utilization of medical literature, SUS (Single Health System, Brazil`s public funded health care) statistics and ethical debates of medical councils, vulgarizing medical discourse and entwining with this realm of knowledge.

Mother's discourses were near of those of the medical workers. They both recognize there is a discrepancy between the theory of medical literature - also accessed by mothers - and day-to-day hospital practice. The blame remains on infrastructure, overburdened staff and traditional medicalization. Throughout our research, we saw the discussion about the role of the obstetrician in every birth and how multidisciplinary teams might modulate the overload crisis in the process of birth.

The majority of mothers learnt from the Brazilian law change by the internet, amongst so many other aspects of childbirth changing culture. They see the web as a place of empowerment and information, translated in our work on the placement of "parto" strongly related to the word "mulher". Even further, the word "mulher" is related to terms such as "privado", "direito", "respeito", "conhecimento" and even "machismo", so to speak as a shift of the structural social disregard towards women to an empowered private moment, when they are agents of the birth process, especially when they have information and support from family, medical staff and society as a whole.

4. CONCLUSION

The discussion about the excess of interventions in childbirth is present in all corpora analysed and even the appropriation of new terms such as "obstetric violence" makes its path from medical to legal to public discourses. Mainstream media also plays a role on vulgarizing terms and bringing social and emotional aspects to the conversation, but with an extended vocabulary and more subjective aspects in sites, blogs and mothers' speeches is seen. Internet has risen conversation about many political subjects and health interventions that tie personal aspects and pragmatic matters. Those interactions, nonetheless, can only have an impact when they relate to a culture and a political system that are ready to acknowledge them (Gomes, 2005). What we found with our analysis is that there is an incoherence between actual medical research and discourse and the health structure offered to women to childbirth. There is a historical entanglement between medical practices and insurance companies, normalizing the cultural image of childbirth. This is being partially remediated by the means of mediation through many spheres, as cited by this study. Mediation, as discussed by Cammaerts (2011), relies on symbolic power, referring not only "to the power of representation and the technical skills to be able to produce and transmit information, but likewise to skills enabling individuals to critically assess information, select and make sense of information". Mediation processes in this case study remains accessible mostly to people with education and internet access and, even considering the increasing approachability of internet, factors such as free time and literacy play a role in women empowerment. A number of interviewed subjects from the health staff reported a rich and innovative educational background, in agreement with the latest recommendations concerning birth giving, discussed on Brazilian law and recommendations of the World Health Organization. Nonetheless, the same people declared being confronted by an astonishing contrasting reality when it comes to structural work conditions and ultimately end up restrained by the general health system's environment, compelled to compromise their knowledge and somehow perpetuate the present circumstances. Law change echoes how other spheres

seek to oppose malpractice or the inconsistencies of theory and practice of birth worldwide. Along with the empowerment of women through the bias of information, there is still a need to pursue structural amelioration in hospitals, maternities and other facilities where birth may occur - contemplating realities as different as those of urban and rural environments. Discussion and mediation that go beyond the medical aspects and contemplate social, economic and cultural facets of this reality should go hand in hand with health staff education and especially structural development, so medical staff may be better enrolled, being coherent with smaller rates of (unnecessary) C-sections.

5. REFERENCES

Agência Nacional de Saúde Suplementar. 2015a, *Resolução Normativa - Rn Nº 368*, Available at <http://www.ans.gov.br/component/legislacao/?view=legislacao&task=textolei&format=raw&id=mjg5mg==>, last consulted in the 13th of August, 2018.

Agência Nacional de Saude Suplementar. 2015b, *Entram em vigor novas regras sobre parto na saúde suplementar*, Available at <http://www.ans.gov.br/aans/noticias-ans/qualidade-da-saude/2923-entram-em-vigor-novas-regras-sobre-parto-na-saude-suplementar>, last consulted the 13th of august, 2018.

Betrán, A. et al. 2007, Rates of caesarean section: analysis of a global, regional and national estimates, *Paediatric and Perinatal Epidemiology* 21(2): 98-113.

Cammaerts, B. 2011, Mediation and resistance. In Tomanić Trivundža *et al* (eds.), *Critical perspectives on the European mediasphere, the intellectual work of the 2011 ECREA European media and communication doctoral summer school. The Researching and teaching communication series* 6: 41-56. Tartu: Estonia.

D'Gregorio, R. 2010, Obstetric violence: A new legal term introduced in Venezuala, *International Journal of Gynecology and Obstetrics* 111(3): 201-202.

Gomes, W. 2005, Internet e participação política em sociedades democráticas, *Revista Famecos* 27: 58-78.

Guerra, G. 2008, Editorial violencia obstétrica, *Revista de la Faculdad de Medicina* 31(1): 5-6.

Hjarvard, S. 2012, Midiatização: teorizando a mídia como agente de mudança social e cultural, *Matrizes* 5(2): 53-91.

Krüger, P. et al. 1906, *Corpus iuris civilis*

La Assamblea Nacional de la República Bolivariana de Venezuela. 2007, *Ley organica sobre el derecho de las mujeres a una vida libre de violencia, G. O. (38668 de 23 /4/2007)*, Available at <http://www.derechos.org.ve/pw/wp-content/uploads/11.-Ley-Orgánica-sobre-el-Derecho-de-las-Mujeres-a-una-Vida-Libre-de-Violencia.pdf>, last consulted in the 15th of August, 2018.

Latour, B. 1996, On actor-network theory: A few clarifications, plus more than a few complications. *Soziale Welt* 47(4): 396-381.

Pallares-Burke, M. 2004, Entrevista com Zigmunt Bauman, *Tempo Social* 16(1): 301-325.

Vogel, J. et al. 2015, Use of the Robson classification to assess caesarean section trends in 21 countries: a secondary analysis of two WHO multi-country surveys, *Lancet Glob Health* 3(5): 260-270.

Science et Vie and the Genesis of the Space Race

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ABSTRACT: The French magazine Science et Vie was first published in April 1913. Under the slogan «les questions de la vie, les réponses de la science» it raised its standing in the popularization of exact and natural sciences during the following decades. At the height of the Moon Race, it was a leading magazine in the dissemination of scientific and technological knowledge. Popularizing the latest scientific discoveries Science et Vie gave visibility, after the Second World War, to the extraordinary advances in military technology that occurred during that period, especially in the aeronautical field, that headed to the development of the modern rocket and speeded up the entry in the so-called Space Age. In particular, readers could learn about the V-2 construction, an impressive military engineering feat. This controversial first ballistic missile, initially a fearsome and indefensible weapon, would become the subject of an enormous dispute between the United States and the Soviet Union and would prove to be a fundamental element in the beginning of the scientific exploration of the upper layers of the atmosphere and outer space. This work is focused on the articles published by Science et Vie, from 1945 to 1957, related with the first period of the Space Race, from the V-2 exploratory tests to the launch of the first artificial satellite, the Sputnik 1. This complex geopolitical period that coincided with the beginning of the Cold War, would mark the future of the space conquest and, therefore, the whole second half of the 20th century. Analysis results of written reports, significant events, technologies, protagonists, and collaborators are highlighted.

1. SCIENCE ET VIE

1.1. History

The magazine first issue appeared on April 1, 1913, under the name *La Science et la Vie*. The founder, politician and press magnate Paul Dupuy (1878-1927), was inspired by the American publications *Popular Science* and *Popular Mechanics*. The magazine initially had 144 pages, a print run of 60,000 copies and cost one franc (Villiers, 2013).

In 1914, at the beginning of the First World War, the high demand led the magazine circulation to rise to 150,000. During the two war periods, the monthly periodicity was occasionally interrupted. The magazine acquired its current name in the February 1943 issue (Villiers, 2013).

In December 1945, the first special edition *Hors-Serie* titled *Artillerie atomique* was published. *Science et Vie* would become an essential magazine in the diffusion of the exact and natural sciences, being one of the first European publications of scientific divulgation still in print.

In 1968, the monthly print and circulation were 225,000 and 180,000 copies, respectively, with an estimated 1.65 million readers (Jurdant, 1973, p. 239). That year the *Quid* encyclopedia considered it «le plus important mensuel de vulgarisation scientifique et technique en Europe et proportionnellement (en tenant compte de la population) du Monde». *Science et Vie* readers were mainly middle management (26%) aged between 35 and 49 years (32.7%) with higher education (30%) (Jurdant, 1973, pp. 239-240).

In 1983, the Excelsior Publications group, owner of *Science et Vie*, decided to expand the scientific purpose of the magazine with several spin-offs. In December they launched *Science et Vie Micro* (*SVM*), followed by other titles in later years. In 1999, *Science et Vie* had a monthly circulation of 344,000 copies and 3.30 million readers (Semir, 2002, p.65). In January 2001, the publication reached the 1000 issue mark.

In 2003, the East Midlands Allied Press (EMAP) media group acquired the Excelsior Publications group. In 2006, the magazine became part of Mondadori France, which has since then edited the brand's set of publications. In April 2013, *Science et Vie* completed 100 years with a monthly print and

circulation of 395,000 and 317,000 copies, respectively. (ACMP, 2018). Being considered «a particular case of study due to its solidity» (Semir, 2002, p. 65), in 2017 its readership reached 4.38 million (ACPM, 2018).

1.2. Space Race

Science et Vie covered the remarkable achievements of the Space Race in the period between 1945 and 1975. This dispute between the superpowers of the time, the USA and the USSR, fuelled by the aim to acquire supremacy in the space exploration and technology, led to efforts to launch artificial satellites, suborbital and human orbital flights around the Earth and manned trips to the Moon. In this context, and according to the elements gathered in the current research, about 120 relevant articles were published in the periodical.

The magazine's network of contributors enabled it to publish restricted information and ground-breaking reports. In 1958 Georges Dupont (b. 1928) was the first non-American journalist allowed to report from the Randolph military base in Texas. There secret experiments were carried out simulating human behaviour in space (Dupont, 1958, p. 75). During the Apollo Program, Jacques Tiziou (1939-2017) moved to Cape Canaveral (Florida) to monitor lunar missions closely. During that period, he gained the confidence of many of the astronauts and heads of the American space agency, what allowed him access to restricted equipment from the National Aeronautics and Space Administration (NASA). Tiziou was acquainted with all the American space installations and major aerospace companies. He was the sole European journalist to drive the Lunar Rover One-G prototype and the first European to test a Crawler (Ryba, 2013), which took place during the transport of the Saturn V launcher from the Vehicle Assembly Building (VAB) to the Launch Complex 39 (LC-39) at the Kennedy Space Center (KSC).

The publication also benefited from the French geopolitical context that allowed contacts with both superpowers. In 1966, Charles de Gaulle (1890-1970) was the first Western leader to visit the Soviet Baikonur Cosmodrome (Lardier & Barensky, 2013, pp. 229-232). Within a few hours, the French delegation would witness the launches of a meteorological satellite and an intercontinental missile. This strategic approach between the two countries would begin, as early as 1966, a series of aerospace cooperation agreements (Lardier & Barensky, 2013, p. 257).

Besides Jacques Tiziou, during the period under study, several renowned scientists and experts in the aerospace field, including Camille Rougeron (1893-1980), Charles-Nöel Martin (1923-2005), and others collaborated with the magazine.

1.3. Camille Rougeron

According to our survey, Camille Rougeron was the main collaborator to *Science et Vie* in the period between the end of Second World War (1945) and the launch of Sputnik 1, the first artificial satellite (1957). He signed seven of the 18 written articles associated with the theme. The remaining individual contributors wrote only one article each.

Born in Guéret (Creuse), Rougeron graduated in naval engineering in 1918 at the École Polytechnique, one of the oldest, most celebrated and prestigious French engineering schools. He served during the First World War, was promoted to Officer of the Légion d'Honneur for military engineering feats, and was awarded the Croix de Guerre at age 25.

From 1919 to 1935, Rougeron held several military posts in the naval arsenals of Brest, Toulon and Lorient. From 1936 to 1938, he was assigned to the Air Ministry, becoming an aviation specialist. Since 1931, he drew attention to the vulnerability of naval fleets towards enemy air attacks. Harassed by the Navy for being a critic of the military leadership, he decided to turn a civilian in 1938. From then on, he worked as a consulting engineer at Brandt, an armament company, where he conducted studies on the development of mortars. In 1940, he took refuge in Algeria after the Germans' persecution for his military skills. During 1945 and 1946, he turned a technical consultant at the French National Defense Department (d'Abzac-Epezy, 2004, pp. 763-766).

A military strategy expert, he wrote several books and hundreds of articles, from 1927 to 1979, especially in the daily press (*L'Écho d'Alger*, *L'Illustration*, *Le Monde*) and in specialised publications (*Journal de la Marine marchande*, *Science et Vie*). Rougeron's collaborated with these two magazines between 1940 until 1970, writing on average an article a month[1] (d'Abzac-Epezy, 2004, p.766).

2. INTERNATIONAL GEOPHYSICAL YEAR

2.1. Origins

Ended of Second World War, the potential of the German V-2 missile to both warfare and the exploitation of the atmosphere upper layers made it a target of enormous interest for either the American or the Soviet military authorities.

The United States used a modified version of this engine to capture the first Earth photos seen from space in 1946. Several other American breakthroughs followed this historic milestone. New and increasingly sophisticated aeronautical equipment was developed leading, for instance, with the flight of

[1] e.g. *Science et Vie*, Nov. & Dec. 1957.

Bell X-1, the first aeroplane to surpass the speed of sound, in 1947.

These events were recorded in the pages of *Science et Vie*, in articles such as "La Terre vue d'une altitude de 100 km", March 1949, or "Fusées et moteurs-fusées à l'assaut des records de vitesse et d'altitude" in the May issue of that year, both signed by the magazine's editors.

During the spring of 1950, a group of American scientists, led by James van Allen (1914-2006), discussed the possibility of an international scientific project to study the upper atmosphere. The strong support of the Western European scientific community led to a global program, named International Geophysical Year (IGY), which ran from July 1, 1957, to December 31, 1958, coinciding with a period of intense solar activity. The Soviet representation in the commission created for this purpose (Comité Spécial de l'Année Géophysique Internationale - CSAGI), which included the vice-president of the Soviet Union Academy of Sciences, Ivan Bardin (1883-1960), did not contribute significantly to the works (Siddiqi, 2000, p.145).

2.2. Soviet context

On May 1954, the deadline for submitting projects under the IGY ended, with no sign of interest from the Soviet authorities. On October 4, at the CSAGI meeting in Rome, scientists from the USSR silently testified the approval of the US-sponsored plan to put artificial satellites into orbit during the IGY. The satellite proposal surprised the Soviet delegation and had repercussions during the fall (Siddiqi, 2000, p.145).

The USSR Academy of Sciences created a commission to discuss spatial exploration generally, led by Leonid Sedov (1907-1999), an internationally renowned physicist, and fluid dynamics expert. The applied mathematician Mstislav Keldysh (1911-1978), a great promoter of the creation of this commission and Sedov's appointment, had overseen an exploratory-studies team on satellites since 1953 (Siddiqi, 2008, pp. 530-533).

On April 16, 1955, a Moscow newspaper announced the creation of a forum for Soviet space exploration, named Interplanetary Communications Commission. Its purpose was clearly defined: «One of the immediate tasks of the Commission is to organise work concerning building an automatic laboratory for scientific research in space». The commission had very little decision-making influence on the Soviet space program. Its principal role was to enable Soviet scientists, not designers, like Sergei Korolev (1907-1966), to be involved in space-related conferences (Siddiqi, 2000, p. 145).

None of the commission members had any connection or direct contact with the URSS space and missile programs (Siddiqi, 2000, pp. 145-146; Siddiqi, 2008, p. 533), although they knew of Korolev's prominent role, as the Soviet chief designer. However, Leonid Sedov may have played a key role in mediating between Korolev and the IGY work, attending several international meetings to discuss the future of space exploration. Sedov became president of the International Astronautical Federation (IAF), from 1959 to 1961, an international organisation that included experts from several countries, including both superpowers.

2.3. Race for satellites

On July 29, 1955, the White House Press Secretary, James Hagerty (1909-1981), announced the US launch of artificial satellites for scientific purposes under the Vanguard Program as part of the country's participation in the IGY (Hartford, 1997, p. 124; Siddiqi, 2000, p. 146). On August 2, Frederick Durant III (1916-2015), president of the 6th International Astronautical Congress (IAC), organised by the IAF in Copenhagen, communicated the intentions of the Eisenhower's Administration.

In response to the announcement of the American project, Leonid Sedov, leading the first Soviet delegation present at an IAF congress (Hartford, 1997, p. 125), called a press conference that same day. Before 50 journalists, he said: «In my opinion, it will be possible to launch an artificial Earth satellite within the next two years. [...] The realisation of the Soviet project can be expected in the near future.» (Hartford, 1997, p. 125; Siddiqi, 2000, p. 146).

The Soviet satellite project was authorised on January 30, 1956, but Leonid Sedov may have been informed, by prominent Communist Party officials, of the August 1954 exploratory space research acceptance. Sedov's announcement at Copenhagen seems to have been decisive for Korolev's future work (Siddiqi, 2000, p.146).

3. REPERCUSSIONS IN *SCIENCE ET VIE*

The statements produced by the Eisenhower's Administration and by the Soviet delegation headed by Leonid Sedov, at the Copenhagen conference, generated immediate interest in the world press.

In the October 1955 issue, *Science et Vie* reported on US and USSR plans to launch an artificial satellite and discussed, in the article of the month, titled "La Terre lance son premier satellite à l'assaut du ciel", the success possibilities of such a project (Farjaud, 1955, pp. 28-34).

On November of that year, the first article on Soviet aerospace research was published in "Les fusées intercontinentales rendront la guerre impossible", concerning a supposed new intercontinental engine called Intercontinental Ballistic Vehicle (IBV), which worried the USA, based on a project of the Austrian aerospace engineer Eugen Sänger (1905-1964) (Dufour, 1955, pp. 104-109).

On February 1956, *Science et Vie* approached the technology of the hypothetical first artificial satellite, based on a model exhibited at the Hayden Planetarium in New York, in "La première maquette américaine du satellite artificiel" (Science et Vie, 1956, pp. 14-15). In the July issue of the following year, in the article "La vie dans l'espace est possible", with the eminent launching of artificial satellites, a group of specialists discussed the conditions for human survival in space, making optimistic predictions (Vincendon, 1957, pp. 54-65).

In the November 1957 edition, the magazine reported the success of the Sputnik 1 launch on October 4, in "La fusée intercontinentale soviétique", highlighting the scientific and strategic impact of the event (Rougeron, 1957a, pp. 66-77). In the December issue, Leonid Sedov is referred to as the main personality behind the Soviet satellite in the article titled "A quoi sert un satellite", for the occasion of the 8th International Astronautical Congress in Barcelona, held in October of that year. The Sputnik 2 mission is also described, as the first with a living being in orbit, highlighting the progress of the USSR against the USA, as well as its Vanguard project (Rougeron, 1957b, pp. 34-43).

4. FINAL REMARKS

Our study shows that *Science et Vie* has followed all the important events in the history of space exploration, from its genesis to 1957.

The broad thematic scope, and volume of information are characteristics of the magazine. There is a high level of detail in the language, as evidenced in the description of the technical information exposed and enriched with schemas, illustrations and data presented to the readers. As already mentioned, Camille Rougeron, a specialist in military affairs, was the main contributor to the publication in this period.

Soviet authorities did not publicly support the idea of space flight until the Copenhagen announcement on August 2, 1955. In this context, *Science et Vie* started to cover the Soviet aerospace program, in an article published in the following October issue.

The magazine compared American and Soviet advances even though not all information being publicly available at the time. Leonid Sedov would be seen in the West as the main face of Sputnik's success over the next few years, and *Science et Vie* corroborated this idea.

5. REFERENCES

ACPM. (2018). *Science & Vie – Chiffres*. Retrieved October 4, 2018, from Alliance pour les chiffres de la presse et des médias: http://www.acpm.fr/Support/science-vie#historique

d'Abzac-Epezy, C. (2004). La pensée militaire de Camille Rougeron: innovations et marginalité. *Revue française de science politique*, vol. 54, (5), 761-779.

Dufour, P. (1955, November). Les fusées intercontinentales rendront la guerre impossible. *Science et Vie*, (458), pp. 104-109.

Dupont, G. (1958, December). Les hommes dans l'espace. *Science et Vie*, (495), pp. 74-87.

Farjaud, H. (1955, October). La Terre lance son premier satellite à l'assaut du ciel. *Science et Vie*, (457), pp. 28-34.

Hartford, J. (1997). Korolev: *How One Man Masterminded the Soviet Drive to Beat America*. New York: John Wiley & Sons.

Jurdant, B. (1973). *Les problèmes théoriques de la vulgarisation scientifique*. Thèse de Doctorat de Troisième Cycle, Université Louis Pasteur de Strasbourg.

Lardier, C., & Barensky, S. (2013). *The Soyuz Launch Vehicle: The Two Lives of an Engineering Triumph*. (T. Bowler, Trad.) New York: Springer Praxis Books.

Rougeron, C. (1957, November). La fusée intercontinentale soviétique. *Science et Vie*, (482), pp. 66-77.

Rougeron, C. (1957, December). A quoi sert un satellite. *Science et Vie*, (483), pp. 34-43.

Ryba, J. (2013, May 22). *The Chroniclers: Jacques Tiziou*. Retrieved October 14, 2018, from NASA Kennedy Space Center: https://www.nasa.gov/centers/kennedy/about/history/chroniclers/tiziou.html

Science et Vie. (1949, Mars). La Terre vue d'une altitude de 100 km. *Science et Vie*, (378), pp. 167-169.

Science et Vie. (1949, May). Fusées et moteurs-fusées à l'assaut des records de vitesse et d'altitude. *Science et Vie*, (380), pp. 302-303.

Science et Vie. (1956, February). La première maquette américaine du satellite artificiel. *Science et Vie*, (461), pp. 14-15.

Semir, V. (2002, May). *Science & Media: the promotion of RTD culture and public understanding of Science*. Barcelona: Pompeu Fabra University. Retrieved October 4, 2018, from http://www.upf.edu/pcstacademy/_docs/sc_media.doc

Siddiqi, A. A. (2000). *Challenge to Apollo: The Soviet Union and the Space Race, 1945-1974*. Washington: The NASA Series.

Siddiqi, A. (2008, Mars). Sputnik 50 years later: New evidence on its origins. *Acta Astronautica*, vol. 63, pp. 529-539.

Villiers, M. (2013, Mars 26). *Qui sommes nous?* Retrieved October 4, 2018, from Science & Vie: https://www.science-et-vie.com/qui-sommes-nous

Vincendon, D. (1957, July). La vie dans l'espace est possible. *Science et Vie*, (478), pp. 54-65.

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Under giants: technical challenges and scientific accuracy in exhibits

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ABSTRACT: Skeletons and models of whales are common in natural history museums exhibitions. From a set of European and American cases this type of display became an analysis tool for scientific and curatorial practices. We advocate for the idea of exhibit design as a space for exchange of meanings and circulation of knowledge, practices and professionals. The fat of whale bodies poses challenges when it comes to the display of these giants' collections and to the conservation of their skeletons. Natural history museums have accepted these challenges as a proof of scientific authority and technical capacity.

1. INTRODUCTION

In July 2017, the Natural History Museum (NHM) opened a new exhibition in the Hintze Hall. One of its most important exhibits is Hope: a historical skeleton of a blue whale (*Balaenoptera musculus*), suspended in the air, as if it were diving in London's sky. This giant object replaced Dippy, the famous model of a *Diplodocus carnegii*.

Since the 19th century, skeletons and models of whales have been displayed in natural history museums. In this work, we collected cases of suspended whales in different natural history museums (skeletons and models). This type of display became an analysis tool for scientific and curatorial practices. We advocate for the idea of exhibit design (or display) as a space for exchange of meanings and circulation of knowledge, practices and professionals.

2. SKELETONS HANGING FROM THE CEILING

Beached whales were the first "public exposures" of these giants and also the first specimens in museum collections. During the 19th century, novel whaling techniques allowed the hunting of different species of whales and brought complete specimens to dry land. There was a partnership between whaling enterprises and natural history museums: whaling ships provided museum collections with new specimens (and species) and museum professionals joined whaling crews or stations seeking accurate measurements and photographs, better specimens or ecological data.

Frederick William True (Smithsonian Institute), Roy Chapman Andrews (American Museum of Natural History) and Andrew Halkett (Canadian Fisheries Museum) were some examples of professionals who worked with this kind of research practice (Knight, 2014; Sanger; Dickinson, 1997).

Giant skeletons demanded new structures and facilities in the museums. Richard Owen, the first superintendent of the Natural History Department of the British Museum, mentioned the large proportions and importance of the whale collection as an argument to transfer the natural history collections from Bloomsbury to South Kensington, where the cetaceans would have a specific central gallery (Hendry, 2017).

Whale collections also modified architectural structures in German museums in the 19th century. Most of the area of public exhibitions in the Museum für Naturkunde (Berlin) was occupied by specimens organized according to taxonomic categories, except for the atrium, which was reserved for large skeletons, such as whales. The same pattern was followed by museums in Hamburg: "*The ground floor, like the central atrium in Berlin's natural history museum, was dominated by gigantic whale skeletons*" (Nyhart, 2009).

Apart from European institutions, the museums in the Southern Hemisphere sought recognition in international scientific networks. Hermann Burmeister, director of the Museo de Ciências Naturales Bernardino Rivadavia (Buenos Aires), made great efforts to bring skeletons of stranded cetaceans found in Argentinian beaches (Podgorny; Lopes, 2014). In the Museo de La Plata (Argentina), the first exhibitions displayed huge marine mammals and fossils (Farro,

2009). As summarized by García et al. (2015): "*A fines del siglo XIX, la exhibición de ballenas en los museos era un gran desafío y un símbolo de prestigio institucional*".

In order to impress visitors, Frederick McCoy, the director of the National Museum Victoria (Australia), followed Richard Owen's exhibition scheme, with an innovation: in 1868, he placed an outdoor exhibition with a skeleton of a *Eubalaena australis*, at the rear of the museum (Sheet-Pyenson, 1988).

Seeking prestige, different institutions proudly display whale skeletons, since rarity and size are fundamental criteria. The display of complete skeletons of blue whales nowadays reflects this trend. There is a limited number of this type of displays, which are mostly found in North America (American Museum of Natural History, National Museum of Natural History, Santa Barbara Museum of Natural History, New Bedford Whaling Museum, Beaty Biodiversity Museum e Canadian Museum of Nature). In Europe, blue whale skeletons can be found in the Natural History Museum (UK), Göteborgs Naturhistoriska Museum (Sweden), Muséum National d'Histoire Naturelle (France). Apart from North American and European museums, other institutions have followed this trend: Kaikyo-kan (Japan), Regional Museum of Natural History (India) and in the Museo de La Plata, which has just a blue whale skull in the centre of the Mammals Hall. In these cases, the presence of these famous objects is highlighted on the institutional websites and social medias of the museums above mentioned.

3. SEARCHING FOR AUTHENTICITY: CONSTRUCTION AND REPRESENTATION OF WHALE MODELS

Dinosaurs and whales posed obvious problems for exhibitors interested in both scientific accuracy and popular elucidation. Unlike dinosaurs, whales could technically be observed – they still roamed the seas, albeit in increasingly dwindling numbers (Rossi, 2008).

Although cetacean taxidermy is technically impracticable, there is one successful case in the Göteborgs Naturhistoriska Museum, described by Grönberg e Magnusson (2009). "Malm whale" is a juvenile blue whale, hunted in the waters of Näset (Sweden), in October 1865. August W. Malm was the zoologist called to identify the "leviathan". He examined, measured, sketched drawings and coordinated the dissection. The skin was processed and finally fixed to a wooden frame with the aid of 30,000 zinc and copper pins.

However, this specimen demonstrated one of the technical challenges when it comes to cetacean taxidermy: measuring a dead animal in dry land caused distortions, since these animals' bellies are slightly flattened in aquatic environment and also because they quickly decompose. These kinds of technical challenges caused the wooden frame to be larger than the animal's prepared skin. For this reason, visitors can see a few slits on the skin of this specimen. (Grönberg; Magnusson, 2009).

Malm hoped to secure his scientific reputation. In 1867, the researcher published the documentation about the killing, towage into Gothenburg, scientific measurement, and the process of preservation of his whale in the publication *Monographie illustrée du baleinoptère trouvé le 29 Octobre 1865 sur la côte occidentale de Suède* (Illustrated Monograph on the *Balænoptera* Whale Found on the West Coast of Sweden on 29 October 1865). This illustrated 133-page folio was recognized by the international researchers (Rossi, 2010).

The search for authenticity and impact (besides skeletons) and the challenges posed by whale taxidermy, led to the construction of scientifically accurate models throughout the 20th century.

In May 1903, Frederic A. Lucas, chief osteologist and head of exhibits at the Smithsonian Institute, and two assistants William Palmer, chief taxidermist, and J. W. Scollick, osteological preparator, were dispatched by Frederick W. True, the Smithsonian Museum's curator of mammals and a scientific authority on whales, to the Cabot Steam Whaling Company's principal station, Balena, on Hermitage Bay, Newfoundland, to obtain the world's first full cast of a whale, which the Smithsonian would display at the Louisiana Purchase Exposition, in 1904 (National Museum of Natural History, 2010; Sanger, Dickinson, 1997).

The team made plaster moulds in sections, working down towards the median line (as Malm did while measuring the Malm' whale) of the stomach of a blue whale specimen which steamers had hauled in, measuring around 23.8m in length and weighing 70 tons. They returned to Washington with detailed moulds and a complete skeleton (Sanger, Dickinson, 1997). From the moulds, measurements and diagrams, they built a cetacean model made of wood and iron, covered in papier maché and painted in blue tones by Palmer. After the Louisiana Purchase Exposition, this model was suspended from the roof trusses of the South Hall in the Art and Industries Building. In 1910, when the U.S. National Museum (today the Smithsonian National Museum of Natural History) opened, it was mounted on a pedestal and placed at the centre on the Hall of Marine Life for more than fifty years (National Museum of Natural History, 2010; Rossi, 2010). The efforts towards the completion of such a complex and expensive project which resulted in the first full-scale model of a blue whale, was recognized with 15 awards and huge success in international fairs and in the museum exhibition (Sanger, Dickinson, 1997).

In New York, other blue whale model was built in

the American Museum of Natural History, in 1906. Under the overall supervision of James L. Clark, with the assistance of Roy Chapman Andrews and a team of twelve preparators constructed another full-scale model of a blue whale. Primarily using measurements, sketches, slides and photographs brought back from Newfoundland by Frederick Lucas, Clark set out to construct a far more substantial replica than that made by the Smithsonian Institution (Sanger, Dickinson, 1997; Rossi, 2010).

Before Hope occupied the centre of Hintze Hall in London, there were other exhibitions of skeletons and whale models. A Cetacean Gallery was part of Richard Owen's original plan for South Kensington, but the intended space for cetaceans in the new building was a "room in the basement, in which the specimens of whale-like animals, for which, on account of their large size (…). The room has, unfortunately, the disadvantage of being not well lighted, and of being intersected by massive columns, which interfere with the complete view of any of the larger skeletons" (British Museum, 1882).

Plans for a dedicated space for the display of whales were finally realized in the 1930s, following decades of funding problems, political manoeuvrings and the First World War. Hope, the contemporary icon of Hintze Hall, was first displayed in 1934. For this purpose, a new extension of the museum was constructed. The new facility's steel framework was exceptionally strong to support the huge skeletons suspended from the roof, and it needed wide doorways to admit their large skulls (Natural History Museum, 2017).

Besides the huge cetacean skeletons, NHM sought to build the most authentic model of a blue whale, based on scientific measurements of specimens. Under the scientific supervision of Francis C. Fraser, cetologist at the Zoological Department, the museum's technical assistant and taxidermist, Percy Stammwitz, and his son started work on the model in 1936. Stammwitz used giant paper cut-outs to measure the wooden sections and overlaid the structure with wire, before finishing it with plaster. After two years, the model was displayed as a complement to the blue whale skeleton and was considered an engineering feat. Nowadays this model is at the Mammals Gallery (Blue Zone) of the NHM and is the oldest blue whale model displayed in natural history museums (Natural History Museum, 2017; Rossi, 2008).

In the 1950s, the Smithsonian National Museum of Natural History started renewing some of its exhibitions, which would soon receive a new blue whale model. Rader and Cain (2014) described this process and the disagreement it generated among museum professionals, scientists, educators, designers and administrators. Hoping to bring the old hall in line with recent trends in science education and exhibition design, Frank Tylor (director of the institution) and Hebert Friedmann (chief curator of Zoology) and the Smithsonian designers team pushed for a narrative about themes of ocean exploration and long-standing myths about the sea. However, the scientific staff did not support this proposal, since they expected exhibitions to be more focused on their research findings, which reflected a rigid, discipline-based understanding of science.

The exhibition "Life in the sea" opened in 1963, with a new blue whale model as its centrepiece. Designers wanted the whale model not only to serve as a powerful embodiment of marine life but also to give the museum visitors a sense that they were immersed in marine environment (Rader; Cain, 2014). The 28.65m model was fabricated based on two sets of measures: from the blue whale model in the NHM and from a female blue whale caught off South Georgia Island (the whale #112). The British helpfully shipped to America 34 small templates made from their model. These were enlarged by the Smithsonian's team to form a skeletal wooden whale around which the final model was moulded. The Smithsonian's whale outgrew the British version by at least 0.3m. Moreover, some of the first underwater footage of whales, captured by Jacques-Yves Cousteau, was used to inform their design of the new model. Besides the advanced techniques of production used in its construction, lightweight plastics and fiberglass allowed for a more dynamic posture (National Museum of Natural History, 2010).

The models – and personnel – at the British Museum and the Smithsonian turned out to be valuable resources for the Exhibitions Department of the American Museum of Natural History to construct their blue whale model in the late 1960s (Rossi, 2008). The object became a centrepiece of the Milstein Hall of Ocean Life (currently considered "the AMNH's treasure") and is also an important landmark when it comes to the increasingly accurate knowledge about cetaceans (Quinn, 2006).

This is another example of the circulation of data, curatorial and scientific practices among American and European museums. Based on the correspondence between Richard Van Gelder (chairman of the Department of Mammalogy at the American Museum of Natural History) and Francis Fraser (British cetologist), Rossi (2008) demonstrated the exchange of references, scale models, photographs and critical commentaries about the Smithsonian's model. The absence of scientific data was, once more, a problem that affected the making of the details of this model. Van Gelder (1970) dramatically tells about how surprised and scared he was for not having found answers about the correct angle of the flippers, the width and depth of the grooves on the belly, the colour of the eye and of the body: "I began telephoning some of my mammalogist colleagues who are specialists on whales, and I got some more surprises. Most of them had never seen a blue whale either, or if they had, they hadn't seen enough of one to be helpful in the paint-

ing" (Van Gelder, 1970). The solution came from a practitioner: Ed Mitchell was the whaleman of the Canadian Bureau of Fisheries and was also a pretty good artist, who guided and supervised the Smithsonian team (Van Gelder, 1970). On the first Sunday that Milstein Hall of Ocean Life was open, in February 1969, the exhibition had more than 35,000 visitors, which was a new record for the Museum (Quinn, 2006; Van Gelder, 1970).

Thus, we noticed that the three blue whale models previously described were models from the same specimen: the whale #112, a large female hunted off South Georgia in 1925. It was among the largest of 1680 whales listed in the Discovery Reports, a collection of dispatches issued by a British Museum expedition to study whaling in the Antarctic. We also noticed that the 3 models have different sizes, according to the date of production: the more recent, the larger.

These facts illustrate important values to natural history museums and collections: the constant search for "the unique", "the biggest", "the most authentic".

In the 2000s, the Smithsonian's model was dismantled, but the institution invested in a completely new model in 2008. Phoenix is a model of a *Eubalaena glacialis* and the centrepiece of Sant Ocean Hall. Although it is smaller than blue whales, it represents a different way of production and the search for impact and authenticity. This model is unique because it represents a live animal that has been studied by marine biologists at the New England Aquarium in Boston and also because it is the result of four years of work and collaboration among exhibit fabricators, whale biologists, sculptors, painters and engineers. (National Museum of Natural History, 2010).

4. CONCLUSION

The architectonical challenges involved in suspending huge skeletons from the ceiling or the scientific and technical debates related to the construction of blue whale models highlight the fact that objects and their display create unique histories. Hope is a contemporary icon of a century-old tradition. The possession of giant skeletons has been a historical landmark that adds value and prestige to collections and scientific institutions. However, the process of construction of whale models opens a discussion on technical challenges, limitations of scientific research and the search for accuracy.

According to Henning (2011), the whale-object becomes a convincing whale not only through direct physical connection with the animal it represents, but through the rigor of the processes involved and the authority of science. This "epistemological coverage", as defined by Rossi (2010), could ultimately be utilized by exhibitors to argue that the model was just as viable, or just as authentic, as an exhibit made from a real whale.

Thus, placed in a non-linear chain with hunting, trade, science, engineering and art, whales are raised from the depths of the oceans and displayed on the ceiling of museums. The fat of their bodies poses challenges when it comes to the display of these giants' collections and to the conservation of their skeletons. Natural history museums have accepted these challenges as a proof of scientific authority and technical capacity.

5. REFERENCES

British Museu (Natural History). 1882. *A General Guide to the British Museum (Natural History): with plans and a view of the building*. London: William Clowes and Sons, Limited.

Farro, M. 2009. La formación del Museo de La Plata. Coleccionistas, comerciantes, estudiosos y naturalistas viajeros a fines del siglo XIX. Rosario: Prohistoria ediciones. García, S.V.; López, H.L..; Etcheverry, E. F.; Gómez, J.P. 2015. El taller de Taxidermia en la historia del Museo de La Plata. *Museo.* (27): 33-40.

Grönberg, C.; Magnusson, J.J. 2009. The Gothenburg Leviathan. Cabinet (33):1–9.

Henning, M. 2011. Neurath´s Whale. In Alberti, S.J.M.M. (ed.), *The Afterlives of Animals: a museum menagerie*:151-168. Charlottesville: University of Virginia Press.

Hendry, A. 2017. The Whale Story: Richard Owen. Natural History Museum. http://www.nhm.ac.uk/discover/the-whale-story-richard-owen

Knight, W. 2014. Modeling Authority at the Canadian Fisheries Museum, 1884-1918. Faculty of Graduate and Posdoctoral Affairs. Ottawa: Carleton University.

National Museum of Natural History. 2010. *A Century of Whales at the Smithsonian Institution*. https://naturalhistory.si.edu/onehundredyears/profiles/Whales_SI.html

Natural History Museum. 2017. *The Life of the Blue Whale 2017*. http://www.nhm.ac.uk/bluewhale/

Nyhart, L.K. 2009. *Modern Nature: The Rise of the Biological Perspective in Germany*. Chicago: University of Chicago Press.

Podgorny, I.; Lopes, M.M. 2014. El Desierto en una vitrina : museos e historia natural en la Argentina : 1810-1890. Rosario: Prohistoria Ediciones.

Quinn, S.C. 2006. *Windows on Nature: the great habit dioramas of the American Museum of Natural History*. New York: ABRAMS.

Rader, K. A.; Cain, Victoria E.M. 2014. *Life on Display: Revolutionizing U.S. Museums of Science & Natural History in the Twentieth Century*. Chicago: The University of Chicago Press.

Rossi, M. 2008. Modeling the Unknown: How to Make a Perfect Whale. *Endeavour* 32 (2): 58–63.

_____.2010. Fabricating Authenticity: modeling a whale at the American Museum of Natural History, 1906–1974. *Isis*. 101(2): 338–61.

Sanger, C. W.; Dickinson, A. B. 1997. The Construction and Display of the First Full-Scale Model of a Blue Whale: the Newfoundland Connection. Acadiensis XXVII (1).

Sheets-Pyenson, S. 1988. *Cathedrals of Science: the development of colonial natural history museums during the*

late nineteenth century. Kingston and Montreal: McGill-Queen's University Press.
Van Gelder, R. 1970. Whale on my back. *Curator* XII (2): 95–118.

Digital information and communication technologies: culturalism, literacy, and empowerment in pedagogical practices and in teachers' training of elementary education

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ABSTRACT: This article reflects on the pedagogical use of Digital Information and Communication Technologies (DICT) both in the initial and in the continuing education of Brazilian teachers. To do so, it shows two researchers about teachers' training to the pedagogical use of DTIC, respectively developed together with university and basic education teachers. The researchers used the theoretical frame of the socio-historical perspective of education. Based on concepts such as literacy, culturalism, digital culture and empowerment, the investigations point that there is a gradual process of digital literacy and culture, both in basic education and in higher education context.

1. INTRODUCTION

Digital information and communication technologies (DICT), as we know them today, is the result of human historicity and the technical phenomenon in this history.

Human relations with their cultures, ways of thinking and acting are constantly changing and becoming more interwoven with technological devices.

In this way, cyberspace supports intellectual technologies belonging to human cognitive functions such as memory, imagination, perception, reasoning, which favor new forms of access to information, new styles of reasoning and knowledge (Lévy, 1997).

In the sociotechnical context (Manovich, 2001), changes' speed occurred is at once incredible, perceptible, and alarming, and strikes us so surprisingly that sometimes we do not account for everything that is happening in our daily lives and in society.

According to (Serres, 2012), a new generation was born in a time of great development of information and communication technologies.

As Lemos (2015) shows us, historically, from the discovery of fire to the emergence of industry, technology and technology have always been intrinsically linked to the demands and changes of the society. In its concept the technical meaning (in Greek - *teknè*) is the practical activity, the knowledge, and the technology are the technical objects, the machines, and their respective manufacturing processes. Both are part of human nature, so technology and society cannot be analysed separately, because "there is a symbiotic relationship between man, nature and society" (Lemos, 2015, p.15).

In this relationship and from the human needs, techniques and technologies arise - the telegraph, the radio, the telephone and the cinema - and they develop - fusion of the analog telecommunications with the computer science, allowing the transmission through a computer of diverse messages and of different languages (written, oral and imagery).

Jenkins (2006) points out that in the culture of convergence we have witnessed a new relationship between politics and popular culture. Media devices such as YouTube may be relevant to the consolidation of a more participatory policy.

According to Castells (1996), in the network society the ways of storing information and distributing become independent, emerging the social network. And all of this is happening in the cyberspace and creating the cyberdemocracy (Lévy, 2002).

Cyberspace is the virtual place of interconnections, where information universes are housed, and cyberculture are the ways of experiencing and experiencing this social moment, in a technical and intellectual way, with new social practices, attitudes, thoughts and values included in this virtual place. According to Bonilla (2010) the digital culture is established, increasingly present in the daily life of contemporary society, in a contextualized and significant movement, in an integrative process, of cultural and communicative construction of the subjects, overcoming even the pedagogical issues in school.

Soares (2001) points that, in school, through the

use and reflection of the use of social networks and digital media, digital literacy occurs.

With the idea that everything can be accessed, it is necessary to discern, evaluate and focus on what you want to know. Society and school are faced with new ways of learning and knowing. The way to read the world is different. Interactivity in cyberspace leads us to other possibilities of seeing and understanding the world and people. The speed of information goes beyond the aesthetics and statics of the textbook. Thus, in the context of the school, the question of its role in the face of the social movement of cyberculture and the use of DICT emerges.

DICT, especially the computer and the mobile connectives did not only impact on education, but on all social segments, even changing our relationship with time.

Lévy (1997) as already warned us that any reflection on the future of education and training in cyberculture should be based on the relations we have with knowledge and on the recognition of the speed of emergence and renewal of knowledge.

To work is increasingly to learn, transmit knowledge and produce knowledge, understanding cyberculture and DICT within the school context, crossing the logic of the "use" of the tool or repulsion to the media devices, to enter the logic of interconnection, the possibilities of the shared knowledge in multiple times and spaces. In this logic, teacher training needs reflections on the paradigms related to praxis, breaking them when necessary, supporting in the construction of significant knowledge, in the developing of the professor's autonomy, producing real and liberating social changes, such as already pointed out by Freire (2003).

2. THE RESEARCHES

The two qualitative researches were carried out, respectively, at the Federal Public University of São Paulo - Brazil, in the Pedagogy course (an initial teacher's formation) and at a Municipal Public Elementary School in São Paulo - Brazil (a continuous teacher's formation).

The researches deal with these conceptual fields: a) Teachers' Training: Initial, Continuous; b) Language: Dialogism, Literacy, Multiliteracies; c) DTIC in School: Empowerment, Culturalist Approach.

The first case study investigates the teacher resignification, regarding to the pedagogical use of DTIC, in the graduation course of Pedagogy, at Unifesp. It was based on the social historical perspective in education and in the process of digital literacy. It concludes that: a) the trend of use and reflection of DTIC in education is closer to the constructionist approach; b) the culturalist approach, like said by Bonilla (2010) is showed in half of professor's statements; c) the 3 disciplines that fully contemplate the constructivist and culturalist perspectives of the use of DICT in education are optional; d) the pedagogical use of DICT should not be restricted to the didactic teachers' competence, but should be included as an integral part of their political educational.

The second one investigates the continuous teacher training in service, related to the use of the DICT in the elementary school, in a process of empowerment (Freire & Shor, 1986) of teachers and students. The course promoted critical reflection and confrontation with what they already knew and did with technologies, in their social practices.

Knowing and experiencing what exists in school was a differential for the group and contributed to overcoming the fears of the group. It has been extended the understanding that the teacher of informatics education as a professional who collaborates, who can and should contribute to the formation of this group of teachers, as well as present and study together with the teachers the educational technologies available in the Network. The integration of DICT took place in the didactic sequences linked to the school's major projects and/or the individual projects of each teacher. The demands for the school absorb the pedagogical teacher's time and, as a result, the pedagogical use of the DICT ends up being secondary. Therefore, almost all the testimonies request the continuity of the training with this approach. There was mobilization from the course and the process of empowerment of these teachers begins to provoke changes in teaching practice. The course contributed, so that teachers assign another role to the Computer Laboratory and POIE, re-signifying their pedagogical practices, based on the educational use of DICT and collaborative work. The course, as a Collaborative Work in an Authorial Perspective, brings a differentiated movement to the school, constituting a space for expansion of the uses of the DICT to produce knowledge, mainly by the students.

Both studies can be taken as examples: a) of the use of DICT in Brazilian education; b) of the public policies adopted in this country related to the pedagogical use of DICT.

The second investigation also conclude that, besides training, problems with infrastructure (network connectivity, software, equipment and so on) are important variables to achieve changes in teaching practice.

Both researches point that: a) there is a great resistance, by some teachers, regarding to the pedagogical use of DICT, either because of ignorance or fear; b) to offer to the students a full experience in the cyberculture, it is very important to develop teacher's training in terms of pedagogical and social use of DICT, in a cultural perspective, both in the initial and in continuing training; c) although teachers

use technologies in their daily lives, pedagogical transposition demands a continuous training; d) empowerment is a latent process for some teachers, while for others it appears in a digital literacy perspective; e) it is very important to invest in continuous formation, mainly considering the fragilities of initial formation, regarding to the pedagogical use of DICT.

3. CONCLUSION

This article aimed to bring a brief reflection, in the context of teachers' education, based on two researches carried out in Brazil on possible changes in pedagogical practices, regarding to the use of TDIC in the school's context. Their theoretical frame is based on the theories of literacy, digital culture, empowerment (Freire & Shor, 1986).

The two described researchers – developed by Carneiro (2017) and by Vieira (2017) – point out in their results that there is a gradual process of digital literacy and culture both in basic education and in higher education context. However, the pedagogical use of DICT, by teachers, still happens, in most cases, as new tools to help old practices. It is precisely for this reason that we must to invest in the continuing training, because it influences new practices based on the potential of media devices.

4. REFERENCES

Bonilla, M. 2010. H. Public policies for digital inclusion in schools. Motrivivência [Internet]. 34(1): 40-60. Available from: https://periodicos.ufsc.br/index.php/motrivivencia/article/view/17135DOI: https://doi.org/10.5007/%25x

Carneiro, G. 2017. Pedagogical use of the TDIC: case study of the continuing education of teachers in service at a municipal school in the eastern zone of São Paulo. Dissertation. Master's in Education. Federal University of São Paulo, São Paulo.

Castells, M. 1996. The rise of the network society. Cambridge: Blackwell Publishers.

Freire, P. 2003. Pedagogy of autonomy: knowledge necessary for educational practice. Rio de Janeiro: Paz e Terra.

Freire, P. & Shor, I. 1986. Fear and daring: the teacher's daily life. Rio de Janeiro: Paz e Terra.

Jenkins, H. 2006 Convergence culture: where old and new media collide. NY: New Your University Press.

Lemos, A. 2015. Cyberculture: technology and social life in contemporary culture. Porto Alegre: Sulina.

Lévy, P. 1997. Cyberculture. Paris: Éditions Odile Jacob.

Lévy, P. 2002. Cyberdémocratie. Paris: Éditions Odile Jacob.

Manovich, L. 2001. The language of new media. Cambridge, Massachusetts, London, England: The MIT Press.

Serres, M. 2012. Petite Poucette. Paris: Éditions Le Pomier.

Soares, M. 2001. Literacy: a theme in three genres. Belo Horizonte: Autêntica.

Vieira, P. 2017 Teacher training and digital technologies: a case study of Unifesp Pedagogy under a dialogic approach. Federal University of São Paulo, São Paulo.

Building Knowledge from the heart. History of Emotions contribute for History of Education. The love for science in Teachers of High School San Isidro (1835-1900)

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ABSTRACT: This research analyses the importance of feelings for teacher's profession during the process of configuration of Liberalism (1835-1880) when the political system faced the primacy of universal public education. It addresses the subject's responsibility for the creation and transformation of Secondary educational system in the XIXth Century in Spain. Focusing on Cultural History, it reveals the importance of emotions to structure the public trajectory of a job, opening a new field of analysis usually forgotten. The approach to teacher´s attitudes of San Isidro High School (Madrid) gives a clue to the educational system: the documents they wrote, and especially the administrative dispute between professors Pereda and Santisteban, become expressive of an arena where feelings took the preeminence on teaching. It concludes that during the implementation of Liberalism, emotions where essential to boost science and build a new model of education, on behalf of public cause and Scientific Knowledge.

1. LOVE FOR THE PROFESSION IN A HISTORICAL PERIOD OF CHANGE

1.1. Passion for teaching[*]

"*Love for teaching*" was argued constantly by several professors of the most important high school in Spain´s capital between 1835 and 1900. That record appears in *Memories* of the *Instituto San Isidro* from Madrid (ISI), in publications or administrative documents written by teachers.

Nevertheless, Modern Period history books of high school education use to forget about the emotion's perspective, maybe following the classical pretension of being more objective. Positivism has been the current perspective in Education History, which leads to study descriptive and quantitative elements. For example, the theories that teachers taught, the books they wrote, characterize those schools and classrooms or detail laws and official rulings. That panorama is shown with the public profile of the subjects, reflecting a classic *cursus honorum*. So, rarely is written the biography of teachers on daily life, and hardly taken any attention of their feelings and personal emotions. Then, they just look into knowledge of science, but not to the love for science. Constantly a vital part of the subjects is mainly forgotten (Ortega y Gasset, 1941).

1.2. Search for the role played by love

The fact is that it is necessary to recover and interpret correctly the real meaning of emotions in a profession. Especially when teachers themselves gave an insistent record of their feelings, directly linked to the job of teaching. They showed their love for teaching as more valuable than their own curriculum.

So, this study analyses how intensity of emotions of teachers towards its job increased its personal commitment for teaching. Beyond than the employment itself, it focuses in the affective part of a profession.

With this case study I want to elucidate which was the role that feelings played to configure a public job; to make clear the importance of that sensibility for the individual (Febvre, 1941: 5-9); and to enlarge the relevance of perception about feelings, in symbolic terms.

Paying attention to those questions can lead us to discover a fact that has been commonly forgotten in Modern History. However, is essential for the development of teaching science during the process of configuration of the public school while the implementation of Liberalism.

[*] M. Zozaya-Montes is a Researcher at CIDEHUS-UÉ, (grant ref. UID/HIS/00057/2019 from the Portuguese Foundation FCT). This research began with Projects CEIMES and IBEREDUCA, "Dinámicas de renovación educativa y científica en las aulas de bachillerato (1900-1936)", Ref. HAR2014-54073-P, *IP:* L. López-Ocón. Has been made within the project "Prosoparlam", *IP:* J. Aguirreazcuénaga, Ref. UPV/EHU-MINECO. HAR2014-53974-P.

1.3. Liberalism: a crucial moment of change

This study focuses on the ISI Institute, one of the most important High School in Spain together with Cardenal Cisneros of Madrid. Both were recognized as the best of Spain ("first class" bachelor degree institutes), and in fact they shared teachers and facilities with Complutense University of Madrid.

The importance of those pre-university colleges on the scientific world was originated on the historical context: it was the period of the configuration of public educational system in Spain. The end of *Ancient Régime* and the arrival of Liberalism in the 1830´s, meant the beginning of progressive implementations for modernity. Among other changes who differentiate Early Modern Period to Modern Period I can highlight the following: the -early- Constitutional System, the promotion of equal rights and the merge of merit values; the centralization of State´s administration, which established levels of quality and categories of institutes and teachers, with promotion ladders. The most remarkable change was the reorganization of the educational system between 1836 and 1845 (*Mon & Pidal* Laws), as public and presumably universal for all citizens (but not free). Also, the economy was ruled by capitalism and entrepreneurship attitudes, which lead some teachers to establish private schools, even when working at public Secondary School.

When arrived the Constitutional system since 1835 is assumed that new values of Liberalism were playing a particular role on modernization, as works of merit or the credit given by bourgeoisie to work itself. But, in my opinion, more things have to be considered to understand that changing process. Specifically, introducing personal likes and own opinions as if they were measurable criteria to evaluate their public job. I mean, elements beyond scientific quality, as virtues of love or feelings.

2. CASE STUDY ABOUT EMOTIONS

2.1. Incorporating the love for profession in the curriculum?

We have observed how feelings were argued as a proof of better performance of a job. *Love for science* was continuously remarked by different teachers in various contexts or sources. It seems like the emotions felt for teaching counted as much as their scientific results in the education matters. Then, affectivity helped to build the concept of the profession. Also, I can consider that those teachers were building an "emotional community" (Rosenwein, 2010:11) about the love for teaching, adding more intensity to the profession with another magnitude.

We can quote some illuminating examples. Phd in sciences professor Bernardo Rodríguez Largo, being secretary of the ISI, organized a meeting of teachers in 1876. He received all the scientific cloister as "favourite brothers". In that session he lamented the death of ecclesiastic professor of Latin and Language's Ciriaco Cruz, who was "well versed as few scholars" in his area of knowledge, remarking that the deceased left good and pleasant memories "of his virtues, science and love for teaching" (*Memoria*, 1877: 6). Also, when professors Benigno Carballo and Mariano Nicolás died in 1864, ISI director Antonio Corte Ruano held a great farewell, remarking "the noble example that both professors gave with its perennial love for teaching, virtue which enhance human being and make him capable of practising all Christian virtues that both deceased possessed" (*Memoria*, 1865: 9).

When teacher of politics and geography Mariano Muñoz Herrera quit school in 1876 due to be elected as MP, he had to reject his charge of auxiliary teacher at ISI, but: "guided by its love for teaching and the ISI Institute, he continued teaching for free the chair of Geography and Statistics that was entrusted to him, with the zeal and working diligence that had characterized him the years before" (Rodríguez Largo, *Memoria*, 1877).

Is possible to follow this love for science in the testamentary legacies, which reveals a deeper meaning to that emotional connection. Design teacher Mariano Borrell energized science by creating an award in 1893 to aid the poor pupils of ISI institute, stating: "In order to provide a clear signal of the zeal that I have always had for teaching, I want to give a small gift to the establishment where -during more than 40 years- I have had the approval of my bosses, the consideration of my colleagues, and the affection of my pupils" (AHP, T.MB, L. 37494, fol. 945vº-946vº, 1893).

Likewise, professor of Natural Sciences Sandalio Pereda reflected that love within his testament, when donating money to the servant´s ISI Institute, his books and collections to the ISI, or money to the Laboratory of Natural History. With all his work towards that Lab, it passed from 206 objects to 12.000, being the most important of Spain (Simón Díaz, 1952-9: 470-5). Besides, his will of being dressed and shrouded in professor´s suit and with the mortarboard (AHP, T. SP,1885, L. 3552, fol. 321-320rº), expressed the same love for his profession to posterity. Also, in the ISI Annual Records, he proclaimed his love for educational world and his satisfaction awarding the best pupils. Thus, he remarked that he felt he was "equal to other distinguished professors, maybe not in knowledge – saying with rhetorical modesty- but in zeal and love for teaching" (*Memoria*, 1871: 2). In the speech for becoming a member of the National Academy of Sciences, he remarked that, he was linked to his predecessor on that academic title by "two high aspirations: love of science and protection of

misfortune" (Pereda, 1870: 8). So, he did not argue the knowledge, but the feelings for teaching.

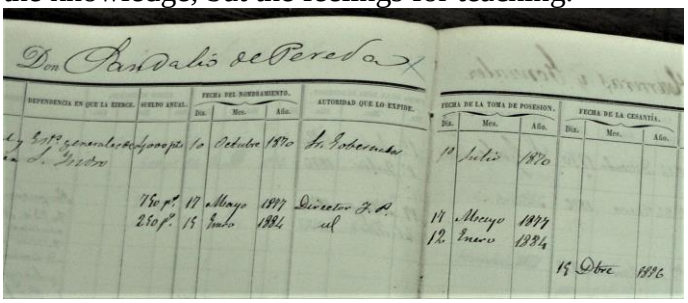

Figure 1. Detail of the Professional Expedient of Sandalio de Pereda. Parallel trajectories during the quarrel. *Teacher´s books of San Isidro High School.AHISIM, 1870-1886*

2.2. Emotions of two teachers revealing a good job.

Those information display how feelings were argued as a scientific proof of improving a good job. The aforementioned situation is better shown when appeared a personal rivalry between two professors, Mariano Santisteban and Sandalio Pereda. Both carried out a kind of administrative hostility. The result was a correspondence directed to the general administration (AGA 1, 2 & 3 *[*]). In all the documents of those three expedients it can be seen constantly how love for teaching was argued as a matter of fact, as a profession pillar.

The conflict was caused because Mariano Santisteban opened a private school in 1868. That was a common attitude since during that period, wages of public Secondary School were small, and sometimes was not paid regularly. Then, they use to teach also in private schools (Martín, 1994: 144) and some of them, as Mariano Santisteban, even funded and directed his private own college. When that happened, the pacific coexistence between both professors finished. Sandalio Pereda wrote to the administration to relate the harassing situation. He said that, before 1868, Santisteban was a very good teacher. He gave to pupils' free classes and rehearsal of Physics. By then, Pereda even "praised the zeal, interest and activity towards science" of Santisteban. But in 1868 he founded his Polytechnic School, and with "mercantilist objectives for science", "not guided by his love for teaching", Santisteban declared an unfair competition to the ISI school because of its own capitalist business.

Afterwards, Santisteban began to say hostile words towards the ISI laboratory material, saying that, from 1861 to 1875 it had not been improved at all. He made a discredit campaign between pupils and their parents. To announce the solution to -what Santisteban called- "that deplorable scientific situation", he even gave flyers of its own school in the very door of ISI Secondary School. As Pereda said, with that attack Santisteban was denying the "zeal and care that all ISI directors had played to increase the collections of the Natural Sciences laboratory". Besides, Santisteban said that its own Polytechnic laboratory was the best (when that was materially impossible).

Likewise, Mariano Santisteban "injured" directly Sandalio Pereda, saying that Santisteban "loved science just for science itself", not as those men who -pointing Pereda- "above science and its progress in teaching media, always put forward their personal interest". When Santisteban attacked the scientific merit and teaching job of Pereda, he resolved that it was against "my credit and my honour, which I love even more than life itself".

During this process it is clear that the feelings for science were really important for teachers, even altering its scientific practice. Theories agreed that some emotions are learnt culturally, depending on the social context, and are capable to determine a kind of behaviour (Frevert, 2010, 87-140; Reddy, 1999; 2001). In this case, it is easy to sustain that those strong feelings towards science -even when speaking about a rivalry- were conditioning the action which enhanced the public teaching system. As far as those teachers wanted to show their love for science, they made more merits to be recognized with the status of the pure vocation for teaching.

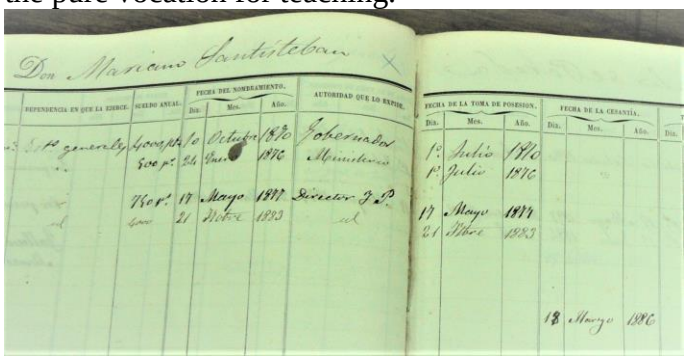

Figure 2. Detail of the Professional Expedient of Mariano Santisteban. Parallel trajectories during the quarrel. *Teacher´s books of San Isidro High School. AHISIM, 1870-1886*

3. CONCLUSIONS:

3.1. Changing from the heart

We have revealed in these pages how love for teaching was considered an essential virtue for professors, even more than scientific results. Nevertheless, this view of emotions is silenced in common historiography of education in Modern Era. But, why is important this perspective? In our opinion, because it allows to rescue the historical subject and it offers new interpretations about a changing period:

[*]** AGA Archive Documents that we have to thank teacher Leonor González Lastra, of San Isidro School, Madrid.

Firstly, it gives emphasis to the role played by individuals to develop science following their impulse, based in the love for teaching concept.

Secondly, the intensity of their emotions apparently consolidated teaching practise, showing how private feelings had influenced in an improvement of working life.

Thirdly, personal impulse on a Secondary School invigorate science and the public educational system. Those teachers promoted science: energizing the laboratory; giving donations in the testament to the ISI, and increasing the laboratory collection. Then, I can conclude that the vivification of science came "from below", I mean, from individuals (as citizens impulsing an "emotional community") to the State´s public educational institutions.

Fourthly, crossing private life and public job would lead us to rescue the significance of feelings to shape an educational model system which was consolidated by then. Thanks to this gaze of *professional* emotions I can state that during the process of implementation of Liberalism system, subjects were essential for educative changes, when social networks and personal attitudes were crucial, and helped to create a particular teaching system of Modern History Age.

4. REFERENCES

4.1. Primary Sources

National Archive of Spanish Administration (AGA), private correspondance ***: AGA: Exp. IDD (05) 017.000:

AGA1, Exp. Premio M. Santisteban, with critics by M. Pereda. Sign. 201704061648-1, 14 pp.

AGA 2, Conflict with Santisteban written by Pereda. Sign. 32 - 08527-00002, 65 pp.

AGA 3, 1875. Santisteban Politechnic School, Sign. 01707241236 (1). 28 pp.

Historical Archive of Protocolos of Madrid (AHPM):

AHPM: Testament S.Pereda, Leg.3552, 06-V-1885.

AHPM: Testament M.Borrell, Leg.37494, 9-V-1893.

4.2. ISI Secondary School. Annual Memories or books.

Memoria (1865): *Memoria acerca del estado del Instituto de 2ª Enseñanza de S. Isidro* [by Corte Ruano, J. A.]. Course 1863-1864. Madrid: A. Gómez Fuentenebro.

Memoria (1871): *Memoria acerca del estado del Instituto de 2ª Enseñanza de S. Isidro* [by Pereda Martínez, S.]. Course 1870-1871. Madrid: A. Gómez Fuentenebro.

Memoria (1877)*: Resumen acerca del estado del Instituto de 2ª Enseñanza de S. Isidro* [by Rodríguez Largo, B.], Course 1876-1877. Madrid, A. Gómez Fuentenebro.

AHISIM:Historical Archive of San Isidro of Madrid: Book of Teachers of San Isidro High School. 1850-1930.

4.3. Bibliography

Febvre, L. 1941. Comment reconstituer la vie affective d'autrefois ? La sensibilité et l'histoire, *Annales d'Histoire Sociale* 3: 5-20.

Frevert, U. 2010 *Emotions in History, lost and found*. Brussels: CEU Press.

González Lastra, L. & Guijarro, V. 2010. *La quimera del autómata matemático*. Barcelona: Cátedra.

González Lastra, L. & Guijarro, V. 2000. *Instrumentos científicos para la enseñanza de la física*. Madrid: Ministerio de Educación y Cultura.

Martín Jiménez, I. *El sistema educativo de la Restauración en el Distrito Universitario de Valladolid*. Valladolid: Junta de Castilla y León, 1994.

Ortega y Gasset, J. 1941. *Estudios sobre el amor*. Madrid: Revista de Occidente.

Pereda, S. 1870. *Discursos Leídos ante la Academia de Ciencias Exactas, Físicas y Naturales*, Madrid: Vda. Aguado.

Reddy, W.M. (1999): Emotional Liberty: Politics and History in the Antropology of Emotions, *Cultural Antropology* 14 (2), pp. 256-288.

Reddy, W.M. 2001. *The Navigation of Feeling: A Framework for the History of Emotions*. Cambridge: University Press.

Rosenwein, B. 2010. Problems and Methods in the History of Emotions, *Passions in context*, *Journal of the History and Philosophy of the Emotions* 1(1).

Rosenwein, B. 2016. *Generations of Feeling: A History of Emotions, 600–1700*. Cambridge: Cambr. University Press.

Simón Díaz, J. 1972. *El Instituto de San Isidro (1572-1972).* Madrid: Instituto de Estudios Madrileños, nº 8.

Simón Díaz, J. 1952-9. *Historia del Colegio Imperial de Madrid, del Estudio de la Villa al Instituto de San Isidro, 1346-1955*. Madrid: Biblioteca de Estudios Madrileños.

Simón Palmer, C. 1972 *La enseñanza privada seglar en Madrid*, Madrid, CSIC.

Zozaya-Montes, M. 2012. "Estudiando al profesor. El caso de Sandalio de Pereda en el Instituto San Isidro", In: L. López Ocón, S. Aragón, M. Pedrazuela (eds.), *Aulas con memoria. Ciencia, educación y patrimonio en los institutos históricos madrileños*. Madrid: Doce Calles, pp. 189-207.

Notes about the history, architecture, and heritage in the railway station of Almería (1892-2017)

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ABSTRACT: Most of the life cycle of the railway infrastructures is singularly long-lived. In addition, many of these stations were born in the 19th century with a symbolic representation load with which they have not still parted. This is the reason why many analyses referred to railway heritage are emotionally charged. In our study of the case, the railway station of Almería, 125 years after its construction, the building remains without use since in 2000 was replaced by the attached intermodal station, which has led at present to an intense debate on his preservation and reuse. It is a building that, despite possessing singularities and architectural relevancies of great interest, the process of patrimonial protection is unfinished being a clear threat to the integrity of the building. As it is exhibited in the text, despite the modesty of the railway company that built it, the building stands out on most of the principal stations of Spain.

1. INTRODUCTION

In the researches made on the architecture of the railway stations built during the nineteenth century, two ideas have symbolized the function exercised from that moment by these new buildings in the main cities: on the one hand, they were constituted as the new entrance doors and departure to the city and, also, they became the new cathedrals of the contemporary world (Meeks, 1995).

This text has, therefore, as main goal the integral study of the travellers building of the Almería railway station, from its business origins, the construction and operation of the passenger building, the renovations carried out, and, finally, to the current situation about the heritage protection.

Our objective is the dialogue between the contributions of economic history, architecture and industrial archaeology to build a discourse that contributes to the preservation and proper use of the building.

2. THE HISTORICAL FRAMEWORK OF THE RAILWAY IN ALMERÍA

The Linares-Almería railway line was one of the last of the Spanish network to be built. In particular, the completion of the section from Guadix to Almería took place in 1895 and the link with the general line in Baeza-empalme was held in March of 1899. At that time only, the main cities of the Spanish provinces Soria and Teruel did not still have railway service.

The delay in the arrival of the railway to Almería was attributed to the lack of interest of foreign investors, the main financiers of railway construction in Spain during the 19th century, also because it was a peripheral railway line passing through territories with a very complex orography and even with scarce demography.

Figure 1. View of main facade of Almería Railway station. Source: Spanish Railway Foundation, 2006; Picture: José Morón.

This delay put in the head of the project a singular businessman who was the promoter of the building and the owner of the company until his death.

The business forms of Bosch took special care of their image with the intention of impressing their

partners and customers, being political relationships at the highest level the axis of his strategy. This is reminiscent of the ways of another Spanish railway entrepreneur, José de Salamanca (1811-1883), who had starred in the glare and decline of the railway in Spain during the decades from 1850 to 1870 (Broder, 2012).

The Spanish Southern railway company was made in the image of the strong personality of its main shareholder, Mr. Bosch, who made that almost all the actions undertaken by the company had something of exaggerated pursuing goals and achievements hardly expected such a modest company (Cuéllar & Sánchez Picón, 1999, Cuéllar, 2011).

It was then logical, that the company conceived as something special the proposal of the construction of the travellers building since it should be representative of the category, identity, and power of the company. Therefore, resources were not spared in the construction, hiring one of the most important companies in Europe in the railway sector, the French company Fives-Lille. This, by special order of Bosch, conceived a building of "great architectural character". The definitive project was sent to its approval by the General Direction of Public Works in Madrid in 1892 (Historical Railway Archive (onwards, AHF), A-121-01).

3. ARCHITECTURAL ANALYSIS OF THE BUILDING

3.1. Regarding typology

The typology of the Almería station is peculiar since it does not adopt the typical solutions used in other Spanish stations, most of which, especially passing stations, used the type of one building on one side of the tracks (“I” shaped stations) or the "U" shaped specially for terminal stations typical in the big cities.

Thus, the typology of Almería station would be a combination of both solutions being a "U" shaped timidly expressed, with small wings oriented towards urban space on one side of the track. Although the station was terminal the railway line was continued to the nearby Almería port and probably, that is the reason of the peculiar building shape.

3.2. Regarding functionality

As regards functionality, the building has two floors except for the hall which is developed on a monumental scale. The monumentality may be due to two reasons: on one hand, the intentional effect of monumentality, better called pseudo monumentalism, as a representation of the company power. On the other hand, the intention of showing a sincere language according to the properties of the new material (steel) that allows big lights and heights and, consequently, to achieve monumentality without intending it.

It is noteworthy that this travellers building gives great prominence to the departure hall which, in addition to occupy the most prominent position in the plant, is projected with twice the space as the arrivals located on the left wing of the ground floor.

3.3. Regarding composition

The main facade presents the classical tripartite composition typical at railway stations based on mirror symmetry. The axis of symmetry is emphasized with two key elements: the clock and the name of the city. It also presents the tripartite scheme in the arrangement of the three bodies that form the building: one central, two lateral and two ends, with dimensions respectively of 16 m, 12 m, and 7.5 m. Furthermore, each of the three bodies is dimensioned in a hierarchical manner, giving greater dimension to the most relevant in the composition.

The central body represents the tripartite scheme by metal posts and with the presence of the three main entrances to the building. It also emphasizes the central body, and the main access, changing the scale: human scale for the lateral and extreme bodies with clear distinction of the two levels and "giant order" for the central body. This change of scale is illustrative of the inside distribution, with two floors in the entire building except for the central body - coinciding with the lobby - which is projected at double height as reflected by the facades. In summary, the classic resource of, by means of the facade composition, showing the main distribution of the building.

Analysing the composition, it is discovered the use of golden proportions in the central and extreme bodies of the building. The different geometric relations discovered are shown in the figure added. For instance, the central body is inscribed in a circle whose centre is the clock, also emphasizing in this way, the importance of this element.

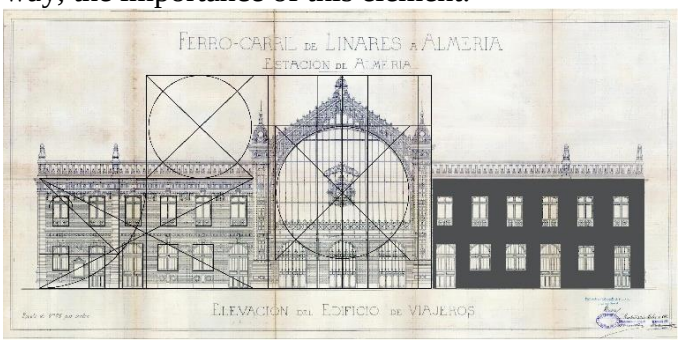

Figure 2. Study of proportions and relationship between massive and hollow in the travelers building of Almería railway station (1892).

3.4. Stylistic and ornamental aspects

The mixture of styles is shown in the classicism used as the basis of the composition, at the disposal of Roman arches, triangular pediment, baseboards, stone corner cushions, baluster, stone entablatures with its variant of triglyphs and metopes, combined

with Moorish style influences such as the brickwork and the cross-shaped handrails. It is also found gothic pseudo pinnacles and beaux-arts style cresting. On the other hand, the analysis of the original project reflects that the original roof baluster was neoclassical style, however, the one that exists today, and which is now in the process of rehabilitation, was done in Moorish style.

3.5. Construction and materiality

Dissertation on the use of brick: Steel-brick combination that the station of Almería presents has its origin in France. In the 19th century, walls made by brickwork left in view on the facade, a material with a long constructive tradition, had become unpopular. However, towards the middle of the century, these two materials returned to prominence with the construction of Les Halles by Víctor Baltard. This combination that was brought to Spain with the construction of the Almería station being a novelty in the construction of railway stations. However, other contemporaneous and more relevant stations, such as Valladolid Campo Grande (1895), Sevilla Plaza de Armas (1901) or Valencia Alameda (1902) did not bring any novelty to the architecture of the railway stations.

Materiality of the project: The structural configuration presents the typical arrangement of the structures designed based on load-bearing walls composed of orthogonal cells that combine main walls with tie walls. The main metal trusses that form the structure of the central body are triangular porches based on lattice beams composed of triangular "L"-shaped steel profiles with stiffeners in the joints running monolithically from the foundation to the ridge. This type of structure is also unique.

Almeria is the first case of a Spanish station where the passenger lobby openly shows the large metallic structure reserved for the train space. We will have to wait for the extension of the Barcelona-Nord station in 1910 to find a similar case, although note and this adds more value to the Almería station, the notable differences between the size of the cities, Almería and Barcelona, and between the companies that built them: the powerful North of the Péréires Brothers and the ambitious South of Bosch, respectively.

Added values. Constructive sincerity: The travellers building of the Almería station, in addition to the richness described in proportions as well as in style and materiality, presents, from the point of view of construction, the added value of didactically expressing aspects related to the nature of the different materials and its structural behaviour.

4. RENOVATIONS CARRIED OUT

The railway operation is an activity in continuous evolution that subjects its facilities to constant transformations, being necessary numerous reforms that do not keep the buildings in their original state.

It is thus easy to understand that any railway station is conserved in the same state in which it was built, although the intensity of the changes is variable. In the case of Almería station, works and modifications have been constant from the moment of its construction, but almost all of them of little importance reason why, in general lines, the integrity of the building has been maintained from its origin. Both in regard to the complementary facilities that make up the entire railway station, understood in its broadest sense, as in the case of the historic building, object of study, have been preserved in a similar state to the original.

This suggests that, despite not having been able to locate other reform projects until 1987, and since the 1930 proposal was pending, between the 1940s and the 1960s, other reform works had to be carried out determining the distribution and uses of the building found in the 1987 reform project such as, for example, the installation of a canteen inside the building.

The 1987 reform project was the most important one carried out in the travellers building of the Almería railway station, being part of the "Modernization and Station Equipment Plan" launched by RENFE in the 80s. It is interesting to note that the aforementioned project does include a historical review of the building but does not mention the initiation of the procedure to declare the building as an element of the Spanish cultural heritage that had taken place barely two years before, as we explain later.

This project was executed between 1988 and 1991 and had as objectives the treatment of the existing pathologies in the building, the interior reorganization of the spaces in relation to the existing uses, the recovery of the waiting room in the space that was occupied by the aforementioned canteen, and, finally, the partial arrangement of the exterior space with the demolition of the toilets and the construction in its place of the new canteen surrounded by a garden area.

5. HERITAGE SITUATION AND BUILDING PROTECTION

Regarding the patrimonial protection of the building, we must point out that the procedure of declaration of historic-artistic monument was started by resolution of April 1st, 1985 of the Fine Arts Administrative Office of the "Junta de Andalucía", and since that, according to the provisions of the legislation, all the works that were to be carried out in the building had to have the prior approval of the aforementioned state organism (BOJA, 35, 17-04-1985).

On the other hand, as a continuation of the procedure and by resolution of June 15, 2005, of the Fine Arts and Cultural Assets of the Spanish Ministry of Culture Administrative Office, it was agreed to open

a period of public information for the declaration of the station as a monument. It is important to indicate that, since the application of the 2003 Rail Sector law, the station belongs to the Spanish Railway Infrastructure Administrator (ADIF).

Despite this, the case started 33 years ago, has not continued until the declaration as a monument of the historic building of the railway station of Almería as would have been logical and desirable. But, because there has not been any complaint about the delay in the procedure, the case remains open pending resolution.

This situation must be solved immediately as it is contrary to the Law and, the owner of the property must protect it as a unique element of the Spanish industrial heritage, as we have discussed in the preceding pages being applicable in future actions, the recommendations of the National Industrial Heritage Plan (2011): Inventory, Study, Master Plan, and Project. In this way, the basic objectives of protection and reuse will be covered to guarantee the survival of the historic building.

6. CONCLUSIONS: DEBATE ON THE FUTURE OF THE BUILDING

Since the inauguration of the Almería intermodal station in May 2000, the historic building has been left with minimal and private railway use, since only the circulation manager's office is inside. No one since then has been able to pass through the imposing lobby losing people in addition to the use, the enjoyment of the monument.

Regarding the architectural interventions carried out in the travellers' building of the station, we conclude that they have been unfortunate. If it can be demonstrated, the replacement of the roof balustrade with the brick railing changing the concept, harmony or overall image of the building, would be the most flagrant intervention suffered outside the building. From the interior, we have already described substantial changes of pavements or coatings among others, that have altered the configuration and the perception of the building forever. In short, actions carried out without an exhaustive prior analysis, without discussion or shared criteria and of course without understanding the logic of the building as mentioned above, and without thinking about the heritage consideration. Any intervention can be able to keep both the identity of the building and the environment.

The future use of the historic building is not a new debate, at all. When the issue was discussed in 2000 after the opening of the new nearby intermodal station, many proposals were raised from different forums (State Administrations, citizen groups, etc.). We can summarize that the two basic ideas raised were: firstly, to return the building to its historical railway use for which it has been designed and for which it is still necessary; and secondly, to assign a cultural and recreational use that approximates the building to the city allowing at the same time to be object of an intervention, for, either under municipal or shared management, to give a new function to the monument, guaranteeing its integrity and protection as a historical building.

Whatever the decision taken, the declaration of the monument should be solved and then a detailed inventory of the state of the building should be carried out as well as a complete study of it collecting all the existing information, a master plan of the uses and actions in the monument to finally, before making any project in the building, be clear about the criteria to follow in the way that the travellers' building of Almería railway station can remain for many years as a reference for the city.

7. REFERENCES

Broder, A. 2012. *Los ferrocarriles españoles (1854-1913): el gran negocio de los franceses* (1ª ed). Madrid: Fundación de los Ferrocarriles Españoles.

Cuéllar, D. 2011. Ivo Bosch y Puig (1852-1915). *Grandes empresarios andaluces (Antonio Parejo, dir.)*: 349-355. Madrid: LID Editorial.

Cuéllar, D., & Martínez-Corral, A. 2018. History, architecture, and heritage in the railway station of Almeria (1892-2017), Labor & Engenho, v. 12, n. 1, jan/mar 2018: 100-124.

Cuéllar, D., & Sánchez Picón, A. 1999. El impacto económico de un ferrocarril periférico. La Compañía de los Caminos de Hierro del Sur de España (1889-1929): In M. Muñoz, J. Sanz & J. Vidal (ed.), *Siglo y medio de ferrocarril en España*. Madrid: Fundación de los Ferrocarriles Españoles.

Meeks, C. L. V. 1995. *The Railroad Station. An Architectural History.* 1ª edición, 1956. New York: Dover Publications, Inc.

Martínez-Corral, A. 2017. *Estación de ferrocarriles de la Compañía de los Caminos de Hierro del Norte en Valencia. Génesis, de la idea al proyecto, de los materiales a la construcción*. Madrid: Fundación de los Ferrocarriles Españoles.

Morales Medina, A. 1987. *Proyecto básico y de ejecución de modernización de la estación de Almería.* Jefatura de edificación. Gerencia del plan de Estaciones. Madrid: RENFE.

Navascués, P., & Aguilar Civera, I. 1980. Introducción a la arquitectura de las estaciones en España. In *Les temps des gares*. Madrid: Ministerio de Cultura.

Philosophical consequences from the Turing Test Undecidability

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ABSTRACT: Alan Turing proposed in 1950 a decision criterion for intelligence validation in a computer. If a human judge was incapable of deciding from two witnesses which was the computer and which was the human, the machine would have acquired artificial intelligence. However, the Turing test has a fundamental flaw, making it impossible to provide human intelligence validation. The test is undecidable and therefore cannot be considered a valid methodology to test for Artificial Intelligence (IA). This does not mean that human intelligence simulation in a machine is unattainable. However, as the Turing Test seems to represent the most fore grounded empirical limit for AI recognition, the possibility for a general AI theory becomes very problematic. The point to be taken is that if the Turing Test (or any likewise test) cannot be used for AI recognition, there will be no way to say when has a machine became humanly intelligent. In other words, there will be no predictability powers about the AI singularity phenomena and therefore no possible general theory to formally explain and preview it.

1. INTRODUCTION

In 1950 Alan Turing proposed a decision criteria for intelligence validation in a computer. If a human judge was incapable of deciding which of two hidden witnesses was the computer and which was the human being, the machine would have become intel- ligent. Turing starts his paper «Computing Machinery and Intelligence» by asking «can machines think» (Turing, 1950). He devised a testable situation, using the so called "game of imitation", where before a blind jury, two different gender witnesses are instructed to answer by writing to a list of questions. One of the witnesses will try to imitate the gender of the other, trying to lead the judge into believing that he is a woman when he is a man or otherwise. The judges must provide correct gender identification, thus ending the game. Turing then asked what would happen if we were to substitute the role of one of the human witnesses by a computer programmed to imitate human behaviour. The question «can machines think» becoming an empirical one. Namely, «can a human judge distinguish between another human and a machine». He was accepting that human intelligence is a computable procedure, within our powers to simulate with enough memory and processing power.

The Turing debate, concerning the meaning of the Turing test to Artificial Intelligence feasibility and to what human intelligence is or is not, has been one of the major philosophical research domains over the last decades. The debate includes claims, rebuttals, and counterrebutals upon the Turing test and his further claim that «at the end of the century… one will be able to speak of machines thinking without expecting to be contradicted» (Turing. 1950). The imitation game involving machines has been performed again and again. Using Eliza like strategies (Weizenbaum, 1966), chatterbots have been programmed and tested before human judges, only to find that we are still far from seriously consider that machines do think (Floridi, 2008).

In a somehow similar computational spirit to the one brought about by Turing, it is worth mentioning a rather recent and surprising result about the test. Sato and Ikegami analysed the computability of the imitation game, replacing the human judge by a Turing Machine. They then look for an universal effective procedure the machine could follow, playing the imitation game, in order to distinguish between a human witness and another Turing Machine. Using a mathematical proof, they argued that such a procedure does not exist. The Turing test is thus computationally undecidable, as the authors emphatically stated:

«We have shown that "No machine can be an interrogator who can distinguish a man from a machine." However, whether a man can play the role of the interrogator or not is still an interesting open question» (Sato, Ikegami, 2004).

2. THE TURING TEST UNDECIDABILITY

In yet another effort to analyse the Turing Test and its possible epistemological consequences, I have studied the remaining open question after Sato and Ikegami. That of knowing if the Turing Test is indeed logically feasible even using a human as a judge. Quite surprisingly, I have found that the test as it stands in its original formulation, is in fact undecidable (Castro, 2017).

Taking the Turing Test original configuration, one starts by assuming that one does not know which of the three agents is the judge and which are witnesses. Before even such a trivial condition, our problem will now be if there is a feasible procedure to identify intelligent behaviour. After the judge authority validation, the Turing Test can, of course, perform as usual. I will argue as follows.

Let us call three agents A, B and C, assuming that there exists a procedure to validate human intelligence for every agent, having the following two properties: i) no agent can apply the procedure to itself; ii) the procedure is only valid if it is performed by a human intelligent agent.

The first property ensures that the procedure is truthful. Since each agent is to be treated like a black box, if we would allow ourselves to accept a self-intelligence assertion coming from the agent itself, any procedure doing that would be valid. That would make the procedure trivial, ill applicable and thus, not trustful. We would never know if an agent was applying a legitimate procedure to its own case.

The second property ensures that the procedure is sound. If a less than a humanly intelligent machine could truly identify human behaviour, it could also truly imitate it. That would make the procedure useless. Property ii) means that no machine cannot compute correctly the procedure, unless it is human intelligent. In a certain sense what has been said stands equivalent to what Sato and Ikegami asserted. Assuming that the procedure above exists and can be performed by either a human or computer agent (although this last will perform it incorrectly), let us now accept that all agents can communicate with one another. For generality sake, let us also assume that the agents can be either humanly intelligent or computer intelligent and that each agent can perform like a judge, deciding which of the other two agents is human. Each agent will, of course, stand as a witness before each one of the other two. All possible configurations for the true nature of each agent are listed in Table 1.

One can easily see that if we would have only a humanly intelligent agent, the procedure for human intelligence validation will be undecidable since there is no other human intelligently agent to validate the former. On the other hand, with only computer agents acting, the procedure will also be undecidable, and fundamentally by the same reason: a lack of expertise power. This makes the first two situations in Table 1 undecidable.

Table 1. All possible configurations for a human intelligent validation procedure involving three agents. Classification refers to the procedure possible results.

A	B	C	Classification
Humanly intelligent	Computer intelligent	Computer intelligent	Undecidable
Computer intelligent	Computer intelligent	Computer intelligent	Undecidable
Humanly intelligent	Humanly intelligent	Humanly intelligent	Undecidable

Let us now analyse the two remaining configuration cases. That is, Turing's original configuration for the game of imitation, and the situation where only humanly intelligent agents are involved. As it stands, they were also found to be undecidable.

Consider first Turing's classical configuration: two humans and a machine. Suppose humanly intelligent agent A judge's B to be a humanly intelligent agent and C to be a computer intelligent agent. Meaning that:

a) A finds B humanly intelligent and C computer intelligent.

Now suppose humanly intelligent agent B judges A to be humanly intelligent and C to be a computer intelligent agent. That is:

b) B finds A humanly intelligent and C computer intelligent.

Since by property ii) A could only have performed correctly if it was humanly intelligent in the first place, one can thus write:

c) A finds B humanly intelligent only if A is humanly intelligent.

Similarly, for B, one can assert that:

d) B finds A humanly intelligent only if B is humanly intelligent.

This, of course, leads us into an undecidability situation, since from c) and d) one must conclude that:

e) A finds B humanly intelligent only and only if B finds A humanly intelligent.

And since each agent can only find the other humanly intelligent, if it is itself humanly intelligent in the first place, we must finally conclude that:

f) A is humanly intelligent only and only if B is humanly intelligent.

Conclusively, the human intelligence validation procedure can only work for a Turing classical configuration, if there are two humanly intelligent agents in the first place. We immediately see that same argument can be applied to the last situation in Table 1, where there are no computers. This shows that neither the presence nor the absence of a machine is relevant to the procedure soundness. Hence, any procedure in the Turing test style, conceived to identify the existence of at least one humanly

intelligent agent, requires ab initio the presence of at least two humanly intelligent agents. Most concretely, we have found that the human intelligence validation procedure, in the Turing test style, whatever it may be, can only serve his purpose being redundant. Therefore, no such procedure exists.

Considering all possible situations in Table 1, we have arrived to the conclusion that any human intelligence validation procedure in the context of the Turing test is a non-computable task. And it so follows that the question it was supposed to answer, namely if there is a humanly intelligent agent among three possible candidates, becomes undecidable.

A third agent wouldn't alter this state of affairs because if it is computer intelligent, it will perform badly according to ii), and if it is humanly intelligent, it will be in the same situation as the one described for the other two agents, either in relation to A or B. Still we could try to sort the difficult out, allowing the procedure to be performed by more than three agents. Let us say we have *n* agents and that these have been grouped in subsets of three agents. This means that there will be one, two or none agents left. Each set of three agents as we now know would end in an undecidability situation. From f) it is clear that the same would happen if two agents remained. As to the situation where only one agent is left, it cannot be validated by any one of the other *n*-1 agents, since none of these can be asserted to be humanly intelligent.

Since the procedure to be used wasn't further specified save for properties i) and ii) and since it is to be applicable by observing any behaviour performed by a candidate agent, we can assume that it is a generic empirical procedure. Thus, our final and complete statement must be that "the problem of human intelligence identification by empirical means, strictly using intelligent agents as the only authoritative resource among a set of *n* candidates, is undecidable".

3. PHILOSOPHICAL CONSEQUENCES

The prior statement is not about mechanical computability, as the one in Turing machines. The kind of undecidability herein stated is independent on the nature of the performing agents. It's more like an epistemological boundary, imposing on each agent the impossibility for proof reading the same degree of intelligence in similar agents. We have already seen that same phenomena, according to Sato and Ikegami, since Turing machines are computably unable to identify themselves as such.

The test is, one could say, ontologically undecidable and therefore cannot be considered a valid methodology to test for Artificial Intelligence in general. This does not mean that human intelligence simulation in a machine is at all unattainable. However, as the Turing Test seems to represent the most fore grounded empirical limit for AI recognition (Harnad, 1992), the possibility for a general AI theory becomes very problematic. For if such a theory could be formulated one could predict, with reasonable accuracy, when and how one would have humanly intelligence simulation. In other words, a kind of production line, designed to build artificial humanely intelligent robots would be feasible. However, as we have seen, we seem unable to ascertain in a solid empirical way, faulty robots from sound ones, at the end of the production line. This comes to say that should a general theory about AI be attainable, it would predict something that lacks empirical validation possibility from our part. Even if some other empirical test, besides the Turing Test, could be devised, one could at the end, still argue that from what was here seen, no human scientist has the ontological authority to adequately perform such a test. For if he would have it, then he could also correctly perform in the Turing Test. Since, on the other hand, one cannot replace a human scientist by a machine, according to the Sato-Ikegami result, it seems that a general theory about Artificial Intelligence seems out of reach.

Does this mean that AI singularity is also behind our constructive material powers? In fact, such a feat may indeed still be possible, although in a seemingly uncontrolled way. The fundamental point to be here taken is that if the Turing Test (or any likewise test) cannot be used for AI recognition, there will be no way to say when has a machine became humanly intelligent. In other words, there will be no predictability powers about the AI singularity phenomena and therefore no possible general theory to formally explain and preview it. And such the appearance of an altogether alternative material base intelligence will be somehow similar to a biological evolution leap. One that, from our point of view, will seem to happen by chance. This may pose some unexpected ethical issues.

4. REFERENCES

Castro P. 2017. Computing Machinery, Intelligence and Undecidability. *Journal of Theoretical Computation* Sci 4: 160.

Floridi L, Taddeo M, Turilli M. 2008. Turing's Imitation Game: Still an Impossible Challenge for All Machines and Some Judges - An Evaluation of the 2008 Loebner Contest. *Minds and Machines* 19: 145-150.

Harnad S. 1992. The Turing Test is Not a Trick: Turing Indistinguishability is a Scientifc Criterion. *SIGART Bulletin* 3: 9-10.

Horn RE. 2009. Parsing the Turing Test: Philosophical and Methodological Issues in the Quest for the Thinking. *Computer Dordrecht*: Springer, Netherlands, pp: 73-88.

Warwick K, Shah H .2016. Can machines think? A report on Turing test experiments at the Royal Society. *Journal of Experimental & Theoretical Artificial Intelligence* 28: 989-1007.

Weizenbaum J. 1966. ELIZA - A Computer Program for the Study of Natural Language Communication between Man and Machine. *Commun ACM* 9: 36-45.
Sato Y, Ikegami T. 2004. Undecidability in the Imitation Game. *Minds and Machines* 14: 133-143.
Turing AM. 1950. Computing Machinery and Intelligence. *Mind* LIX, pp: 433-460.

IoT, user´s information and ethics or who ate my data?

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ABSTRACT: The Internet of Things (IoT) is the network of physical devices, like vehicles (cars, trucks), smart-TVs, smartphones, smartwatches, home appliances, robots, drones, 3d printers, sensors (all kind of) etc. Every device has its own identification that permits to communicate to another and it is able to interoperate with the Internet structure that exists now-a-day. The emergence of new technologies has greatly facilitated information circulating freely, emitted from various points. However, the human being is not aware, at least the vast majority of consumers of wireless technologies, that when using the Internet or any other service that needs to connect to a wireless local area network (WLAN), they expose themselves unintentionally. The default setting for a wireless network is insecure. But, the most frightening question is: What kind of data, my devices are giving to companies and strangers in a legal way and I don't know? The answer: a lot of all kind of data!!

1. INTRODUCTION

1.1. Wi-Fi Technology

With the technological evolution and convergence of new generation networks, wireless networks have become ubiquitous in corporate environments. Increasingly, more electronic and computing devices such as smartphones, tablets, notebooks and watches are sold with embedded Wireless Fidelity (Wi-Fi) cards. The most popular standard for this type of wireless local area network is the 802.11 standard IEEE (Institute of Electrical and Electronics Engineers) and its various versions (b, g, n and ac).

The new concepts of Pervasive Computing and the Internet of Things are based on wireless network environments, thus favouring mobility and ease of access to local networks and the Internet. Worldwide, millions of people use wireless networks daily in public and private environments to access the Web and perform professional, personal, shopping, and entertainment activities (RAMACHANDRAN, 2011). Several educational institutions, aiming to meet the needs of their students, teachers and employees, have made available Wi-Fi networks for the academic community. Often these networks present good speed for data transmission, large coverage area and connection to the institution's wired network.

The massive use of Wi-Fi networks has made the lives of people who need or like to stay connected easier, this is undeniable, providing great freedom of access, low implementation costs, ease of installation and configuration (RAMACHANDRAN, 2011; RUFINO, 2014). However, new risks have arisen with the increasing and massive adoption of this new technology. The frequency of attempted violations and attacks on these networks has intensified in recent years (RAMACHANDRAN, 2011). In the context of information security, several vulnerabilities and threats present in Wi-Fi networks have already been discovered and studied, however, it is worth noting that it is not only a question of encryption of data such as bank passwords and personal data, internally the protocol that allows the operation of the network exchanges data that are not considered personal and that somehow exposes to the same extent or perhaps even to a greater degree the identity of the person who accessed the wireless local area network (WLAN). We are talking about the discovery of the possible location of home address, work, school and anyother environment in which an unnoticed user may have simply approached.

2. INFORMATION SECURITY

2.1. Brazilian Information Security

According to Associação Brasileira de Normas Técnicas (Brazilian Association of Technical Standards ABNT, 2013), Information Security is focused on protecting information against various types of threats, aiming to ensure business continuity, minimize risks and maximize investments and business opportunities. The fundamental structure of

information security is based on three basic pillars (SOMMOLA, 2003, MANOEL, 2014):

- Confidentiality - controls that seek to limit access to information to whom it is intended.
- Integrity - controls that seek to guarantee completeness of information and data, maintaining its conditions when made available.
- Availability - controls that guarantee access to information at any time requested.

According to (STALLINGS, 2008), Network Security emerged with the emergence of distributed networks and the use of telecommunications for communication and data transmission between users and computers, brought a need for more comprehensive protection. For before, Information Security at the level was concerned only with paper files, entry into restricted places, files and information stored on independent computers.

Nowadays, almost in their entirety, public and private institutions have their work environments and computer systems connected to data communication networks, for different purposes and needs. These networks can be internal (local networks) or between remote partner institutions (Extranets). In addition, they may also be connected to public networks and the Internet.

2.2. WLAN (Wireless Local Area Network)

In the mid-1980s, the Federal Communications Commission (FCC), the North American regulatory agency for telecommunications and broadcasting, allocated part of the spectrum for free development without the need for licensing and payment for use of certain frequency bands. The frequency bands dedicated to Industrial Scientific and Medical (ISM) are internationally reserved bands for industrial, scientific and medical development. To this end, transmission power limitation norms and modulation techniques have been established within these bands.

This standard was internationally disseminated and adopted in several countries, and in Brazil, with some caveats. In Brazil, the legislation for this type of system was initially defined by ANATEL, through Standard 02/93, later by Standard 012/96 (resolution 209 of Jan / 2000) and currently by resolution 506 of Jul / 2008 - Regulation on Equipment of Radiocommunication of Restricted Radiation.

According to GAST (2005), the IEEE 802.11 standard can be referenced by several names such as: Wireless Ethernet, justifying the direct connection with the IEEE 802.3 wired network standard. The Wi-Fi name was defined by the Wi-Fi Alliance from the product interoperability certification program that uses the references of this standard. Finally, it is referenced as WLAN (Wireless Local Area Network).

IEEE has developed a number of standards and sub-standards for WLAN technology, among which are the 802.11a, 802.11b, 802.11g, 802.11n, and 802.11ac sub-standards. Some of these standards differ in operating frequency, baud rate, bandwidth, in the modularization used for data transmission and in the supported security features.

2.3. IEEE 802.11 (WLAN`s)

The IEEE 802 standard works with the determinations of layers 1 and 2 of the ISO (Open Systems Interconnection) reference model. That is, this specification works the Physical Layer (1) and Layer Link (2). The 802.11 standard presented in figure 3 was approved by the IEEE in 1997 and as a member of the 802 family, the 802.11 provides definitions for layer 1 and for MAC layer (layer 2 media access control). For the control function logical link LLC of sublayer 2, 802.11 adopts the 802.2 standard as shown in the figure: (GAST, 2005). Table 1 shows a view of the major versions of the pattern that came in and some that are still in use in much of the world.

Table 1. Summary of the evolution of the 802.11

Pattern	Year	F.R*	M.T.R.(Mbit/s)**
802.11	1997	2.4	2
802.11a	1999	5	54
802.11b	1999	2.4	11
802.11g	2003	2.4	54
802.11n	2009	2.4/5	150
802.11ac	2017	5.0	866.7

* Frequency Rate

** Maximum Transmission Rate Mbit/s.

2.4. Threats and vulnerabilities of Wi-Fi networks

The Wi-Fi standard has a lot of wide variety of attacks described in the literature. Attacks that take advantage of technological failures and deficiencies of the physical environment. From the human point of view, problems and alternatives are also discussed. Vasconcelos (2013) states that a significant problem in the security of Wi-Fi networks is strongly linked to the lack of knowledge and lack of preparation of administrators and users in the implementation and use of available security features. Gartner (2008) claims that 70% of the success of attacks on Wi-Fi networks is largely related to configuration problems for APs and client device software.

CNET (2013) made a research that showed that the activation of devices in networks with factory default settings, such as users and passwords already preconfigured by vendors, are very common. The vast majority of users and administrators do not make the necessary changes and settings. In this research, evaluations (scanning) of the whole Internet, and 420,000 devices would be subject to exploitation and invasion using the default settings made available by manufacturers in manuals on websites.

In relation to the WLAN networks, CPP (2010)

investigated through penetration testing in 40,000 Wi-Fi networks: public, corporate, Hotspots (Internet access points through wireless network), SOHO (Small Home / Home Office) and residential throughout UK. The study says that almost half of these networks could be invaded in a few seconds. The conclusion of the research showed important results such as:

- Most users believe they are safe
- The vast majority believe that unauthorized persons do not access their networks
- 17% of people use public networks regularly
- Ease of implementation of malicious APs, leading users to connect in fake networks.
- WLAN networks are used for sensitive and sensitive data services such as e-mail, banking and online shopping.

2.5. The experiment

In order to verify the low security in only one type of switchboard to maintain the connection between devices and access point (wireless router), real measurements were taken in a lab at the university. The measurements were conducted from the observation of the spectrum from a fixed point within the Department of Computer Science (CIC) at the Darcy Ribeiro Campus at the University of Brasilia (UNB) specifically within the COMNET lab, through Dell Inspiron I5 notebook Ubuntu Linux Operating System, 54Mbps g version of the IEEE 802.11 protocol, at 2.4 GHz frequency and typical 18 dBm power transmission. The scenario in Figure 1 is made up of: 15 Fixed Desktop workstations that do not participate in the measurements for using CAT 5, 1 AP Ethernet UTP Ethernet network cards positioned in the COMNET lab. The equipment that makes the capture for this study is positioned near the AP inside the same laboratory.

3. DATA COLLECTION

3.1. How was made the collection

During the tests, through the use of the tool each host authenticates to the SSID of the AP located in the COMNET environment. The values of power, noise and SNR were recorded for each node. For each node, 10 different measures were performed per interval and the mean of each block was calculated. The tests were performed during one month at alternating times between the morning, afternoon and evening shifts. The tests were operated under channel 9, with another 14 access points available in the same coverage area.

A total of 10 measurements were performed during one month, alternating between morning, afternoon and night shifts using the free tcpdump tool, designed to capture packets that travel on a network. Tcpdump is the most powerful Sniffer for the existing GNU / Linux platform and it can capture all the traffic on a network, analyse and discover faults. The tests were operated under channel 9, the objective was to filter the frames known as Probe Request, which would show the search (through active scanning) by connecting other SSID's that the network card had occasionally connected to in others locations. Later, using the Wireshark tool (previously known as Ethereal), a program that analyses network traffic and organizes it through protocols, it was possible to filter the frames necessary for the tests separately. The features of Wireshark are similar to tcpdump, but with a graphical interface, more information and the possibility of using filters. That way, we would then go to a web site (WiGLE.net) to track information about the different wireless access points identified within the catch.

3.2. Probe Request Frames

The Probe Request is a special type of WLAN Board sent from a device equipped with a wireless network card to ask all access points close to their presence. This allows the card to discover whether smartphones or other Wi-Fi enabled devices are close to yours. Since many users leave the Wi-Fi function always on, this function causes the device to do this type of scanning even without the user realizing, and at that moment, they include the MAC address (Media Access Control (Physical address associated with the communication interface, which connects a device to the network) of the destination router, as well as the MAC address of the device itself, the SSID (Service Set Identification Name). with Wi-fi available) from the search among other fields that may not be as important as these 3.

Some manufacturers aware of this problem have already begun to implement measures to send random MAC addresses to their smartphones. This makes unique identification impossible on equipment that is not assigned to a WLAN network. However, through the SSID it is still possible to probe and locate the device through Wigle.net.

During the capture, a total of 130 equipment was identified that connected daily or that sporadically approached the equipment during the collection of the traffic in the place. From the capture it was possible to identify the routine equipment that always made the same searches in the network, since many students attend daily the laboratories, nevertheless there were those that appeared in the capture only once or more, characterizing visitors or employees that work in regime of scale of building maintenance. Figure 1 shows the distribution of the types of equipment identified as users.

54% “Frequent users with daily access”, 23% “Users with only one access”, 15% “Sporadic users

with more than one access" and 8% "Devices that have not switched packets".

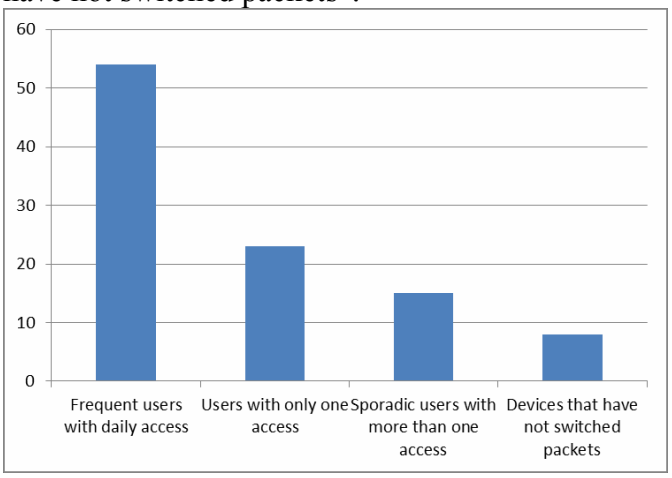

Figure 1. Types of users identified in the collection.

Table 2 shows the result of the collection of packages with the results classified by test plates, which carried the data used. As can be observed, there was a variation in the number of packages during the survey, but the percentage of probes remained within the average of 1% on most days.

Table 2. Percentage of probes requests frames captured per day

Capture	Number *	Frames**	%***
1	3717993	45781	1
2	765843	7678	1
3	401248	12381	3
4	5456789	55678	1
5	3334521	43356	1
6	4234567	54567	1
7	5345621	33466	1
8	4453245	44167	1
9	3456789	44167	1
10	4456218	33456	1

* Number of packets
** Frames of Probe Requests.
*** Percentage of Probe Requests

After the capture and filtering of the probe request frames, we then proceeded to the identification phase of the SSID'S and MAC addresses embedded in probing frames that searched for the recently accessed connection. In this phase, it was possible to identify several access points through the SSID or the MAC address through the Wigle.net website. The equipment was physically located in Brasilia and in the region, since the students of the institution live not only in the capital, but in the surrounding cities as well. Thus, for reasons of security and confidentiality, the non-presentation of these fields in this article without the express release, since many of the catches came from pictures of the various types of users as shown in Figure 1 above, and it is therefore impracticable to contact all involved for release of data.

Figure 2 shows that of the 55 access points identified, 15 were located by the Wigle.net online tool. This is justified because not all geographic areas are assisted by this tool since it is necessary for a user to make their mapping close to the location, or that the user of an SSID can request tools of this type that are excluded from the base information about your equipment. In any case, of the 15 localized devices it was possible for the map to accurately identify geographical positioning such as latitude, longitude, Mac Address and / or SSID and thus easily reach a certain location without the prior authorization of its user and / or owner.

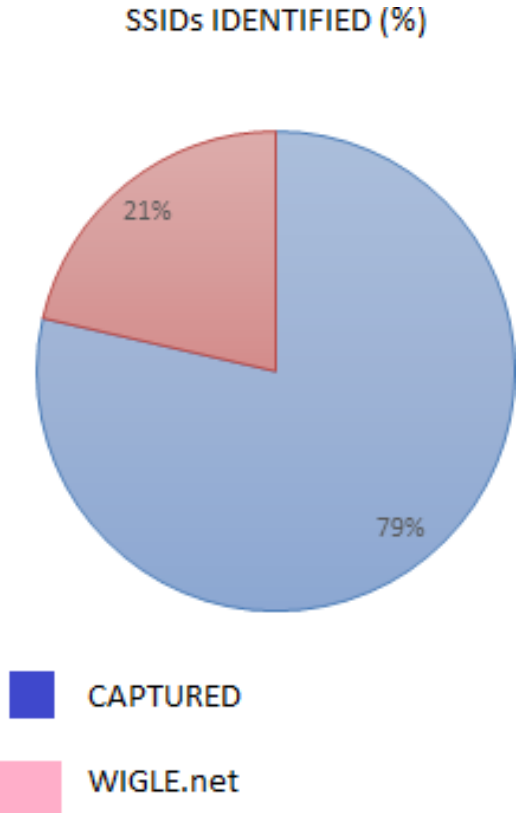

Figure 2. SSID Identification.

4. CONCLUSION

The use of computer networks, cellular networks, social networks, reaching the Internet of Things (IoT), impact people's lives and their relationship with the world, and can be analyzed from human principles. The simple experiment presented here demonstrated that is very easy and very simple capture people's data. Humanity most needs to discuss the moral and ethics that are involved with these issues. We need a new vision to deal with the phenomena arising from the use of the connected network, what is acceptable and what is not when we think of individual data and share it. Your robot vacuum cleaner sends data from the location of your home, the size of it and even how many times a week you use it. What we tolerate and what we will tolerate from now on is what we need to discuss and define.

5. REFERENCES

ABNT. 2005. NBR ISO/ IEC 27002 Tecnologia da informação – Técnicas de segurança – Código de prática para a gestão da segurança da informação. Rio de Janeiro: Associação Brasileira de Normas Técnicas.

CPP. 2010. UK Wireless Network Hijacking, A CPP White Paper [online]. Available at: http://blog.cpp.co.uk/files/uploads/cpp-research/UK_Wireless_Network_Hijacking_2010.pdf [Accessed on 15 Mar 2017].

Figueiredo, D. A. 2015. Análise da Segurança de Redes Wi-Fi Através de Teste de Penetração em Instituições de Ensino Superior de Belo Horizonte. Projetos e Dissertações em Sistemas de Informação e Gestão do Conhecimento.

Gast, M. 2005. 802.11 wireless networks: the definitive guide. " O'Reilly Media, Inc.".

Heiser, J., & Nicolett, M. 2008. Assessing the security risks of cloud computing. Gartner Report, 27, 29-52.

Manoel, S. D. S. 2014. Governança de segurança da informação: como criar oportunidades para o seu negócio. Rio de Janeiro: Brasport.

Ramachandran, V. 2011. BackTrack 5 Wireless Penetration Testing: Beginner's Guide. Packt Publishing Ltd.

Rufino, N. M. D. O. 2007. Segurança em Redes sem Fio-2ª Edição: Aprenda a proteger suas informações em ambientes Wi-Fi e Bluetooth. Novatec editora.

Sêmola, M. 2014. *Gestão da segurança da informação* (Vol. 2). Rio de Janeiro Elsevier Brasil.

Stallings, W. 2008. Criptografia e segurança de redes 4a ed. São Paulo: Pearson. 2008.

Sverzut, J. U. 2005. Redes GSM, GPRS, EDGE e UMTS: evolução a caminho da terceira geração (3G). *Editora: Érica. ISBN*, 85-3650.

Tam, D. 2013. Facebook by the numbers: 1.06 billion monthly active users. CNET News, 8301-1023.

The Portuguese schools of engineers in Lisbon and Porto: continuity and discontinuity of the models and the creation of the national and international networks

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ABSTRACT: In the 1910's, with the establishment of a Republican Regime, were created two new schools of engineering: The Instituto Superior Técnico (Technical Institute) in Lisbon in 1911, and the Faculdade Técnica (Technical Faculty) in Porto, in 1915. In this paper we want to analyse the new pedagogical projects of Instituto Superior Técnico and Faculdade Técnica of University of Porto, and identify the academic and business networks linked to these schools. For this approach we will try to make a comparison between the creation and teaching of the two schools and the professors of each one.

1. THE TECHNICAL SCHOOLS OF THE 19TH CENTURY AS A BACKGROUND TO THE IST IN LISBON AND FTP IN PORTO

The idea of the existence of a close relationship between technological advances and economic progress is the main key to understand the period following 1851 (which is called in Portuguese history *Regeneração* - the Regeneration Period). In this context a new ministry was created in 1852 – the Ministry of Public Works, Commerce and Industry (MOPCI) – of which the minister was the engineer – Fontes Pereira de Melo -, and the majority of the posts on this ministry was occupied by people with a technical education namely engineers.

In order to increase the technical education in the country, that was considered essential to economic development, it was created in Lisbon in 1852, the capital of the country, the *Instituto Industrial de Lisboa* (Industrial Institute of Lisbon), later on *Instituto Industrial e Comercial de Lisboa* (Industrial and Commercial Institute of Lisbon), and in the second most important city characterized by an important industrial development it was created the *Academia Politécnica do Porto* (Polytechnic Academy of Por-to) the successor of *Academia Real de Marinha e Comércio da Cidade do Porto* (Royal Academy of Navy of the city of Porto). In Porto we have also an industrial school, which in 1864 became *Instituto Industrial do Porto* (Industrial Institute of Porto) and later on *Instituto Industrial e Comercial do Porto* (Industrial and Commercial Institute of Porto). With these two technical schools the government expected to answer the needs to educate the new working class of the emerging sectors such as textiles and metallurgy. In the *Instituto Industrial de Lisboa* there were established three levels of teaching: elementary, secondary and complementary. The theoretical training was combined with practical classes in an industrial setting, such as workshops, where the content learned in the theoretical courses was applied.

Throughout the years the *Instituto Industrial de Lisboa* had several reforms and teaching reformulations that intended to make the training offered in this school relate to the economic needs of the country. In 1892 the School Council proposed a new restructuration of the Institute, and the proposal was subscribed by every titular professor except Alfredo Bensaúde who submitted an individual report exposing the problems in the existent training methods, which has been published - *Projecto de reforma do ensino tecnológico para o Instituto Industrial e Commercial de Lisboa*.[1] In his proposal, Bensaúde presented a set of problems that prevented the school of being successful: the lack of professional "hands-on" experience of most of the teachers; the very few theoretical papers, articles or books written by the teachers; the theoretical minded classes which were precisely the opposite of a true technical teaching based on everyday practice; and the little attention paid to technical drawing, that was "in a way the written alphabet of the technician."

Despite all the reforms, in the beginning of 20th

[1] *Projecto de reforma do ensino technologico para o Instituto Industrial e Commercial de Lisboa*. Lisbon: Academia Real das Ciências, 1892.

century Portugal continued to face a lack of technicians to answer the demands of the industry and of the significant public works, promoted by the government.

2. THE CREATION OF INSTITUTO SUPERIOR TECNICO IN LISBON AND OF THE FACULDADE TÉCNICA IN PORTO

The creation of two new schools of engineering created under the reform of higher education in the Republic Regime was regulated by the Decree Law - March 22, 1911, subscribe by important politicians and intellectuals of that time: Joaquim Teófilo Rego, António José de Almeida, José Relvas, António Xavier Correa Barreto, Amaro de Azevedo Gomes, Bernardino Machado e Manuel Brito Machado.

Alfredo Bensaúde a mines engineer that had made his education in Germany, was nominated as director of *Instituto Superior Técnico*, and he tried to put in practice the ideas that he had already developed in 1892 in *Projecto de reforma do ensino tecnológico para o Instituto Industrial e Commercial de Lisboa*.

The *Instituto Superior Técnico* offered a General Course that lasted two years and higher education courses of three years in the following engineering areas: mines; civil; mechanic; electro-technical and industrial chemistry. It also offered elementary courses, namely of mines and public construction conductors.

The new decree-law also created the University of Porto in the north of Portugal and from the new structure the Faculty of Science was founded and later on in 1915 the *Faculdade Técnica*[2]. In the case of Porto, the Engineering degree was taught both at the Faculty of Sciences of the University of Porto, where the preparatory years of the engineering teaching were attended, and the Technical Faculty of Porto, with complementary training.

Its model of training engineers was similar with the IST.

3. THE RECRUITMENT OF PROFESSORS

3.1. A national and international network

The different disciplines of the curriculum of these two schools were supported not only by teachers that had previously taught in the Polytechnic Academy, in the Army School and the Industrial and in the Commercial Institute that existed in both cities, but also by foreigner teachers coming from France, Switzerland, Germany bringing new methods and practices.

In 1919-1920 – eleven of the twenty-seven of the professors of *Instituto Superior Técnico* had pursued their studies abroad in famous schools such as the *École des Ponts et Chausses* and the *École des Mines* of Paris, the *University of Liège*, the *University of Berlin* and the *University of Gottingen*.

Table 1. Professors of *Instituto Superior Técnico* (1919-1920)

Name	Graduation in Portugal	Graduation aboard	Industrial activity	Courses teach at the IST
Alfredo Bensaude		University of Goettingen and School of Mines of Clausthal		Portuguese Mineralogy
Francisco Ferreira Roquete		École de Mines of Paris	Mines inspector.	Mines and mineral waters
Charles Lepierre		École de Physique et Chimique de Paris	Consultant engineer of Enterprise Henry Burnay & Cª	Chemical analyses and Organic Chemical
António Lobo de Aboim Inglês	I.I.C.L. [3]		Previous technical director of the Mine of S. Miguel (Huelva)	Metallurgy
António dos Santos Viegas	A.S.		Sub-director of Portuguese Railways	Roads and Railways
Maximiliano Gabriel Apolinário	I.I.C.L.	University of Liége (Institute Montefiore9	Entrepreneur et engineer of Cª Eborense de Electricidade; Fábrica promitente	Electricity in general; constructions and industrials establishments.
Léon Fech		Institute of Montefiori University de Liége – Electric engineering	Previous assistant of the de Montefiori Institute. Consultant engineer of the CRGE	Electricity (General Theory, and applications)

[2] PORTUGAL – *Diário do Governo*. Lei nº 410, de 31 de Agosto de 1915, artº 77º. See also: FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO (FEUP). *Faculdade Técnica da Universidade do Porto (1915-1926) //Faculdade de Engenharia da Universidade do Porto (1926*) – U.P. – FEUP.file:///C:/Users/Utilizador/Downloads/Faculdade-de_Engenharia_da_Universidade_do_Porto.

[3] I.I.C.L. - Instituto Industrial Comercial de Lisboa
A.S. - Army School
P. A. - Polytechnic Academy
F.M.E. - Faculty of Mines of Engineer
T.F. -Technical faculty
U.T. University of Toulouse
P.S. - Polytechnic School of Zurich
U.C. - University of Coimbra

António Vicente Ferreira	A.S.		Engineer of Portuguese Company of Railways	Materials. Stability of constructions, bridges
Raul Miguel de Mendonça		École des Ponts et Chaussées	Enterprise H. Burnay & Cª – Hydraulic Section	General Hydraulic, Hydraulic machines
Júlio V. da Silva Pinto	I.I.C.L:		Enterprise H. Burnay & Cª – Mining Section	Mineralogy and geology
Eduardo Augusto Valério Vilaça	A.S.		Engineer of the Company of Borralha Mines	Materials and methods of construction
Tomás de Aquino de Almeida Garrett		Génie Naval - Paris	Engineer of the enterprise H. Burnay & Cª	Technology of mechanic

Most of the foreign teachers were hired for their technical and scientific skills and had already taught in other schools, such as: Abram Droz, professor at the *Zurich Technical School*, León Fesch of Institute of Monteffiori of University of Liége

To better understand the presence of foreign professors we must refer that a part of the Portuguese professors had completed their studies abroad in some of the must reputed schools in France, Belgium or Germany, where they stablished personal and professional networks with other students coming from different countries.

4. THE CREATION OF UNIVERSTY OF PORTO IN 1911 AND THE TECHNICAL FACULTY IN 1915

4.1. From Polytechnic Academy to Technical Faculty

In the city of Oporto, the Polytechnic Academy, and the Medical-Surgical School, founded in 1837, was the structure from where was founded the University of Porto in 1911. The Polytechnic Academy since the first decades of the 19th century had been reinforcing its role in teaching science and engineering in detriment of commerce and navigation. In 1911, it became Faculty of Sciences. For the teaching of engineering Porto also wanted to have an identical education system like the one of IST with the same pedagogical frame and number of years. This requirement allowed for the Technical Faculty in Porto to be created in 1915, where in complementarity with the Faculty of Sciences, form engineers (Law nº410 of 31 August 1915).

The Technical Faculty presented some differences in the recruitment of professors. Like the Faculty of Sciences of Porto, also the Technical Faculty recruited internal professors for the teaching of engineering directly made through the Polytechnic Academy and at the Industrial Institute / Industrial and Commercial Institute. A small number came from University of Coimbra. In this way, there was only one transition from one institution to another, only new contracts were made, without a concern to seek new teachers abroad. In this sense we must notice the continuity of the Academic "Elite" in the university and in the new school.

Table 2. Professors of Technical Faculty (1919-1920)

Name	Gradution in Portugal	Gradution Abroad	Other activity	Courses teach at FT
Vitorino Laranjeiro	U.C. + A.S.		Railway	Thermal Machines Construction and Roadways Roads and railways Mechanic Technology
Thomas Joaquim Dias	P.C.			Mechanics; Electric Machines Construction and roads; Topography;
Roberto Alves Sousa Ferreira	UC			Political Economy
António Ferreira da Silva	P.A.			Industrial chemistry
Francisco Xavier Esteves	P.A.		Deputy Minister of commerce	Concrete Reinforced ; Bridges
Manuel Rodrugues de Miranda	PA			Mines Docimasia
Bento Sousa Carqueja	P.A.		Founder of the newspaper *O Comércio do Porto*	Political economy. Legislation and accounting
António José Adriano Rodrigues	A.S + T. F. + F.M.E.			Mines
Luís Couto dos Santos	P.A.		Owner of Fábrica *Electra* Director of *Cª de Carris de Ferro do Porto*.	Electro mechanics - Thermal Machines; Electricity Measures
Miguel Machado		P.S. Z.	Internship Brown Boveri & Cª	Hydraulics
Albano Pacheco Coelho		U.T		

Most of the professors were transferred to the Technical Faculty of the University of Porto from Polytechnic Academy or Industrial Institute. In the research project we found that the Technical Faculty

had some isolated cases of teachers who completed studies abroad with degrees in engineering branches by European universities. This last one is evidenced with the most internationalized school of the nucleus with the presence of Miguel Luís Machado Guimarães (Polytechnic School of Zurich), and Albano Pacheco Coelho (University of Toulouse).

In other sense the local and international network operated in a similar way, as can we see in the command of equipment's labs and workshop as the companies that provides internship to the students, most of them related to important technological projects.

4.2. Between teaching and professional activity

The founder of *Instituto Superior Técnico*, Alfredo Bensaude, wanted to transfer to Portugal the German model, well known by him, through his studies in Hanover, in Clausthal and later at Georg-August University in Göttingen. He propositioned the creation of a more practical teaching model betting not only on mathematics but also on the drawing discipline. The new school and the pedagogical framework of the training was based on the configuration of the skills that were foreseen for the engineer at the beginning of the twentieth century, regarding their role in public works projects and in the industrialization process.

Bensaude considered that the engineers that already had professional experience in their field of expertise were better professors, because beyond the theoretical knowledge they also had experience in resolving unexpected practical problems therefore important lessons to the students about practical knowledge that many times was not present in even the best books.

He also defends that the teachers that are engineers and are already in the industrial 'milieu' could be a sort of "*a bureau de placement".* That means that they could help the best students to find a job at the end of their academic education.

4.3. Others networks

Regarding the relations established between these new schools and the companies dedicated to public works or private companies, we have verified that both schools promote their students' internships in the *Companhia de Caminhos de Ferro*, in the *Carris de Lisboa* and Porto or in companies in the national panorama; such as CUF - *Companhia União Fabril*. Another similarity we find in both schools is the network of companies and enterprises where pupils did their training, most of them local and national companies.

The installation of schools promoted important acquisitions of equipment for workshops and laboratories in the new schools, not only deepening the lessons and practical experiences, but also developing relations with companies, associations, societies, libraries that became suppliers of these schools. In general terms we find mechanisms for laboratories coming from abroad, books and magazines for their libraries from associations and societies, machines. and utensils acquired from various national and foreign companies.

5. CONCLUSIONS

We must conclude that both schools transferred and improved the model of the Polytechnic Academy and Industrial Institute, schools of late 19th century. The IST developed the model with the recruitment of foreign professors and the University of Porto and the Technical Faculty transferred their professors from the Polytechnic Academy and from the Faculty of Science. Concerning the training of students, both schools benefit of a local and national network, emphasizing academic education, and connections with foreign countries: acquisition of equipment for laboratories, publication in foreign academic journals, training from foreign teachers, participation in Congresses and celebrations. Both Schools during 1911-1926 developed their internal organization: updated course plans and equip laboratories and libraries, actions directed by the members of the board.

6. BIBLIOGRAPHY

Bensaúde, A. (1922). *Notas histórico-pedagógicas sobre o Instituto Superior Técnico*, Lisboa: Imprensa Nacional.

Branco, J. Freitas (org.) (2013), *Visões do Técnico no centenário: 1911-2011*. Lisboa. ISCTE-IUL.

Brito, J. M. Brandão de, Heitor, M., Rollo, M. F. (eds). (2002), *Engenho e obra: uma abordagem à história da engenharia em Portugal no século XX*. Lisboa: Dom Quixote.

FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO (FEUP). *Faculdade Técnica da Universidade do Porto (1915-1926)*. Faculdade de Engenharia da Universidade do Porto (1926)

file:///C:/Users/Utilizador/Downloads/Faculdade-de_Engenharia_da_Universidade_do_Porto.

FEUP - SDI/ARQUIVO - Livro de Actas do Conselho Escolar, 1915 - 1922. Cota: 7(01) ARQ00000006

FEUP - SDI/ARQUIVO - Livro de Actas do Conselho Escolar, 1922 - 1924. Cota: 7(02) ARQ00000007

Grilo, E. Marçal (2010). *A génese do Técnico: Alfredo Bensaúde*. Lisboa: IST.

IST - Instituto Superior Técnico – CE – 1-3-0198 a 207

IST - Instituto Superior Técnico – CE - 1-2 007 a 0014

IST - Instituto Superior Técnico. Biblioteca – Copiador de Correspondência [1914-1922]. Accessible in Núcleo do Arquivo do IST, Lisboa, Portugal.

IST- Instituto Superior Técnico. Biblioteca – Livro de Correspondência IST/GDBS- INV/1/1, [1911-1922]. Accessible in Núcleo do Arquivo do IST, Lisboa, Portugal.

IST - Instituto Superior Técnico. Conselho Escolar. Livro de Actas [1911-1918]. Accessible in Núcleo do Arquivo do

IST, Lisboa, Portugal.
Matos, A. Cardoso de. (2009). Asserting the Portuguese Civil Engineering Identity: The Role played by the École de Ponts et Chaussées. In Matos, A.C. de, Diogo, M. P., Gouzevitch, I., Grelon, A. (ed) *Les enjeux identitaires des ingénieurs : entre la formation et l'action* (p. 177-209). Lisboa: Colibri/CIDEHUS/CIUCT
Pinheiro, M. A. (2013). A ruptura de 1911. In Branco, J. Freitas (Org.) *Visões do Técnico, no centenário: 1911-2011*. Lisboa: ISCTE-IUL.PORTUGAL – *Diário do Governo*. Lei nº 410, de 31 de Agosto de 1915, artº 77º.
PORTUGAL. *Diário do Governo*. Decreto-lei nº 163, 19 de Julho de 1911.
PORTUGAL. *Diário do Governo*. Decreto nº 5029, 25de Maio de 1911.
PORTUGAL. *Diário do Governo*. Lei nº 410 de 31 de Agosto de 1915. Artº 77.
Projecto de reforma do ensino technológico para o Instituto Industrial e Commercial de Lisboa. Lisbon: Academia Real das Ciências, 1892.

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The legacy of Fotokemika factory as analog photographic world heritage

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ABSTRACT: In the transition process from analog to digital photography, a phenomenon that started taking place at the end of the 20th century, most of the analog photo factories shut down. As a result, production of photo equipment is substantially diminishing and centuries old tradition of analog film photography is disappearing into history. This work explores the case study of Fotokemika factory (1947-2012), once a famous and respectable photo factory during Yugoslavia period, later the Republic of Croatia, as an example of the shutdown of an industrial unit that produced equipment for processing film photography. The study examines the history of the factory, the achievements in the fields of advertisement, design and influence on the development of analog film photography in the territory of Croatia. It also aims to valorise analog film photography as a cultural heritage and to contribute to a better understanding of the position of film analog photography processes and techniques in the 21st century.
Keywords: analog photography, analog technique, intangible heritage

1. THE DISAPPEARING ART OF ANALOG PHOTOGRAPHY

Society is currently going through extreme changes, due to a period of rapid technological advancement. Most of the times, we are not completely conscious of the fact that we are quickly adapting to using new pieces of technology. New technologies are making our lives easier on a day-to-day basis and continually changing our habits and ways of doing things. There are many examples of this impact in different fields, especially after entering into the new millennium in which digital technology culminates. If we look at the case of telephones, twenty years ago it was normal for every house to have wire/landline devices. Nowadays, the traditional telephones have almost disappeared and phones have become 'smart', with everything required to satisfy our needs, even with quality digital photo cameras inside.

More than one hundred years ago, George Eastman, as the result of the invention of capturing light on photo sensitive material (celluloid film), created the photographic industry, based on chemical processes and standardization of film cameras – what is called, from the authors' perspective, analog or film photography. The major difference between traditional film and digital cameras is how they captures the image. Digital cameras use a solid-state device called an image sensor instead of film. Improving technology to better capture light to create an image, from the chemical process to the digital process, has changed many things in the world that go beyond just creating photographs; it changed people's lives, from habits to industry.

The rapid progress of technology made digital photo cameras more affordable and, as prices fell, the need for film and analog cameras declined. The law of supply and demand and the transition of the media caused an accelerated collapse of the analog photo industry. In 2005 Kodak started shutting down plants and demolishing factories, and in 2012 the company declared complete bankruptcy. The decline of chemical film developing, during the digital era, was not responsible for destroying only one brand or industry; it took hold across the world. For example, Ilford Company, the black-and-white film manufacturer based in Britain, closed many parts of its factory. Also, the European factory of Kodak, in Chalon-sur-Saône, France, the birthplace of photography, closed its doors in 2006 and the same happened to the famous brand Polaroid, which had a factory in Massachusetts, USA. Fotokemika factory, in Samobor, Croatia, did not escape to this fate; their machines stopped production in 2012, the year that marks the final nail in the coffin for the analog photographic industry.

2. HISTORY OF FOTOKEMIKA FACTORY

The birth of the photo industry in former Yugoslavia started after the World War II, in a time of major renovation and demand of the market. By merging the companies Photo and Ozacel, a group of photographers and photographic experts formed the stock company named Fotokemika, which began building a factory in Zagreb in 1946. The idea of creating a larger company started as an initiative of this group of people deeply involved in photography, led by Viktor Riedl, who become the first director of Fotokemika. Beside Riedel, who enthusiastically pushed the project, the engineer Maks Plotnikov and his chemistry knowledge were the basis on which the factory started its production.

Black and white photo paper, photo chemicals, and simple cameras were first produced. Soon after, in 1952, the new plant in Samobor was opened and photographic, cinematographic and X-ray films were produced there. At that point, the only countries that had a photo industry were Germany, Belgium, England, France, Italy, the former Union of Soviet Socialist Republics, USA and Japan.

Besides Maks Plotnikov, there were some other leading names from the chemistry world working in Fotokemika, such as Ivan Jerman, who was, in the period of 1950s, the director of the chemistry industry in Croatia and later director of Fotokemika. He and a team of experts improved photo materials on a world level and created the brand Efke.

The period during the 1950s and 1960s was seen as a 'golden era' for Fotokemika. After the war in Croatia, in 1994, Fotokemika was privatized and continued working until 2012.

What started as a small regional company became a major actor in the photo industry with the creation of brand eFKe. To improve the materials production, a laboratory for chemical testing was established inside Fotokemika and it based its research on films and materials for analog photographic processes. In Figure 1, some photos of this laboratory in Fotokemika *Institute for research and development* are presented.

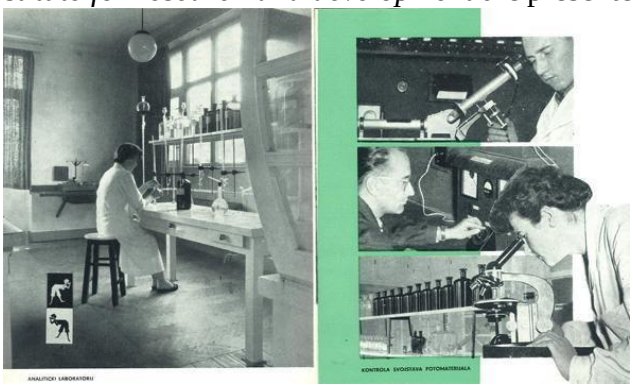

Figure 1. Research laboratory in Fotokemika, 1950s, Fotokemika magazine, 1954-1955.

Due to the lack of money and competition from large conglomerates like Kodak, Fotokemika stopped pursuing to improve their technology for films in color in the 1980s but it continued with black and white production, which made it the last factory in the world to produce films with silver.

2.1 Avant-garde design and marketing strategy of Fotokemika

For many years, in the main square in Zagreb, stood a big neon sign with the logo of Fotokemika and the Efkić characters, a personalized name which derivates from the Efke brand. The image of a person holding the camera ready for shooting became the symbol of the city's main square. When the factory was closed that image, which constituted the trademark of square, was left to oblivion.

The recognizable logo was created by Josip Sudar and Dušan Bekar, a team of an advertising expert and a designer. They were responsible for many propaganda campaigns and also for the creation of the public image of Fotokemika in 1950s.

Josip Sudar graduated from the Faculty of Economics in Zagreb and he is considered a pioneer in advertising, not only in Croatia but in all the territory of former Yugoslavia. He was a top propaganda expert who created campaigns for many enterprises, including Fotokemika, where he worked from 1953 to 1966, when he left to start working as a university professor. Besides economics, he also studied acting and directing. He directed one of first animation films in the famous Zagreb School of Animation. Probably, this artistic note of his character marked his propaganda campaign for Fotokemika. Moreover, he was much more than just an employee; he was a passionate photographer, always involved in other activities of the factory. He was a regular member of the jury in the exhibition of Fotokemika amateur club and also a jury for the *XI International Exhibition of Photography*, with the most known Croatian photographers of that time: Tošo Dabac, Mladen Grčević and Milan Pavić.

In an interview in the Fotokemika magazine issue from 1995, he explained how he came to the idea of Fotokemika logo and what it represented: *My basic idea was to show, through a visual presentation, that taking photos was such an easy thing that anyone could do it, even a little kid (it was not define whether the image corresponded to a male or a female character)*[1].

With a public image he wanted, in the first phase, to create the idea that photography was available to everyone. Many of his propaganda slogans were playing on a family card, with titles like: *Photos are*

[1] Fotokemika, list radnog kolektivnog poduzeća,'Fotokemika' tvornice filmova i fotopapira (Fotokemika, magazine of working collective enterprises, 'Fotokemika' factory of films and photo paper), broj 2, Zagreb, 1995, p. 9

one of the best memories in life, and therefore shoot everything that you want to save!; Today, tomorrow, you will be glad to find an image from childhood in an album; In summer and in winter, shoot your baby with EFKA film; Shoot, because shooting is giving you joy and happiness; Enjoy life, shoot! Stop the time... Shoot![2]

Sudar was playing with humour, memories, joy, happiness and life; a formula that guaranteed success. His advertisement was marked, with a hidden motto, '*photography for everyone* '.

Another influential figure in the branding of Efke was Dušan Bekar, responsible for the visual part. He started by creating an attractive logotype showing a young man holding a camera, that did not change from the 1950s to the closing of the factory (Figure 2). He and Sudar did all the visuals for the propaganda in 1950s and almost all in 1960s. Bekar graphic design for product line was based in geometric abstraction, a dominant trend in painting at that time.

Figure 2. Fotokemika logo, Fotokemika magazine, 1954-1955.

The work of Aleksandar Srnec, an avant-garde artist, should also be mentioned. Srnec was one of the members of group EXAT 51, whose aesthetics was marked by pure geometric abstraction. In a manifesto, they proclaimed the idea that there was no difference between the so-called pure and applied art. For Fotokemika, Aleksandar Srnec did three advertising posters and a few drafts for New Year's cards during the years 1960 and 1961. Today, one of the posters belongs to the collection of the Museum of Art and Crafts in Zagreb, and the rest is in the private collection of Marinko Sudac, collector of progressive avant-garde, neo-avant-garde, and post-avant-garde art. In Figure 3, one of the posters belonging to Sudac's collection is presented.

In that context, Fotokemika found its place. Thanks to Josip Sudar and his vision of a very modern public image, the Efke brand was born. By employing the leading artists of that time, Fotokemika created avant-garde designs for posters and products, which from today point of view should be considered as works of art.

When Fotokemika was formed, the business direction was aware of the fact that part of their market was going to be the amateur photographs. They were also conscious that they needed to promote amateur photography through education to incentive new customers and markets.

Figure 3. Aleksandar Srnec graphic design for Fotokemika, 1960, Marinko Sudac Collection

2.2 Fotokemika's impact on the development of amateur photography in former Yugoslavia

Fotokemika achieved these goals by connecting with clubs in different cities in former Yugoslavia. It is important to emphasize that clubs had a long tradition in the country and they were central points for the development of photography. After World War II, amateur clubs were still the centres that spread photography and made it available and affordable for anybody who wanted to do it. It should not be forgotten that in this period an important repression was going on in these countries, and photography was still an expensive *sport.* There was a lack of materials, cameras, dark rooms, and also knowledge.

In the 1950s, the most important institution for amateur photography was the *Union of photo and film amateurs Yugoslavia*. In the first congress held in 1955, in Novi Sad, Josip Bosnar was elected president and Ivan Jerman, at that time the director of Fotokemika, vice president. In a letter that Bosnar wrote to Jerman he said: *Congratulations on your selection. We are convinced that cooperation with Fotokemika will be significant for the work of the Union, because it will represent strengthening of our photo industry with community organizations.*[3]

Fotokemika was providing materials for shooting and developing in dark rooms either for free or at very low prices. They also published *Tips for good photography* along with the booklet *Tips for photo*

[2] Collected slogans from the magazine Fotokemika, list radnog kolektivnog poduzeća,'Fotokemika' tvornice filmova i fotopapira (Fotokemika, magazine of working collective enterprises, 'Fotokemika' factory of films and photo paper), from 1954-1955

[3] Fotokemika, list radnog kolektivnog poduzeća,'Fotokemika' tvornice filmova i fotopapira (Fotokemika, magazine of working collective enterprises, 'Fotokemika' factory of films and photo paper), broj 2, Zagreb, 1955, p. 8

amateurs, which they offered to amateur photo clubs and to their members to promote photography.

3. CONCLUSION

With the invention of digital photography, the process for obtaining an image started to become much faster. In the case of digital recording of light, we have the possibility of visualizing the photos that were taken immediately. This is the key factor that has pushed analog photography from global use. In fact, the fast and frequent improvements in technology of digital photography diminished substantially the prices of the devices and the analog process was almost unnecessary. This caused a decline in the markets related to analog photography and in a domino effect, the factories related to it were closed. As a consequence, the equipment required for the analog process, such as films, papers and chemicals almost disappeared. Without materials, it has become harder and harder to revert the situation and revitalize the analog process which is nowadays almost exclusively in the hands of the lovers of ancient photographic processes.

Digital photography is the future, but analog photographic techniques should be safeguarded, since they constitute now part of our common past.

Fotokemika factory stopped production a few years ago. Being part of the analog photo industry, after 65 years of work, it has left a priceless legacy behind.

A multiple direction of valorisation of Fotokemika heritage is fundamental: science research and application to the industry of photography, advertisement and design and technical immaterial knowledge.

The universal value of Fotokemika factory as cultural heritage in developing and spreading analog photography equipment and technique is undoubtedly known. Analog photography constitutes a fundamental source of historical and social information by showing the changes in society and its visual communication. Fotokemika, as one of many examples of analog photo industry, was part of that story.

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4. REFERENCES

Fotokemika, list radnog kolektivnog poduzeća,‘Fotokemika‘ tvornice filmova i fotopapira (Fotokemika, magazine of working collective enterprises, ‘Fotokemika‘ factory of films and photo paper), broj 2, Zagreb, 1954-1955

Fotokemika, list radnog kolektivnog poduzeća,‘Fotokemika‘ tvornice filmova i fotopapira (Fotokemika, magazine of working collective enterprises, ‘Fotokemika‘ factory of films and photo paper), broj 2, Zagreb, 1995

Photographic ex-votos. Preservation questions on image collections in religious buildings

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ABSTRACT: This work discusses issues related to the conservation of photographic collections placed in religious buildings and makes part of a Ph.D. project on photographic votive offerings (ex-voto) in Alentejo region in Portugal. The ongoing research intends to draw attention on the objects themselves due to their importance to the society as devotional objects, and their relevance to understand local communities through image representation. One major purposes of the work will be to design a strategy for the valorisation and preservation of this particular type of heritage in order to safeguard the collective memory.

1. HISTORIC CONTEXT

Votive offerings, or *ex voto suscepto* in Latin, are objects offered to Christ, Our Lady or to a particular saint in fulfilment of a vow. In ancient times, votive offerings were seen as gifts to gods. Eurico Gama wrote in his book *Os Ex-votos da Igreja do Senhor Jesus da Piedade de Elvas* (Gama 1972), dedicated to a vast collection of ex-votos, that the ex-voto *is as old as mankind*[1], and that *faith, the first of the three theological virtues, has been always associated with man in every civilization (…)*[2]. For the Catholic encyclopaedia *votive offerings can constitute an extremely varied list. The most common are those which represent the person to whom the favour has been accorded, or the thing that has benefited under the miracle, or some representation of the actual Divine interposition* (Jarrett 1912). This wide variety of ex-votos typologies consists, in general, of wood sculptures or wax moulds of representations of parts of the human body, or of paintings over wood or in a metal panel, depicting an event with a descriptive text. Very different ex-votos in nature could nevertheless be included, such as those referring to an event, like dresses, shoes, or even the construction of monuments. Batalha Monastery, ordered by D. João I to thank Our Lady for the victory of Aljubarrota battle against the Spanish invaders, is a good example of this last typology (Gama 1972).

As to paintings, the same type of composition was frequently used for different ex-votos. This is the case of shipwrecking, a common thematic for people living in coastal areas or in the islands, where the boats in the sea were painted with a text explaining the problems they faced (Cardoso 1983). One common representation in Alentejo painted ex-votos is the image of a sick person, lying in the bed, surrounded by the family, under the look of the saint, positioned in the upper part of the painting. Below the scene, a descriptive text was added, which included the identification of the devotee (Fig. 1).

Figure 1. Shrine of Nossa Senhora da Visitação, Montemor-o-Novo. Example of a painted ex-voto.

Photography was presented to the world in 1839. After its popularization due to the technological progress carried out in cameras and photographic processes, which happened during the second half of 19th century (Tagg 2005), it started to be integrated as

[1] Gama, E. 1972. Original text: *é tão velho como o Homem*

[2] Gama, E. 1972. Original text: *(…) a Fé, a primeira das três virtudes teologais, esteve sempre associada ao Homem de todas as civilizações (…)*

an ex-voto. During this time, painted votive offerings were probably an inspiration for photographers. In fact, some of the most common compositions created in paintings are also found in earlier photographs. In order to keep the same visual language, after the photo session in the client's house, the photographers made a photomontage where they included an image of the saint to whom the ex-voto would be offered. Nevertheless, all this detailed work was far to slow for photographers and the studio portrait rapidly substituted the photographic typology where illness was showed. This is why the portrait is the photographic typology that distinguishes photography from other types in ex-votos the collections (Fig. 2). Photography was capable of accurately capture the image of someone, keeping his/her visual memory. This aspect must have been particularly important for those who offered an ex-voto, considering the thousands of photographic portraits offered in Alentejo region, without parallel in the rest of the country.

Figure 2. Shrine of Nossa Senhora do Carmo, Azaruja. Organization and photographic items display on the walls.

This work is based in Alentejo region, in Portugal, and it expects to contribute to the valorisation and the preservation of the photographic votive offerings that were offered to particular shrines in the region and propose a strategy for guidance on object disposal and safeguard. This widespread practice in Alentejo led to the creation of collections of hundreds of photographic portraits, which represent, in fact, the evolution of the local communities for more than one century.

Photographs are usually framed and displayed on the walls, without any environmental control, which immediately raises questions on preservation. The work here presented is based on the case studies of the shrine of Nossa Senhora da Visitação, in Montemor-o-Novo, and the shrine of Nossa do Carmo, in Azaruja, both very popular in Évora's region.

2. ORGANIZATION AND MOUNTING

When devotees offer pictures to a saint in a shrine, they leave the photographs in the walls or in a temporary place indicated by the responsible, waiting for the final destination. Most of these pictures are framed, which determines their arrangement in the space devoted to them. The shrine of Nossa Senhora do Carmo can be considered a small chapel. Nevertheless, 589 photographs are in exhibition there. As to the shrine of Nossa Senhora da Visitação, a larger church, an inventory has not yet been done due to the enormous quantity of photographs that make that task almost impossible. Innumerable amounts of ex-votos occupy all the available space on the walls and ceiling, hanged by the frames with nails and pins, and fixed directly on them or on top of MDF panels. Most of the times, no schematic organization is followed; however, in certain specific cases, it is possible to distinguish a particular disposal under a certain subject. This is the case of the Portuguese Colonial War where considerable areas are devoted to exhibit the pictures of those who fight on it. Frequently it is the shrine´s chaplain, or someone indicated by him, who coordinates the distribution and arrangement of the photographic pictures, always constrained by the lack of space. The use of photographic albums is a frequent option for recent pictures since most of them present a standard format, without frame. In conclusion, the items disposal and arrangement are limited by space optimization, frame format and, in certain cases, they obey to an organization under specific subjects.

The existence of different kinds of mountings in the exhibition's rooms should also be emphasised. Frames are made of wood or plastic that yield organic compounds, which create a chemical instable environment for photographic materials, while metallic frames generally present corrosion, whose particles get in contact with the photographs. On the other hand, an important part of these frames is covered with paints, which when undergoing a physical degradation process, leave particles inside the frame. In both situations, physical damage will occur in the image or on its support, the paper. Moreover, when framed, a front glass is used. Although protection from dust and mechanical action is obtained, when high levels of relative humidity are attained, condensation within the frame will occur, representing one of the main causes for the degradation of the photographic materials.

3. ENVIRONMENTAL CONTROL AND DETERIORATION PATTERNS

Environment control is inexistent in the shrines under study. Temperature and relative humidity are dependent on the meteorological factors and building isolation. Being so, mild temperatures and high levels of relative humidity are expected, especially when the season changes. Temperature and relative humidity

variation are the main causes for material deterioration, namely photographic components: gelatine, albumin, silver, dyes and paper. These variations occur in the day and during the year, depending of the seasons.

Lighting is also a factor that is not controlled. The rooms under study are illuminated by natural light that enters through the windows, and in the case of Nossa Senhora da Visitação, fluorescent lamps are sometimes used. Natural light and light coming from fluorescent lamps contain a component of UV radiation, one of the factors responsible for the oxidation of photographic materials that can led to image fading and colour deviation (Lavédrine 2013; Boadas et al. 2001).

The room and windows' direction are also an important factor that should always be evaluated since the illuminance depends on them. Besides, the room direction will indicate the hours of sun in contact with that part of the building. A room directed to south can be warmer than one directed to north, but in this last one, humidity can be higher. This information can help to determinate which room would be more adequate for storing the permanent exhibition.

In order to have a proper evaluation of these factors, a preliminary fieldwork in both shrines was carried out. Information on temperature, humidity and illuminance were obtained, since it is fundamental to associate these factors with pathologies found in the studied items. The information in table 1 resumes data on temperature (T), relative humidity (RH) and illuminance (E_v). A more complete follow-up is in process and pretends to register a total year of data. In the case here presented, the data is residual, but it already gives precious information on the environment instability inside the rooms. The average of measurements done in the beginning of May reveals high levels of RH, but lower than expected. The room temperature is around 15 ºC, which is acceptable, once it is lower than 18 ºC, the recommended temperature referred to ensure the photographic material stability (Pavão 2001, Fuentes de Cía 2012).

Table 1. Average measurements* for temperature (T), relative humidity (RH) and illuminance (Ev)

	Shrine N. S. da Visitação	Shrine de N. S. do Carmo	
	Room 1	Room 1	Room 2
T (ºC)	15,8	15,7	15,4
HR (%)	60,0	64,5	64,0
E_v (lx)	80	110	30
Orientation	North	Southeast	Southwest

*Measurements done on May 4 and 5, 2018, between 11:30 am and 3:30 pm.

It is also important to point out that 2018 was a year without significant precipitation, especially in winter, when the weather was mild. Alentejo region is known for its traditional cold and humid winter and hot and dry summer. Until now, this year has been uncommon, but future data will clarify the arguments. The building response in terms of thermal insulation and humidity protection also determinates the information in table 1. The two shrines under study do not present water infiltrations nor structural problems.

The discussion here presented is based on the authors' expertise and on the study of specific literature in the field of photograph conservation and history of photography. Nevertheless, the *in situ* monitoring of the indoor conditions is fundamental to understand the pathologies observed in the objects and their causes. Table 2 presents deterioration patterns found in the photographic objects under study on both shrines and the possible causes of their appearance. The most relevant factor for conservation of photographic material is the variation of temperature and/or relative humidity. Other important factors include light exposure, inappropriate mounting and biodeterioration (directly related with high levels of RH). When observed, the photographs present a vast variety of chemical and physical pathologies (Fig. 3).

Figure 3. Stains and image loss due to biodeterioration. Image detail.

Chemical deterioration such as image fading, yellowing or colour deviation are irreversible, confirming the need for a controlled light exposure (Fig. 4). Biological attack is also a serious problem since the activity of insects or fungi can also cause irreversible image loss. As to physical deterioration, which is caused by inappropriate mounting or handling, there are more possibilities for reversibility. In this case, the procedure will require to treat each object individually, which is much time-consuming and effectiveness.

Figure 4. Image fading and yellowing, due to light exposure and high relative humidity. Accumulation of dust and the frame is in an advanced state of deterioration. Image detail.

Table 2. Deterioration patterns found in photographic objects

Cause	Deterioration
High levels of relative humidity (RH) and/or temperature or RH variation	Image and support yellowing Deformation of the support and the image Lacunae on the image due to gelatine degradation Lacunae on the image and support due to Xylophage insects' action
Biodeterioration	Lacunae Stains due to fungi Image' loss
Light exposure	Alteration of original colour (colour deviation) Image yellowing Image fading
Inappropriate mounting: image in contact with glass or with acidic materials, such as cardboards or wood	Rips Support deformation Yellowing Stains Creases Condensation and posterior appearance of fungi, stains or image loss

4. FINAL NOTES

Preliminary evaluation of the collections on both shrines evidenced the utmost importance of an inventory with a description of the conservation state and a proposal for a preservation methodology. The exploratory measurements done on both shrines showed that in the absence of controlled conditions in the exhibition rooms, even in a mild winter and spring, undesired levels of temperature, relative humidity and illuminance, away from those recommended in the bibliography, are reached. Table 2 resumes some of the deterioration patterns found in the items of both collections and allow to establish relationships with possible causes. Last but not least is the economic availability. The dimension of the collections and the economic situation of the responsible entities will surely determine the possible actions to be taken to mitigate the actual situation, eventually revert it, and prevent new developments. Preventive conservation is the response to the main problems, which means that environmental control should be a priority in order to avoid further deterioration. It is also relevant to establish a cleaning plan to reduce the accumulation of dust. These first objectives should be considered the beginning of a change in the way we understand the conservation of photographic ex-votos.

5. REFERENCES

Boadas, J., Casellas, L.E., Suquet, M.A. 2001. *Manual para la gestión de fondos y colecciones fotográficos*. Girona: Biblioteca de la Imagen, CCG Ediciones.

Cardoso, C.L. 1983. *Ex-voto, painéis votivos do rio, do mar e do além mar*, Lisboa: Museu da Marinha.

Fuentes De Cía, Á.M. 2012. *La conservación de archivos fotográficos*, Documentos de trabajo. Madrid: Sedic Asociación Española de Documentación e Información.

Gama, E. 1972. *Os ex-votos da igreja do Senhor Jesus da Piedade de Elvas*. vol. 1. Braga: Associação dos Arqueólogos Portugueses.

Jarrett, B. 1912. Votive Offerings. In *The Catholic Encyclopedia. Vol. 15.* New York: Robert Appleton Company. Retrieved July 27, 2018 from New Advent: http://www.newadvent.org/cathen/15509a.htm

Lapa, A. 1967. *Livro de ex-votos portugueses*, Lisboa: Editora Lisboa.

Lavédrine, B., Gandolfo, J.P., Monod, S. 2000. *Les Collections Photographiques, Guide de Conservation Preventive*, Paris: ARSAG.

Lavédrine, B. 2013. *(Re)Connaître et conserver les photographies anciennes.* Paris: Éditions du Comité des travaux historiques et scientifiques, Collections orientations et méthodes n.º 10.

Pavão, L. 2001. *Conservación de Colecciones de Fotografía,* Cuadernos Técnicos, Granada: Editora Junta de Andalucía.

Tagg, J. 2005. *El peso de la representación. Ensayos sobre fotografías e historias*. Barcelona: Editorial Gustavo Gili, SA.

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Memory recaptured in a small community – Preserving retouched photographic negatives, discussing visual culture

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ABSTRACT: This paper focus on a private portrait photographic negatives collection belonging to Foto-Carvalho, a photo-graphic studio of Estremoz (north of Alentejo, Portugal). It explores the techniques, materials, and reasons behind retouching on photographic negatives; also, the validity of retouching in the search for the photographic truth. Studying dry plate photographic negatives from lesser-known collections is a special opportunity to take a closer look to a time and a place. This case study on a Portuguese community will bring new and valued insights to portrait photography and contributions to visual culture of the first half of the 20th century.

1. INTRODUCTION

With the invention of photography people believed they would have a tool for truth, and any alteration of the photographic image could be controversial. However, retouching photographic images is a practice that exists since the beginnings of photography itself. The reasons for altering the images were varied. Some were necessary to strictly overcome technical difficulties; others had social, artistic or even economic reasons. Nowadays, with digital tools, it is easy to change an image. On the contrary, in the beginning of the 20th century, retouching a dry plate photographic negative was a practice that demanded artistic abilities.

Although dry plates collections are abundant, they are usually unknown and there are few studies that focus outside the well-known photographers. Also, there are few studies about the technical aspects of these collections, their conservation conditions or image alterations.

National archives keep the collections of National interest. Outside the main cities, in smaller towns, usually the information is scarce and scattered. Other collections, sometimes in the hands of private owners, can give precious information, as they contain the memories of a community. Their preservation and study bring to light information about their cultural context, customs and history.

This study is part of a PhD project on the use of retouching on dry plate negatives from different Portuguese photographic collections dating from the first half of the 20th century. The project includes an ongoing laboratorial study of the materials used for retouching, a subject that has, so far, few studies dedicated to it. Also, new contributions are given to visual culture studies regarding the uses and intentionality of retouched negatives. This will allow a better understanding on the materials used for retouching, how they changed the final image, their present conservation condition and guidelines for its preservation.

The focus of this paper is a private photographic collection from the former *Foto-Carvalho* studio, a photographic studio of Estremoz (north of Alentejo, Portugal), active from 1936 to c.2000.

2. PHOTOGRAPHY AND TRUTH

"*You hear so often from admirers of photography emphasizing that this young art represents the pure truth, understanding truth as the counterpart of reality. Indeed, photography can be truer, as truer producer of images as all other arts, but they are not absolutely true, and because they are not absolutely true, it becomes important to know the sources of the untruth in photography, and they are many.*" (Vogel, 1867)

It was soon realized that a photograph would register more than the human retina. The veracity of the formed picture was unquestionable but not always in agreement with what the eyes could see, or with what the photographer wanted to capture or express.

In this same book, Vogel gives the example of lighting, how different ways of lighting the same subject influence the general aspect of a picture and can convey different states of mind. It is also known

that by changing lenses or the aperture of the diaphragm completely different images will be generated. Even changing the disposition of elements in the image can give, to the viewer, different interpretations on the same subject.

In order to overcome technical difficulties, such as lens aberrations, colour or contrast and to bring the image closer to what was observed by the naked eye, the photographers would also retouch their negatives. In that time pictures were retouched by hand.

In the search for a true photograph, often the purpose of retouching was not only to correct but to convey an image closer to the photographer's eye and the taste of the time.

Figure 1. Retouching desk (modern replica), private collection.

3. RETOUCHING PHOTOGRAPHY

In the first half of the 20th century, retouching negatives was done over a retouching desk (Fig. 1) with simple tools, such, as a pencil or a brush. Some colorants were used to correct exposure or alter contrast, highlights or shadows. But this was not a simple task. Most important, with a well retouched negative, the resulting image should not be perceived as having been retouched.

The black and white emulsions available, although rapidly evolving, were in general less sensitive to some colours, especially to the reds, that would be registered as black.

In order to correct this technical issue, a red colorant was often used to retouch the darkened areas on the negatives. By adding red, those areas would turn lighter when converted to positives.

3.1. Portraiture

In the history of photography, portraits market developed very rapidly and since the end of the 19th century, there were photographic studios everywhere offering that specific service. Portraiture is a special kind of photography with less room for accepting the natural differences between what the retina can apprehend and the image captured by the lens.

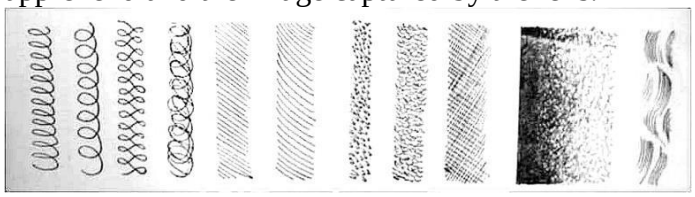

Figure 2. Examples for the practice of pencil retouching (Marin, 1966).

Figure 3. The construction of the railways (1940's - now deactivated) retouched in the sky area with red make up, Foto-Carvalho, Estremoz.

Black and white portraiture is still in use today and some photographers, such as it happened in the Foto-Carvalho Studio, resisted doing colour portraits.

Portraiture was a market-oriented business. Esthetical retouching was recurrently done and now attested by the archive's collections.

A common alteration found in glass plate negative portraits is retouching with pencil. Especially in the first half of the 20th century, pencil retouching would be done to attenuate the texture of the skin, so it would have a porcelain or velvet like appearance, something that is very characteristic of portraits of that time. After applying a varnish layer over the emulsion, the pencil would be used in random patterns (Fig. 2) so to give visual interference and attenuate or virtually erase major artefacts, such as skin wrinkles.

3.2. Other subjects

Portraits were not the only images being retouched. In landscape or documentary photography a common practice was to retouch the sky areas (Fig. 3). A red or black opaque layer would normally by applied to completely whiten those areas. Larger areas could even be covered by masks made of opaque paper. The photograph would then be printed with a white sky or through double exposure, adding a different negative for the sky area.

This technique was also used to isolate elements in a photograph, as it happens in Figure 4. A sculpture photographed inside a church was completely isolated from its background. For this purpose, red paint was applied surrounding the fine details and black opaque paper covered the remaining area.

4. STUDYING PHOTOGRAPHIC NEGATIVE COLLECTIONS

In photographic studios it was a common commercial practice to save the original negative. This way a client could return to buy more copies of the same image. Nowadays, some of the most representative collections, of awarded or well known photographers and photographic studios, are kept as negative archives in the most important National institutions, located in the major cities.

However, other collections exist, away from the major city centres, some still in private hands, that hold complementary information to the National history. Also, they hold a broader view of the visual culture of their period and especially they present greater relevance to their communities.

5. FOTO-CARVALHO

One of such collections is the negative archive of the Foto-Carvalho studio in Estremoz. Its renamed photographer was Rogério Carvalho (1915-1988).

Foto-Carvalho was the most important photographic studio of the region for several decades. It is known that it had several apprentices who would go on using their learning in other towns of Alentejo, such as Portalegre or Redondo. One of the apprentices, Olímpio Ferreira, is still alive. He started working at Foto-Carvalho at the age of 13 and would grow to be the owner with his wife after Rogério Carvalho's death. At the age of 65 he finally sold the studio and its negative archive in c.2001 to the owner of *Estudios Correia*, a studio opened in the 80' and still active to this day.

The current owners of the Estudios Correia regard this archive from a commercial point of view, as an added value to their business. Still today it is possible to buy prints of the Foto-Carvalho studio negatives. At the same time Estudios Correia owners are aware not only of the historic value of this collection but also of its symbolic importance as a way of strengthening the identity bonds within the community. They are open to research studies such as the present one and also promote viewings of selected examples by organizing themed exhibitions of its archive; with the next exhibition, happening in September 30th 2018. At this exhibition it is intended to show the portrait work of Foto-Carvalho studio from 1936 to 2001, a trade almost forgotten by the general public as, in this digital age, anyone can capture their own portraits with a simple mobile phone.

Figure 4. "Queen Saint Isabel sculpture" Image showing paper mask and retouching for total isolation of the sculpture from its background (194?), Foto-Carvalho, Estremoz.

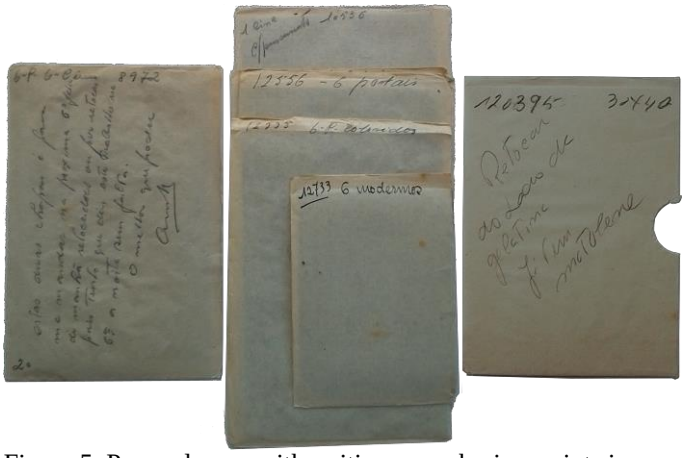

Figure 5. Paper sleeves with writings, numbering, print size, number of copies and retouching instructions, Foto-Carvalho, Estremoz.

5.1. Exploring the Foto-Carvalho collection

The Foto-Carvalho collection mainly includes glass plate and film negatives of studio work; the great majority consists of photographic portraits. The portraits are organized by size and number, which correspond to the order in which they were taken. Originally, each negative was enclosed in a paper pouch (sleeve).

Other kinds of photographs, taken outside the studio are numbered but not organized. Exterior images registered celebrations, such as weddings or other religious events; costume photography, for the publication of postcards; and other social events such as sports, theatre, music concerts or bull fights.

5.2. Retouching at Foto-Carvalho

Information about retouching can be found, not only by observing the negatives themselves but also by reading the notations scratched into the emulsion and written on the enclosing paper sleeves (Fig. 5).

The great majority of the portraits is typically retouched on the face and hands areas, using a pencil (Fig. 6) on the emulsion side and a red colorant on the glass side (Fig. 7).

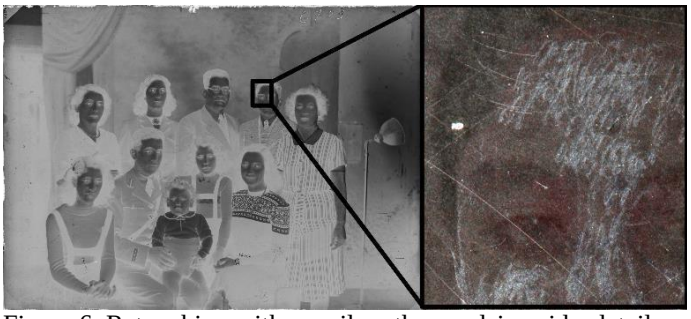

Figure 6. Retouching with pencil on the emulsion side, detail, macro-photography, Foto-Carvalho, Estremoz.

Figure 7. Retouching with red make up on the glass side, detail, macro-photography, Foto-Carvalho, Estremoz.

Varnish was applied on the emulsion side, strictly over the areas to be retouched and never on the entire surface.

5.3. Identifying retouching intentions

When realizing that, at Foto-Carvalho, retouching was a standard practice in portrait photography, this cannot be faced simply as a way to overcome technical issues. The photographer chose to retouch the negatives with the same care as he chose the lighting or pose of the pictured person. This means that retouching is part of the photographic process and should be preserved when considering the preservation of a negative and the interpretation of the final image.

Young or old, men or women, the portraits show whitened faces and softened skins that became characteristic of the Foto-Carvalho work. Also, they mirror the glamour of the star movies' portraits and other National collections of the same period.

6. CONCLUSIONS - MEMORY RECAPTURED IN A SMALL COMMUNITY

Photographyshould not be considered as an unbiased recording device. When searching for the truth, the photographer makes his choices. At Foto-Carvalho this also meant retouching as a complementary technique in photography. The photographer instils his vision and his taste to the final image and his choices along the entire photographic process, including retouching, are what builds a unique image.

The information obtained from observing retouched negatives is the key to better understand the heritage significance of the Foto-Carvalho collection, as a whole.

Portrait collections such as this have few studies dedicated to them. The possibility of studying such collections is an opportunity to revisit and recapture the memories of the respective community. This is a collective memory of the visual culture of its time and contributes to the National view of an important Photographic Heritage.

This justifies the preservation of such collections and special care in the effort to preserve the retouching techniques. As they are an integrant part of the creation process, of the object, of the image and memory.

7. REFERENCES

Marin, Corrado. 1966. *Il ritocco fotografico: positivo e negativo, chimico, manuale, meccanico.* Trieste: Edizioni tecniche fotografiche.

Vogel,Hermann Wilhelm. (ed) 1867. *Lehrbuch der Photographie: nach Vorlesungen gehalten an der Königlichen Gewerbe-Akademie zu Berlin*. Berlin: Louis Gerschel Verlagsbuchhandlung.

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And a special thanks to Paulo Correia, co-owner of the Estudios Correia and Olímpio Ferreira former owner of the Foto-Carvalho studio, for allowing access to the Foto-Carvalho collection and sharing their knowledge to this project.

ARCAer Project. Conservation and analysis of antique ensembles of reliquaries.

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ABSTRACT: This paper focuses on a collection of reliquary busts integrated in the reliquary sanctuary of Madre de Deus Convent. It explores the ARCAer project which will address this set through its historical, stylistic and iconological study. It will include laboratory analysis of the materials and technologies associated with the production of the sculptures with the intend of establishing affinities and differences between the several objects, which may bring clarification about their origins, their ordering process and the conservation treatment of the set. It is intended to recover the works and relocate them in their original places, resuming an integrated discourse that was lost. Also, the project aims to reflect upon the human drive to preserve material memories, establishing parallels with our days.

1. INTRODUCTION

The phenomenon of collecting relics of saints that marked the Modern Age can be considered one of the factors in the genesis of collecting memorabilia and curiosities. The power associated with the intercessory dimension of the catholic saints in the solution of problems or the cure of illness, allows to understand the importance of the spaces where the relics were integrated (Ibañéz Fernández & Criado Mainar 2011).

Born from the regal donation of Queen Leonor (1458-1525), the reliquary sanctuary of Madre de Deus Convent (National Tile Museum) is one of the oldest repositories known in Portugal which combines architecture and reliquaries (Curvelo 2009). The organization of architectural spaces integrating reliquaries is one of the less studied subjects in Portugal and, simultaneously, one of the most interesting manifestations of religious cult which assumed clearly distinct aspects during the Baroque in Portugal (Capelão 2011).

This collection of relics still remains in place, in the choir loft or "Treasure Room", a reliquary sanctuary which is one of the first in living memory and among the rare ones that remain almost intact in Lisbon. The relics, such as bones, teeth and textiles, are inserted in busts dating from the late 16th century and the first half of the 17th century, composing an iconological discourse that was lost and is intended to be restored. The design of an architecture to integrate this type of pieces is unusual today, since many were destroyed after the extinction of Religious Orders (Ibañez 2011). In Lisbon, this is probably one of the oldest and best ensembles for its exceptional quality and for being apparently fully preserved.

This study is part of a PhD project that focuses on the ensemble of relics of the sanctuary from the Madre de Deus Convent and discusses its history, technology, conservation and valorisation. The project includes an ongoing laboratorial study of the materials that compose the polychrome surfaces of the sculptures, which results will contribute for a better understanding on whether the treatises of the time (Pacheco 2001; Nunes 1615) were followed in this typology of sculpture, the reliquary busts, or not.

The focus of this paper is to present the main goals of ARCAer project, by providing a little knowledge of the historical and artistic context of where the ensemble of reliquaries is integrated, presenting the analytical results that were obtained up to this stage, talking about its conservation and valorisation plans and addressing the human drive to conserve material memories of moments or people.

2. HISTORICAL, ARTISTIC AND ICONOGRAPHIC STUDY

Among the most important treasures of the Monastery of Madre de Deus there is an ensemble of reliquaries almost unknown which, for those who are experts in this field, is considered the second most important of Lisbon, only surpassed by those kept in the São Roque Church. São Roque´s collection is older, larger in number, and the relics' receptacles are made of

precious metals. In the monastery of Madre de Deus there was an important tradition of devotion to relics. This can be attested by one of the best-known paintings of the beginning of the 16th century in Portugal which represents the arrival of the relics of Saint Auta at the monastery of Madre de Deus (Fig. 1). Queen Leonor is represented in this painting and her presence in this event is an important statement of the esteem that this worship had at that time (Campos et al. 2002).

Figure 1. Paint of "The arrival of the relics of Saint Auta at the monastery of Madre de Deus".

Figure 2. Reliquary bust of Saint Clara.

Although the choir, where the collection of relics is kept, was built by the end of the 16th century, the display that can be seen today was made in the first half of the 18th century (Telles 1899). Today the reliquaries are in display inside twenty-two cabinets, but they were probably not meant to be placed inside any furniture (Curvelo 2009). This can be attested by the remains of wax from candles and by some burnt areas on the polychrome surfaces.

The ensemble is composed of thirty-eight reliquary busts, made between the end of the 16th century and 1638, and they are associated in several groups: the group of "the first family" (the earliest pieces), the virgins, the holy popes, the holy innocents, the Franciscan saints (Fig. 2), the martyrs of Morocco and four reliquaries without any specific connection between them nor the remaining groups.

3. TECHNICAL AND MATERIAL CHARACTERIZATION

The technical and material characterization of the sculptures will allow the understanding of the differences and affinities between the different objects.

The analytical study will include the use of laboratorial techniques on Micro samples already collected from the polychrome surfaces such as µ-Raman for pigment identification; scanning electron microscopy with energy dispersive X-ray spectrometry (SEM-EDS) for elemental analysis of pigments and fillers; X-ray techniques, such as X-ray diffraction, to clarify any doubts that might not have been cleared from previous techniques, and also chromatographic techniques, such as gas chromatography coupled with mass spectrometry (GC-MS) or high performance liquid chromatography (HPLC) for the characterization of binders. Also, radiography will allow the study of the construction methods of the wooden supports.

Concerning the wooden support, micro samples will be collected for species/families identification through optical microscopy (OM) and, in some cases, through scanning electron microscopy (SEM). From a core group, composed of the works that are believed to be the earliest and the most recent ones, a 0,5 cm^3 sample will be collected for dating through radiocarbon coupled with mass spectrometry which results will allow to estimate the logging dates.

Through the study of the different decorative areas such as flesh tones, hair and *estofado,* some subgroups might be formed, and this may bring clarification on the origins of the works and the ordering process itself, together with the documentary and comparative research developed during the historical and artistic study.

Some analyses using SEM-EDS and Fourier-transform infrared spectroscopy (µFTIR) were already carried out on a group of four sculptures (Cunha et al. 2018). Samples collected from all the works under study were observed as cross sections through OM for stratigraphic characterization. So far, the results suggest that the polychrome techniques, the pigments, fillers and binders used correspond to what would be expected in sculptures of this period (Barata 2008; Barata 2015). The usual sequence of layers in the *estofado* areas was identified: the use of

calcium sulphate for the ground layers, aluminium silicates (clay minerals) for the bole, high quality gold alloys and a single paint layer applied over the gold and composed of lead, mercury, iron and copper--based pigments (Fig. 3). In the flesh tone areas, the usual sequence of layers was also identified: a first calcium sulphate ground layer, followed by a lead white prime layer and, finally, the superficial flesh tone paint layer.

At some stage, probably not very long after the most recent sculptures were executed, most of them have been refurbished, at least in what concerns the *estofado* areas (Fig. 3).

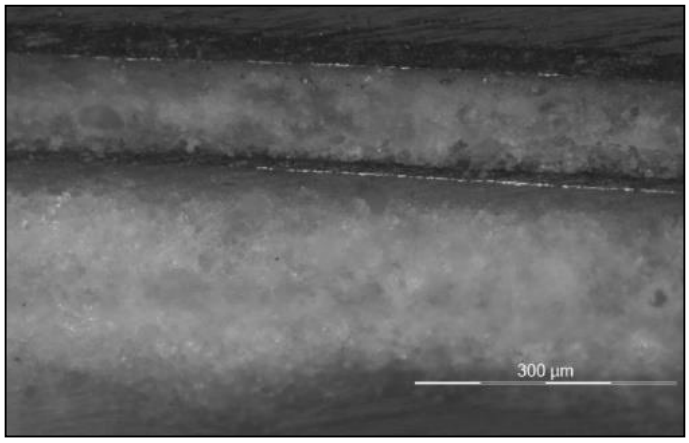

Figure 3. Cross section collected from garment area.

Regarding the flesh areas some faces were not refurbished, something that is more frequent on the hands. Faces would probably be in better condition compared to hands, due to the usual use of these pieces by worshipers, in this case the nuns of the Madre de Deus convent. The pedestals don't show the same procedure, probably because they were added later or didn't need to be refurbished since they were simply gilded. This refurbishment is probably related to a change of taste and the intention of giving a coherent appearance to all sculptures (still in the 17th century).

The characterization of the composition of the remains contained in the reliquaries such as bone, teeth, and textiles and eventually its dating, shall be carried out with forensic analysis.

4. CONSERVATION CONDITION AND TREATMENT

After a careful diagnosis concerning the conservation condition, the main problems identified were woodworm infestation; radial cracks in single block sculptures and, in some cases, the separation of the joints in works composed of several wooden pieces; iron nails corrosion (nails used to fix together the different elements of the support); wooden support losses; paint losses and delamination, and leaching of the flesh tone areas probably caused by caustic solutions used during ancient cleaning attempts. Although less frequent, it was also observed the oxidation of varnish applied in previous restoration processes. This diagnosis allowed to define precise conservation plans for each sculpture in order to stabilize and treat the identified pathologies.

The conservation treatment has already been started on all the works that demonstrate this need, privileging an eminently conservative action that includes disinfestation and consolidation of the wooden support; introduction of low density wood for the stabilization of cracks and joint separation; gluing of the loose elements; fixing delaminated paint layers (Fig. 4); the removal of dirt and oxidized varnish from the surfaces and, finally, the application of a protective varnish film against dirt deposition and also with the objective of balancing optical appearance.


Figure 4. Fixation of delaminated paint layer.

Once all treatments have been completed, the works will be placed in their original space, thus contributing to their enjoyment, dignification and preservation. The set will be organized so that the works can be correctly returned to their original places in the reliquary-cabinet of the choir-loft thus retrieving its value and internal coherence.

5. UNREVEALED

The main focus of this project is to bring clarification to the importance of reliquaries and this specific ensemble. Other collections of reliquary busts, such as the ones from the São Roque Church, in Lisbon, or from the Saint Ignatius of Loyola Church, in Angra do Heroísmo, are known not only by historians but also by the general public. However, the Madre de Deus's collection remains unknown. Why does a collection as rich as this one, in such good condition as a whole, probably preserved in its totality, and a symbol of the power of its owner (queen Leonor) remain in the dark? For all its characteristics, this set deserves to be made known to the public and to the scientific community. Another aspect that is important to bear in mind is the fact that usually

religious collections, as it was the case of reliquary sculptures, were considered valuable items. This concept can be better understood if we relate it with the other denomination by which the choir of the Madre de Deus was known: The Treasure Room.

This room was conceived in terms of its architecture as a treasure box where the richness of the convent, its ensemble of relics, was meant to be kept. These were placed in exquisite sculptures with features that ichnographically portrayed the men and women whose life's examples were worshiped by the Catholic Church.

At the end of ARCAer project, and for the first time since the 18th century, when it was first placed in the display cabinets that may be observed today, the collection will be replaced in the choir loft of the Madre de Deus church (Fig. 5). A closing exhibition will be inaugurated in parallel with an international conference, together with an electronic application that will allow visitors to access information about the sculptures.

Figure 5. Choir of the Monastery of Madre de Deus (18th century).

The meaning and value of saints' relics for the Catholic church today will be considered. Although these have a secular character, the principle underlying the creation of memory receptacles is something intrinsic to the human nature. Thereby, it will also be undertaken a reflection upon what could be the contemporary reliquary. Several projects involving artists and the local community will be an opportunity to reflect upon a phenomenon that nowadays can be seen as strange or understood as slightly morbid but, in its core, it encloses the human search for memorabilia associated with the use of objects that are believed to possess an intricate supernatural power. For this purpose, two groups of senior citizens will build their own reliquaries from their life memories and experiences. The aim of the workshops is to reflect upon the mechanisms of memory, associated with the creation of containers for objects related to people or events that are intended to be valued.

The works produced during the workshops will be included/exposed in the closing exhibition. Also, a web page will be created in order to allow access to the contents produced throughout the project addressed, once again, both to the scientific community and the general public.

6. CONCLUSIONS

To own a collection of reliquaries was a symbol of power and the collection of relics belonging to the Madre de Deus church was an echo of the greatness of Queen Leonor, who has also been an art connoisseur. The fact that the set of reliquary busts is practically intact and in optimal condition, makes this a relevant collection that should be unveiled and made accessible. This is why ARCAer project is so valuable, since it will contribute to a better understanding of art and religious history and, through the conservation treatment, it will allow the following generations to enjoy the beauty and grandiosity of such an outstanding collection. We also believe that this project can open new paths for the study of the importance of religious collections in the Modern European context. This is a subject that starts to be a point of interest in the field of studies related with art collections but whose reality is still almost unknown in Portuguese studies.

7. REFERENCES

Barata, C. 2008. *Caracterização de materiais e de técnicas de policromia da escultura portuguesa sobre madeira de produção erudita e de produção popular da época barroca.* Lisboa: Dissertação de Mestrado em Química Aplicada ao Património Cultural apresentada na Faculdade de Ciências da Universidade de Lisboa.

Barata, C. 2015. *Materiais e técnicas de policromia da talha barroca erudita e popular no Noroeste de Portugal.* Aveiro: Dissertação de Doutoramento em Geociências apresentada na Universidade de Aveiro.

Campos, T.; [*et al.*] 2002. *Igreja da Madre de Deus: História, conservação e restauro.* [S. l.]: Instituto Português de Museus, Instituto Português de Conservação e Restauro.

Capelão, R. M. S. 2011. *El culto de reliquias en Portugal en los siglos XVI-XVII: contexto, norma, funciones y simbolismo.* Porto: Dissertação de Doutoramento em História na Faculdade de Letras do Porto.

Carvalho, M. J. V. 2003. Práticas de devoção e equipamentos litúrgicos numa casa monástica feminina: alguns exemplos da Madre de Deus de Lisboa. In Carvalho, A. (ed.), *O Presépio da Madre de Deus*. Lisboa: IPM, Palácio Nacional da Ajuda.

Cunha, D. & Barata, C. & Pais, A. 2018. Four reliquary busts from the former monastery of Madre de Deus: study and conservation. *Estudos de Conservação e Restauro* 8: 96-117.

Curvelo, A. (ed.) 2009. *Casa perfeitíssima: 500 anos da fundação do Mosteiro da Madre de Deus - Celebrating 500 years of the foundation of the Convent of Madre de Deus: 1509-2009*. Lisboa: IMC, Museu Nacional do Azulejo.

Ibañéz Fernández, J. & Criado Mainar, J. 2011. El arte al servicio del culto de las reliquias: Relicarios renacentistas y barrocos en Aragón. *Memoria ecclesiae* 35: 97-138.

Noticia da Fundação do Convento da Madre de Deos de Lisboa das Religiozas Descalças da Primeira Regra de Nossa Madre Santa Clara E de algumas couzas que ainda se puderão descubrir com certeza das vidas e mortes de muitas Madres Santas que ouve nelle, escritas por huma freira do mesmo convento, e dirigida a todas as mais delle no anno de 1639. (Autoria atribuída às Madres Sorores Joana da Piedade e Maria do Sacramento). Manuscrito de 1639-1652 (versões existentes: Biblioteca Nacional de Portugal; Museu Nacional de Arte Antiga; Museu Nacional do Azulejo).

Nunes, F. 1615. *Arte poetica, e da pintura, e symmetria, com principios de perspectiva composta por Philippe Nunes natural de Villa Real*. Porto: Editorial Paisagem.

Pacheco, F. 2001. *El arte da la pintura*. Madrid: Ediciones Cátedra.

Telles, L. 1899. *Mosteiro e egreja da Madre de Deus*. Lisboa: Imprensa Moderna.

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Sculpture, archaeology and museums: contemporary transfigurations and mediations

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ABSTRACT: In a research that moves away from the historic contextualisation, with this paper I hope to contribute in an original way to the transdisciplinarity between art and archaeology. I view this proposal as a complex and challenging type of research that uses objects of the past with a view to their contemporary transfiguration. In short, I propose to go beyond the more usual narratives of 'art as archaeology' or 'archaeology as art' (traditionally based on formal analogy and mutual inspiration). I propose to explore the potential of work that goes beyond what is traditionally understood and accepted as either artistic research or archaeologic research. A new vision that benefits from the end of the need for interpreting or representing the past in order to open up a whole potential of creative action on particular traces of the past.

In my work I explore the potential role of contemporary sculpture in communicating archaeology in museums. Combining my training in sculpture and my professional experience in the museum context, I explore the way how contemporary art – particularly sculpture – can be included in archaeological research with the aim to develop new ways of thinking and representing, communicating and displaying. Focused on ceramics production, I propose to develop innovative museum strategies which, because they include the display of contemporary sculpture in archaeological contexts, activate the agency ability of the visitors so that their experience becomes more active, free and subjective.

Over the last two decades, dynamics between sculpture and archaeology have been shifting from the more traditional relationships based on formal analogy and mutual inspiration to other – much more interesting in my opinion – relationships that maximize and explore the potential of joint research projects carried out by interdisciplinary teams of artists and archaeologists (Bailey, 2014: 231-250). The simple reciprocity relationships between the two disciplines are becoming much more complex interactions, where both disciplines address the same issues and adopt working methods of each other (Rea, 2011: 19-30). It is my opinion that the growth of this trend reflects similar developments that have been happening in cognate disciplines such as anthropology and corresponds to a significant expansion of the relationship between art and science in the field of academic research.

Archaeology (as well as the other human and exact sciences) tries to communicate with an ever growing and less specialized audience (Matsuda, 2009: 90-97). According to this, museums and archaeological settings – as privileged places of dialogue between the discipline and society – should provide active and significant heritage-related experiences (Merriman, 2009). However, I think that the traditional display methods are not always up to this challenge and end up creating limiting environments that do not stimulate individual thought (Skramstad, 2004: 118-132). Therefore, new creative approaches in the exhibition program could positively enhance the archaeological experience of the public (Acheson Roberts, 2013) and at the same time contribute to a new way of safeguarding heritage.

Contemporary sculpture has gradually developed into what we could describe as a wide program of research that takes a critical look at what we are. Characterized by a multiple or expanded nature, it is becoming culturally and socially more relevant. The exploration of ways of thinking, communicating and displaying characteristics of contemporary art expands the notion of art beyond the visual representation and turns it into an interesting way of research and communication for the other areas of knowledge.

The transdisciplinary research I propose makes room for artistic production and scientific reflection. In the process, it brings together initiatives of several research areas (sculpture, archaeology, museums) and puts on an equal footing different positions, practices and methodologies of the arts and the sciences (Palmer, 2004: 145-156).

One of my main concerns is to perceive sculpture

as a form of research while trying not to fall into the attractive and simplistic assertion that all art is research nor into the threatening abrasion of art that results from its subordination to scientific standards. I believe that this path stimulates the exploration of the specific potential of art in the context of research, as well as the conscious pursuit of new ways of knowledge.

Although aware of the differences between the disciplines, I believe that the cultural proposals of contemporary art can be a priceless tool in communicating archaeology. Art has long understood that the crossing of frontiers and the resistance to categorization can lead to the development of disciplines that promotes growth and makes a transversal ontology possible (Fernandes Dias, 2011: 103-129). I argue that similarly to art, heritage studies can benefit from an expanded field, a broader context that is at the same time archaeological, museological and artistic.

I see this artistic practice as a complex and challenging form of research that uses objects from the past in view of their contemporary transformation. Research through sculpture is to study the assumptions and the systems that are the basis of our worldview. Taking practice as the starting point, sculpture is viewed here at the same time as material object and intellectual research.

Focusing on the archaeological material culture, the eye of the artist is naturally different from the archaeologist's. Linked to the practice, the eye of the artist seeks to enter the gestures of the creators, recreate them and feel them as their own. I explore in my work the relationship between the hand and the matter in the sense of the artisanal know-how. Announcing a possible return of sculpture to ancient production, I evoke the prehistoric practices of the production of ceramic artefacts and associate the practice of sculpture with an archaic, almost archetypal value.

In the From Magma to the Stars exhibition (Milreu Roman ruins, Portugal, 2012) the sculptures, which clearly express their own mass that is inherent to the physical properties of the ceramic material, appear to be suspended, free of their own weight due to the installation technique. This apparent, or visual, extreme lightness enables the sculptures to leave their object condition, surpass their materiality and acquire new symbolic meanings.

The sculptures use the archaeological character of the exhibition space to relate to or to engage with the visitors. Placed in a more or less discreet way on the archaeological strata of the ruins, their display assumes the transportation or movement of the visitors between different times, spaces or worlds. Articulating an innovative dialogue between art and archaeology, this exhibition provided a new visual experience that emphasized the tactile and chromatic similarities between the terracotta of the sculptures and the stratigraphy of the location. If on the one hand the exhibition enables us to question the way how material culture remains heritage over time, on the other it allows us to think about the nature of the impact of the archaeological site on the sculptures.

Figure 1. Clay modeling. Photograph by Ricardo Soares.

Figure 2. Firing clay. Photograph by Ricardo Soares.

I believe that the display of contemporary works of art in archaeological settings can be, besides good to look at, good to think about (Wallis, 2011: 133-160) insofar as it changes the place and challenges the visitors, re-orienting them towards an innovative commitment between the contemporary and the archaeological character of the space. To display is to suspend, is to take the objects away from their

original context and make them available for contemplation and thought.

Due to the unparalleled visual experience they create and the way they fill the exhibition space, the three-dimensional works of art (contemporary sculpture/installation) lead to a strong physical interaction with the public and at the same time have the power to activate their 'agency' ability. This way they bring vitality to the museum experience and can lead the visitors to more active, free and subjective interpretations (Acheson Roberts, 2013). Sculpture makes it easier for visitors to be physically involved, confronting them with its presence and leading them to discover its shape, its matter, its detail. These aspects may draw and keep the attention of the visitors, encouraging them to independently explore the meanings of the work and of the archaeological context where it is displayed (Acheson Roberts, 2013).

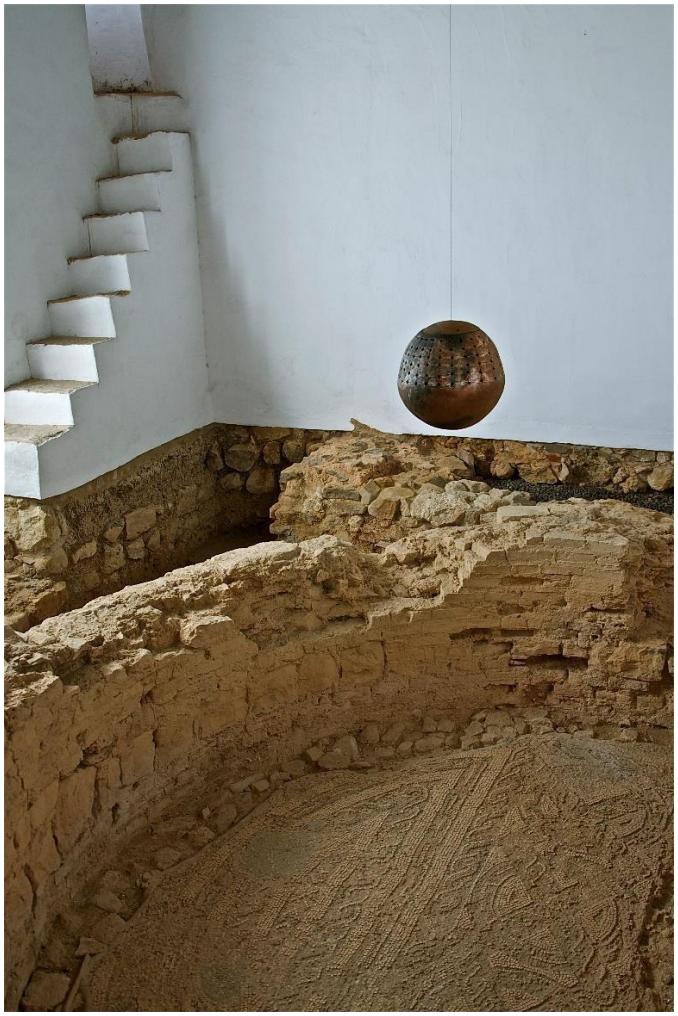

Figure 3. From Magma to the Stars exhibition. Milreu Roman ruins. Portugal, 2012. Photograph by Ricardo Soares

Due to its important ability to raise doubts (and not give answers), contemporary sculpture makes the viewer work. Triggering original dialogues between the visitors and the material traces of the past, contemporary sculpture may, for instance, steer them to important topics, concepts or materials that are usually dormant in the museum space or archaeological setting (Acheson Roberts, 2013). Aiming to get an active answer from the visitors, the exhibition of contemporary sculpture in archaeological settings contributes to an inclusive discourse within the scope of heritage-related practices, a discourse that seeks the equivalence of thought between the public (visitors) and the experts (curators) or between the non-archaeologists and the archaeologists (Acheson Roberts, 2013).

Figure 4. From Magma to the Stars exhibition. Milreu Roman ruins. Portugal, 2012. Photograph by Ricardo Soares.

I hope that the research that I present here leads to the creation of open works, works that are in a blank field and that empower the viewer. I think that the transdisciplinary work is a work of emptiness that should ideally take place in a neutral space that does not belong to any of the disciplines that happen to be there. A work where one discipline does not visit the other occasionally to look for analogies or new ways of thinking and/or representing (Bailey, 2014: 231-250). A work that leads them to leave their comfort zone and place their different abilities on the table in a common effort to search for original thought.

In short, with this research I propose to go beyond the more usual narratives of 'art as archaeology' or 'archaeology as art' and explore the potential of original work that goes beyond what is traditionally viewed and accepted both as art and archaeology

(Bailey, 2014: 231-250). A product that will benefit from the end of the need for interpreting or representing the past in order to open up a whole potential of creative action on the traces of the past (Bailey, 2017: 691-701). A work that will lead to a socially and intellectually challenging area and that will provide unexpected results that are neither art nor archaeology but something that might be much more important.

Figure 5. From Magma to the Stars exhibition. Milreu Roman ruins. Portugal, 2012. Photograph by Ricardo Soares.

REFERENCES

Acheson Roberts, L. (2013) The Role of Sculpture in Communicating Archaeology in Museums. Papers from the Institute of Archaeology, http://dx.doi.org/10.5334/pia.425

Bailey, D. W. (2014) Art / archaeology / art: letting-go beyond. In Russell, Alden I. & Cochrane, A. (Eds.) Art and Archaeology: Collaborations, Conversations, Criticisms. New York: Springer, pp. 231-250.

Bailey, D. W. (2017) Disarticulate—Repurpose—Disrupt: Art/Archaeology. In Cambridge Archaeological Journal, 27(4), pp. 691-701.

Fernandes Dias, J. (2001). Arte e Antropologia no século XX: modos de relação. In Etnográfica, 5(1), pp. 103-129.

Matsuda, A. (2004) The Concept of 'the Public' and the Aims of Public Archaeology. Papers from the Institute of Archaeology. 15, pp. 90–97. DOI: http://doi.org/10.5334/pia.224

Merriman, N. (2009) Beyond the Glass Case: The Past, the Heritage and the Public. London: Routledge.

Palmer, R. (2004) Recherché: Artists' Research and Pactrice-Led PhD. In Hannula, M.; Kaila, J.; Palmer, R.; Sarje, K. (2013) Artists as Researchers: A New Paradigm for Art Education in Europe. Helsinki: Academy of Fine Arts, University of the Arts Helsinki, pp. 145-156.

Rea, W. (2011) Shared sites and misleading affinities: sculpture as archaeology, archaeology as sculpture. In Bonaventura, P.; Jones, A. (2011) Sculpture and Archaeology. London: The Henry Moore Foudation, pp. 19-30.

Skramstad, H. (2004) An agenda for Museums in the Twenty-First Century. In Anderson, G. (ed) Reinventing the Museum: Historical and Contemporary Perspectives on the Paradigm Shift. Oxford: Altamira Press, pp. 118-132.

Wallis, J (2011) Stainless steel/standing stones: reflections on Anish Kapoor at the Rollright Stones. In Bonaventura, P.; Jones, A. (2011) Sculpture and Archaeology. London: The Henry Moore Foudation, pp. 133-160.

Epistemologies of Invisibility: body and art, and the writing of research

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ABSTRACT: Knowledge is a complex web, and even more so, at a time when truth and certainty take on the challenge of its finitude. Without denying rationality, but withdrawing exclusivity, the academy gradually begins to open to new discourses, new ways of thinking. The dominant scientific epistemologies are still those that work with the so-called "strong" theories, methods and objects, difficult to cope with, given the robust character of the analytical apparatus and the potentialities of transferability of results. In what we call "epistemologies of invisibility", we situate the possibilities of scientific inversion, or rather, the territory of "weakness", slowness, emotion, body, and art. It is from experiences of work in research/creation in the arts master's courses and recalling the concept of "decolonizing knowledge" that we propose to reflect on the practices of research and on the writing of practice in the academic context of performing arts.

1. KNOWLEDGE, ACADEMY AND RESEARCH

Taking as empirical basis the relation of teaching / learning with students of master's degrees in performing arts, we call the relation art and knowledge for analysis and reflection on research practices in artistic disciplinary areas. For this purpose, we propose to "give body" to the concept *epistemologies* of *invisibility*, starting from the exploration of three levels of invisibility: art as knowledge, body as agent of knowledge, and writing as presence and meaning.

These axes are small syntheses of questioning about the particularities of the production of knowledge in the arts and its articulation with the research processes in academic context. Art-research practices demand their own paradigms, distinct from the exact or social sciences, although with them it can and should communicate, whenever it appeals to the desired transdisciplinarity.

Doubts, questions, perplexities, urgencies and responses of students and researchers in the arts act as catalysts for the development of ways of thinking and integrating other materialities and other abstractions into the unfinished task of building human knowledge.

2. INVISIBILITY 1: ART AS KNOWLEDGE

Narrative about the history of legitimized knowledge still rests on the principles of cartesian rationality, which is indebted to the affirmation of the reason of the Enlightment and the progressive departure from metaphysical forms of understanding and explanation of the universe. Without underestimating the almost revolutionary importance of Descartes' postulates in his time, we tend, in everyday life and academia, to hierarchize ways of producing knowledge and to place science and the scientific method as a procedure adequate for the purposes of predictability, transferability potential and consequent gains in the universalization of results.

This construct recognizes and exalts the disciplines that apply it - the natural and exact sciences - and still seems little available to abandon the monopoly of its specialization. As Martins (2014, 2015) puts it about the Portuguese case, social sciences, arts, and humanities are minor correlates of academic expression and distant and disinterested relatives of the legitimating and funding instances of their manifold and varied manifestations.

The hegemony and domination of this narrative tends to ignore other possibilities, and sometimes even to invigorate them, with what it has of prejudice to science itself (Ribeiro, 2002).

One of the lessons that this time we are living teaches us is that the complexity of the world is not explained or understood through singular and absolute certainties or truths. As actors and witnesses, we watch a world of pluralities, of deconstruction and of questions, sometimes at the risk of misplacing our references and critical positions. The alleged "end" of the meta-narratives gave us the possibility and the

need to perceive other narratives and to problematize those known and assumed as certain.

Thus, we understand art and science as distinct ways of creating knowledge, since both apprehend the relationship with the world with different lenses. They are not in competition and can complement each other. They serve different purposes and cannot be compared in effectiveness or measure in results because their ontological, epistemological, methodological, axiological and rhetorical agendas obey different objectives.

Although differences of practice, analysis and synthesis, artists and scientists share a common characteristic: the creative imagination, or the "power that the spirit has to form psychic contents that do not correspond to previously established real contents" (Ribeiro & Silva, 1972: 180), which always uses the real, because it is never created from nothing.

The great artist is the one who expresses original ideas and feelings never felt and who, although seeing themes indefinitely resumed, always shows in them the impression of new and unpublished.

The scientist discovers subtle and delicate analogies under the differences that conceal them, brings together ideas that are likely to be joined and hitherto isolated.

The act of putting in relation is always an act of creativity. The way and purpose of relational construction diverges according to the broader framework. The diversity of linkages between ideas, concepts, or forms is as rich as it is complex, neither better nor worse, just different possibilities of developing thought.

The work of art and artists, as a discipline and as researchers, in the work of reflection and research assumes unique characteristics.

The artist produces knowledge about and from practice and exposes himself to criticism and public discussion. Often, a separation between the subject and the object is not assumed, as is the case in traditional or conventional works. Artistic practice is an essential component of both the research process and the results of research, and it is accepted as an integral part of the process the absence of distance between the researcher and the artistic practice.

So, theory and practice are not dissociated, they work continuously, because concepts and theories, experiences and convictions are intertwined with artistic practices.

The material content and intangible, non-conceptual and non-discursive contents of creative processes and artistic products are articulated and expressed in the artist's / creator's study.

The philosopher and pianist Kathleen Coessens (2014) believe that "(...) art does not look at the world through binoculars, but through a prism", that is, art produces a kaleidoscopic knowledge. This statement "blinks the eye" at the concept of "decolonization of knowledge" (Kilomba, 2010), since it defends other possibilities of understanding, appropriation and epistemological awareness.

3. INVISIBILITY 2: BODY AS A KNOWLEDGE AGENT

Body and emotion are controversial notions when they refer to research, either as a theoretical object, method or reference, and even more so when one complains about them.

The organizing dichotomies of modern thought continue to be revelatory and operative, but they do not exhaust themselves. They require a review and a practical and conceptual update. Thus mind/body, theory/practice, reflection/action, subject/object, meaning/signifier, rather than ruptures or boundary spaces can be read as continuities without losing their identity, for they are not always asymmetrical concepts.

Artistic research claims, therefore, to decentralize the cognitive construction of knowledge, so that new interpretations seek to abolish dualities.

The body is therefore the second invisibility to be highlighted. Mauss (1980) argued that the body is both the original tool with which humans shape their world and the original substance from which the human world is shaped.

The relation that each individually maintains with the world is mediated by the physicality with which it presents itself before the other (Almeida, 1996; Le Breton, 2007). The participation and experience of life are warmed by a materiality that creates subjectivity, subjectivity that is returned to the other by the learning of life experiences that participate in creation, whether as an artist or scientist. Thought does not happen without a body that thinks it, as Jean-Luc Nancy (2000) reminds us: "we do not have bodies, we are bodies".

Henk Borgdorff (2012), Dutch musician and researcher, in a text with the suggestive title *The Conflict of the Faculties: perspectives on artistic research and academia*, suggests that the knowledge created by art research is a knowledge *embodied* in the artistic practices contained in the objects and artistic processes. This type of knowledge provides a more direct understanding of embedded knowledge.

Non-conceptual knowledge *embodied* in art has always been the subject of speculation and reflection in the philosophy of aesthetics.

The phenomena of work in the artistic field are decidedly cognitive and rational, although we cannot directly access them through language and concepts. Part of the specificity of art research lies, therefore, in the peculiar way in which non-conceptual and non-discursive content is articulated and communicated.

The epistemological question of the distinctive character of artistic knowledge has been approached mainly by phenomenology, hermeneutics and

cognitive sciences. Knowledge embedded in art - tacit knowledge, practical knowledge, sensory knowledge, cognitive knowledge -, although not conceptually, is a rational knowledge, albeit non-cursive.

Studies on Presence, a theoretical approach proposed by Hans Ulrich Gumbrecht, german-american literature theorist, considers that the part of the subject that assigns meaning to the world is the mind and that the body, in turn, is obstacle to the emergence of the meanings that are given in depth. In this way, interpretation must act to ensure that such meanings, engendered in the depths of the human spirit, can emerge.

Gumbrecht (2010) disputes what he calls the "uncontested centrality of interpretation", the sequel to a metaphysical and cartesian legacy that, by depriving the "presence" of things, focuses excessively on the "meaning" of the social world. The result is a growing desire for presence in western societies, expressed in the arts, mass culture, and fascination with the past. Its primary purpose is not to negate hermeneutics, but to suggest that we conceive of aesthetic experience as an oscillation (sometimes as interference) between "effects of presence" and "effects of meaning."

4. INVISIBILITY 3: WRITING AS PRESENCE AND MEANING

For Jean-Luc Nancy (2000), since there is no thought without body, writing, as an *exegesis* of the research process, can only contain the form of the process, that is, writing touches the body.

The moments of writing while a student or a researcher in performing arts are sometimes synonymous with some symbolic violence and even discomfort given the difficulty of a certain idea of "translation" that underlies it.

The strangeness of writing passes, on the one hand, through the understanding that traditional academic forms of writing do not account for the process of artistic investigation and generation of knowledge, and on the other hand, the autonomy of writing capable of to be fair to the "truth" of the process, in which the artist is the subject, object and vehicle of communication. The way we write influences what we write. The way we write is directly connected with the way we do research, how we theorize about phenomena.

This reflexive writing is intimate in learning from experience and recognizes the subjective nature of the interaction of data inquiry and interpretation.

Schön (2007) defends the *embodied* knowledge of artists as knowledge that is inscribed in their individuality as subjects and manifests itself in behaviour, actions and attitudes. It understands that artists have knowledge that is operational, but that is implicit, and it is desirable that they be explicit. To this end, the artist can accumulate traces of his creative work as an ethnographer documents the customs and manners of a cultural community (Fortin & Gosselin, 2014).

The literature on methods and techniques of artistic research points to the increasing number of users of postmodern ethnography. Ellis and Bochner (2011) indicate as modalities of a postmodern stance: self-ethnographic narrative, creative writing, poem, polyivocal text, e-mail collage, scenic performance, dramatic retelling, alternating relationships theory and fiction, assembly of conversas, etc. Richardson (2005) designates this diversity of Creative Analytic Practices (CAP), while we can also understand as *excritura* in Nancy (2000), that is, as a language and writing that converts the body into a signifier.

For Richardson, writing is a place of incorporation of sensitive knowledge as well as theoretical knowledge, as well as a place of integration of both emotion and cognition.

It happens, however, that, in an academic context, a framing of creative writing is required in a more conventional and convergent way. Polysemic writing should be only part of all text-based production.

Creative analytic practices develop in response to dominant forms of doing research, since various research questions cannot be resolved through standardized research formatting methods.

For Tamy Spry, an American performing theorist, teacher, and director in performance studies, "(…) autoethnographic texts express more fully the interactional textures occurring between self, other, and contexts in ethnographic research. I have begun creating a self in and out of academe that allows expression of passion and spirit I have long suppressed (2001, 708)". In her article, Spry offers evaluative standards for the autoethnographic performance methodology, calling on the body as a site of scholarly awareness and corporeal literacy. And argues that "Autoethnography can be defined as a self-narrative that critiques the situatedness of self with others in social contexts. (…) is both a method and a text of diverse interdisciplinary praxes (idem, 710).

The process of artistic creation and the process of academic research in the arts are not the same, but they are implied. Creation is not research (Hernández Hernández, 2008). Research into artistic creation is always inquiry into the process. Practice and discourse have no boundaries, they are inseparable.

Artistic practices are not isolated; they are always situated. Being the starting point, it is the artistic practice that leads to reflection, it is a reflection in action, founded on the senses and aesthetic perception. This reflection gives rise to the investigation when it begins to include verbal and non-verbal forms of communication and becomes intersubjective; when it considers external perspectives, such as methods, ideas and concepts of other authors and/or creators,

which makes it contextualized, and to which is added the consideration of systematization and the dissemination and disclosure of the results, often in progress or unfinished.

5. ART SERVES TO KNOW THE WORLD

When Grada Kilomba re-appropriates the expression "decolonizing knowledge" and makes it public in his artistic and academic work, it is as if it were a maieutic exercise that obliges us to rethink a set of ideas and presuppositions considered as rigorous and unquestionable.

In the academic context of the arts, the difficulties of integrating the idea of thinking bodies or of thoughts made into matter, has postponed a necessary debate about this approach (artists/academy) until recently formally non-existent.

Despite the rhetoric about the rejection of dualities, it is possible to perceive resistance or ignorance in the balance between theory/practice, mind/body, reflexion/action, subject/object, presence/representation.

This tension results from an artistic academic culture to consolidate, which can compromise different ways of thinking and acting knowledge. Appearing simple, often confuses artistic research as a place where everything and all forms take place, it is precisely on the danger of "nobody's land" that it is important to concentrate efforts to credit a praxis that legitimizes another possibility of doing academic research.

Students of performing arts at advanced levels are challenging the reflection on this tension and a stimulus to the active participation of teaching, especially about research practices and artistic methodologies.

"How do I write my artistic research?", "Can I be my subject and object of my research?", "Which method should I use?" These are some of the questions that students and researchers pose when they become aware of the uniqueness of their processes relative to those of colleagues in other courses.

If it is evident that the positivism to which many students fall when they focus on concrete research work, more from ignorance than from conviction and does not give visibility to their real concerns, it is also important to develop more theoretical robustness to a model of research that seeks to affirm and legitimize and thus safeguard itself from criticism of epistemological insufficiency or even a vehicle for narcissism, for lack of reasoning.

Feyerabend does not believe in the scientific method (Lazar, 1998). From his point of view, epistheological anarchism is fundamental to science. The philosopher considered that epistemologically and methodologically everything was possible. This relativism is a risk, but it is also a Socratic gesture to insist on knowledge as a product of mental activity.

The announced ends and crises of the becoming of modernity carry the power of many beginnings. The intersection of art, body, emotion, presence and meaning can be a way to communicate in a more holistic way, combining both part and totality.

"(...) art serves to know the world.
Not everyone realizes that, after all, the individual and the general are the same thing.
Who writes, always does it to reach his own being."

Rodrigues, U. T. (2011). *A natureza do acto criador:* 35-36. Lisboa: INCM.

6. REFERENCES

Almeida, M. V. (org.) 1996. *Corpo Presente: treze reflexões antropológicas sobre o corpo*. Oeiras: Celta.

Borgdorff, H. 2012. *The Conflict of the Faculties: perspectives on artistic research and academia*. Leiden University Press.

Coessens, K. 2014. A arte da pesquisa em artes: Traçando práxis e reflexão. *Art Research Journal* (1/2): 1-20.

Ellis, C, Adams T. E. & Bochner, A. P. 2011. Autoethnography: An Overview. *Historical Social Research* 36(4): 273-290

Fortin, S. & Gosselin, P. 2014. Considerações metodológicas para a pesquisa em arte no meio acadêmico. *Art Research Journal* 1(1): 1-17.

Gumbrecht, H. U. 2010. *Produção de Presença: o que o sentido não consegue transmitir*. Rio de Janeiro: Contraponto/ Editora PUC-Rio.

Hernández Hernández, F. 2008. La investigación basada en las artes. Propuestas para repensar la investigación en educación. *Educatio Siglo XXI*, (26): 85-118.

Kilomba, G. 2010. *Plantation Memories: episodes of everyday racism.* Münster: Unrast Verlag.

Lazar, D. 1998. Selected Issues in the Philosophy of Social Science, in Seale, C. (ed.), *Researching Society and Culture*. London: Sage.

Le Breton, D. 2007. *A Sociologia do Corpo*. Petrópolis: Vozes.

Martins, M. L. 2014, 3 fev. A FCT e a política de extermínio das Ciências Sociais e Humanas. *Público.* [online].

Martins, M. L. 2015, 28 ago. As ciências sociais e humanas na roleta russa com a FCT. *Público.* [online].

Mauss, M. 1980. Les Techniques du Corps. In *Sociologie et Anthropologie,* 365-388. Paris: PUF.

Nancy, J.-L. 2000. *Corpus.* Lisboa: Vega.

Ribeiro, A. S. 2002. As Humanidades como utopia. *Revista Crítica de Ciências Sociais,* 63: 199-207.

Ribeiro, J. B. & Silva, J. 1972. *Compêndio de Filosofia.* Lisboa: Livraria Popular de Francisco Franco.

Richardson, L. & St. Pierre, E. (2005). Writing: a method of inquiry. In: Denzin, N. & Lincoln, Y.S. (dir.), *Handbook of qualitative research:* 959-978. London: Sage.

Schön, D. A. 2007. *The reflective practitioner: How professionals think in action*. Aldershot, Hants: Ashgate.

Spry, T. 2001. Performing Autoethnography: An Embodied Methodological Praxis. *Qualitative Inquiry, 7*(6): 706-732.

Intervening in the built heritage: a critical analysis of intervention guidelines at the Hotel da Oliveira in Guimarães

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ABSTRACT: This paper aims to analyse the interventions which converted a building complex in Largo da Oliveira, Guimarães, Portugal, from its original residential use into a tourist complex. At a first or unobservant glance, the façades lead to an erroneous interpretation of the property. The yearning to create a non-existent homogeneity was detrimental to the correct interpretation of this heritage's identity. This critical analysis paper intends to discuss decisions made throughout the intervention process and, based on current intervention and preservation of built heritage theories, to point how and why these decisions where correctly or incorrectly made.

1. INTRODUCTION

This paper offers a critical analysis of interventions performed on the building complex which currently houses the *Hotel da Oliveira*, originally of residential use. The complex is located in *Largo da Oliveira* which forms, along with *Praça de São Tiago* and *Largo do Toural*, the centre of the city of Guimarães, defined as a world heritage site by Unesco. These interventions have not yet been the object of a critical-analytical study questioning the intervention method on this built heritage from the point of view of heritage preservation theories. This is, therefore, the aim of this paper.

It is relevant to understand how interventions in the Portuguese built heritage were performed, and discussing this specific intervention case is of surmounting significance for evolving the heritage debate in Portugal. In highlighting the successes and mistakes of the intervention in *Hotel da Oliveira*, the author intends to build a useful questioning basis for future interventions.

2. METHODOLOGY

This work was mainly based on the methods of literature and iconography review through research in municipal archives, libraries and scientific repositories, as well as interviewing of agents responsible for the safeguarding of the *vimaranense* built heritage.

This research faced, however, certain limitations pertaining to the scarcity of architectural survey materials about the first intervention by the architect Alberto Bessa in 1979. These materials would be of great importance for the precise comprehension of the buildings' original pre-intervention state and would give a better perception of the evolution of the building complex until its present state as *Hotel da Oliveira*.

To overcome this limitation, a second research stage focused on analysing the architectural surveys performed after Alberto Bessa's intervention. By confronting these surveys with photographs of the building complex taken at the beginning of the 20th century, it was possible to obtain relevant findings as to the real estate original conditions and the interventions made over time. These results are presented here.

3. THE OBJECT OF STUDY

The *Hotel da Oliveira* facilities were developed in six buildings erected around the 17th century. All properties present façades and entrances facing *Rua de Santa Maria* and *Viela dos Açoutados*. The south property also has a third façade on *Largo da Oliveira*. The hotel has a total area of circa 1.500 m^2. Each property is composed of one ground floor and two upper floors. Three of the properties also have a basement, currently housing supporting activities of the hotel. The ground floor of the South building has a porch with five granite pillars, which articulates with the porch of the City Hall, the immediately next to the hotel. The City Hall, in turn, connects *Praça de São Tiago* to *Largo da Oliveira*.

The facade of the building facing Oliveira' Square is composed of seven apertures on the ground floor and six apertures on the first and second floors. In the lateral facades, the apertures are distributed symmetrically in each building unit but do not follow a uniform rhythm when the six buildings are analysed together. Those apertures are closed by guillotine windows in painted wood with double glazed frames on the upper floors and painted wood doors with double glazed frames on the ground floor.

On the main façade, the first floor is composed by two balconies with bodyguards' marks in wrought-iron delimitating the boundaries of the two original buildings that formed this ensemble. The wooden frame of this facade is another element that emphasises the demarcation of those limits.

All the buildings are constructed in granite masonry on the ground floor and *taipa de rodízio* on the upper floors. The roofs are in Portuguese tile with overhanging eaves finished in wood. The ridges elevations vary between properties. All the buildings are covered by a double pitched roof, except the south-facing building, which is triple pitched. One of the buildings has a small detached mansard.

Openings in the masonry made on all floors allowed to create a corridor connecting the six buildings internally. The ground floor is in tile and the upper floors in *tabuado corrido*.

Two wooden stair boxes and an elevator ensure the vertical circulation inside the Hotel da Oliveira. One of these staircases is accessible only from outside, by Rua dos Açoutados. The other one is accessible from both inside and outside and is used as service access. There are also two stairs leading to the basement of the hotel.

Figure 1. Caption of South façade of Hotel das Oliveiras. Luísa Ghignatti, 2015.

4. BRIEF HISTORY OF INTERVENTIONS

The first intervention on the buildings occurred in July 9, 1979. Alberto Bessa's architectural project involved adaptation works, converting the buildings into the inn *Pousada de Nossa Senhora das Oliveiras*, with 16 suites, a bar and a restaurant.

Intervention works at the *pousada* were part of the *Pousadas Regionais* program, a regional inns movement initiated in the 1940s, implemented in several phases. The project aimed to develop the tourism industry in Portugal, which at the time was still lacking this type of infrastructure.

The opening of *Pousada Nossa Senhora das Oliveiras* occurred during the 4th phase of the *Pousadas Regionais* program. This phase mainly focused in reconverting and adapting existing heritage interest buildings or buildings located in historical centres, a strategy to develop these centres by promoting tourism. The interior design of the *Pousada* at the time of opening, also authored by the architect Alberto Bessa, reflected well the regional character sought for this kind of establishment. The policy of the program's 4th phase differed from the previous one, which involved the construction of buildings from scratch.

The *Pousada* was demarcated as a national heritage site by the General Directorate of Tourism in March 10, 1980, and is currently included on the special protection zone for the urban centre of the city of Guimarães, on the special zone for the joint protection of the *Colegiada de Guimarães, da Padrão comemorativo da Batalha do Salado e dos Paços Municipais de Guimarães.*

The *Pousada Nossa Senhora das Oliveiras* was a member of the so-called *Pousadas de Portugal* network, a luxury hotel chain offering accommodations in real estates of recognized historical and/or monumental value. The *Pousada* was formerly managed by ENATUR (National Tourism Company), which was privatized in 2003, thus transferring the venue management and control to the Pestana Pousadas Group.

While operating as a *pousada*, the building complex still underwent eventual interventions. During the 1990s, interventions were aimed at improving internal comfort, and the frames were substituted for double glazed ones. In 2006, the interior was redesigned by architect Rui Miguel Teixeira de Oliveira. From 2007 to 2009, accessibility improvement and firefighting equipment installation works were performed, both of which projected by architects Rodrigo Miguel and Rafael Leote. In 2012, the Pestana Group decided to forsake the undertaking of the P*ousada*. In 2013 the building underwent a new intervention to adjust the premises for a 4-star luxury-hotel consisting of 20 units, a project by the architect Jorge Teixeira Clemente. From then on, the hotel was managed by a local enterprise. The new hotel concept is centred in a more contemporary style, linked to the arts, especially *vimarense* art, reflected in the hotel decoration, and also by offering cultural experiences to the tourists in the city of Guimarães.

5. RESULTS

This section will primarily analyze the 1979 intervention of architect Alberto Bessa when the residential real estates were converted to a *pousada.* As previously stated, the lack of documents and data about this intervention initially made it difficult to evaluate the buildings' evolution up to its current state as *Hotel da Oliveira*. However, upon a comparative analysis of blueprints and photographs from the beginning of the 20th century with the current building complex state, it was possible to retrace the approximate original state of the complex.

Initially, we focus on the south façade intervention. The comparative analysis revealed that the property facing *Largo da Oliveira* was originally clearly comprised of two separate buildings with very different characteristics, especially regarding symmetry. This is an important indication of the main guideline of the 1979 intervention, that is, which providing the buildings with a homogeneous character, so that it could be perceived as a single unique element.

Figure 2: Caption of scheme of before and after of 1974' intervention in Pousada Nossa Senhora das Oliveiras building. Luísa Ghignatti, 2015.

In the south façade, the number of apertures was not altered, but the original frames of the east building were dislocated and substituted so that they could be symmetrically arranged and similar to the disposition in the west building. The ridges and eaves were also levelled, to obtain the impression of one single property.

One further differentiation is the painting of the frames. Originally, the windows were painted on white (south façade) or dark (side façade). Currently all of the frames are painted with two different colors, white and brown, a possible indication of the last modification it means the substitution from single glazing frames to double glazing frames. On the inside, the design of those frames were not significantly modified.

Figure 3: Caption of frames of south façade of Pousada Nossa Senhora das Oliveiras. New double glazing windows and doors painted with two different colours. Luísa Ghignatti, 2015.

Because of the lack of data about the previous state of the property, inside interventions are less evident. A few modifications are, however, quite evident. For example, openings were created in the original masonry of each floor to connect all the buildings from the inside. The reception, bathrooms, a reading room, a bar, and a terraced restaurant were installed in the ground floor, and, for the setup of the industrial kitchen, further modifications of the frames on *Rua dos Açoutados* were necessary.

Due to a slight slope in the property grounds, the ground floor level was not the same for all original buildings. This level difference was supplanted during the 1979 intervention but is to date visible in the created inside corridor due to four steps on the ground floor (approximately 80 cm) and two steps on the first and second floors (approximately 40 cm).

The upper floors were also altered due to the leveling differences. The original wood floor was only maintained in the south building, which faces *Largo da Oliveira*. Therefore, this was the only building to keep its original elevation, which was probably the guiding elevation for leveling the rest of the buildings.

Most of the original vertical circulation were removed and only two of them remained. Two new staircases were created in strategic locations, and a lift was also implanted. The accesses to both existing basements probably correspond to the original ones. The current staircase layout was previously described (Section 3).

The 2006, 2007 and 2009 interventions did not alter the built. The 2013 intervention, which converted the

pousada to a hotel also did not incur in profound modifications of the original elements of the building complex. It was limited almost exclusively to the interior design, except for the first and second-floor compartmentation of the 1974 intervention, which was reorganized to create four more rooms.

Figure 4: Caption of upper floors of Pousada Nossa Senhora das Oliveiras. In the left the ancient one, in the building further south, preserved. In the right, the new floor present in the rest of the building. Luísa Ghignatti, 2015.

6. DISCUSSION

A basic principle of any intervention in historical built is that we are always creating something new. According to Vitruvius (1994), *utilitas* will always be altered during interventions and it is, therefore, necessary to preserve *firmitas* and be attentive to *venustas* to protect the identity of the historical heritage.

The identity loss during the conversion of the historical buildings was extremely detrimental. On striving to have a standardized façade on the *Largo das Oliveiras* side, no clear distinction was made between what was original and what was new. From a lay or less attentive view, the current façade gives the impression that this particular estate was a manor residence, and it was described as such on the 2005 survey annexe of the *Pousada.* Only a more attentive and specialized analysis is able to identify that the estate was, in fact, two separate buildings.

The blueprints of the 2005 architectural survey indicate an internal wall which apparently separated the two buildings. The two balconies on the first floor also point to a separation on the façade. Again, the modification of an element, the façade, alters the identity and the interpretation of the heritage. This intervention is more in line with Viollet-le-Duc's (2000) ideas since it strives to return the building to a state of the entirety, which probably never existed.

According to Boito (2003), additions must be made in a contemporary manner and should not "shout against" the old elements, a principle which was incorporated by the 1964 Charter of Venice. The theorist advocates for the distinction of new versus old elements as the correct guideline in heritage interventions. In the presently studied intervention, the distinction between new and old occurs very subtly and only in some features. For example, in the white painted double glazed frames, on the new wooden floor and in the façade framing, which indicates the limits of the original building. This approach is also in line with Violet-Le-Duc's ideas, whose intervention guideline aimed to create new possibilities for the expression of old forms using modern materials and techniques in the (re)construction of heritage.

In other aspects, Boito's distinction guideline is neglected. That can be particularly identified in the standardization of the frames disposition on the south façade as well as the levelling of the roof and the elevation of internal floors.

The relation between the building and the surrounding area was also changed. Internal circulation was modified with the creation of a corridor connecting all buildings internally to meet the program needs. Before the intervention, there were at least six street accesses, while only three remained afterwards: one access to *Largo das Oliveiras*, through the porch, one to *Rua de Santa Maria*, and one to *Viela dos Açoutados*. This new disposition alters not only the relation between the buildings themselves, but also incurs in fundamental changes in the relationship between the building, the street and the public space, impacting public perception of the building as well as its relationship with the surroundings.

The conversion works of the *Pousada* occurred during the same time period as the intervention on the historic centre of Bologna. Contrary to what was normally preserved, that is, the volume and façade of the building, in the intervention in the city centre of Bologna the concern was primarily with the interior of the lot and of the properties. Those interventions revealed the tangible need of preserving this very important part of the building, that is a real essential part of the identity of the built heritage.

The patrimonial debate established in Bologna had not yet reached the Portuguese society, and therefore the preservation of the identity, of the disposition and interior articulation of the building was not a predominant factor during the interventions in the *Pousada*, even being neglected. Fortunately, there are still subtle elements which enable us to retrace the internal disposition.

7. CONCLUSION

The conversion of the buildings complex in to the *Pousada das Oliveiras* has shadowed the correct interpretation of the identity of this heritage building. From a lay or less attentive view, the façade gives the impression that this estate was a manor residence. Only a more attentive and specialized analysis is able to identify that the estate was, in fact, two buildings.

On striving for homogeneity, no clear distinction was made between what was original and what was new, which was detrimental for the correct interpretation of this built heritage and has possibly

damaged transmission to future generations. A greater sensibility towards the history of these buildings would have been necessary to perform altering interventions on this heritage.

8. BIBLIOGRAPHY

Boito, C. 2003. *Os restauradores*. São Paulo: Ateliê Editorial.

Capitel, A. G. 1988. *Metamorfosis de monumentos y teorías de la restauración*. Alianza Editorial.

Cervellati, P. L., & Scannavini, R. 1976. *Bolonia: Politica y metodologia de la restauracion de centros historicos [de] Pier Luigi Cervellati y Roberto Scannavini (con la collab. de...)*. Gili.

Choay, Françoise. 2001. *A alegoria do patrimônio*. Unesp.

Ferrão, B. 1998. O conceito de património arquitectónico e urbano na cultura ambiental vimaranense. *Guimarães, Cidade Património Mundial, Um Objectivo Estratégico*.

Ferrão, B., & Afonso, J. F. 2006. A Evolução da Forma Urbana de Guimarães e a Criação do Seu Património Edificado. *Guimarães Património Cultural da Humanidade, 1*.

Giovannoni, G. (1931). Vecchie città ed edilizia nuova. *Torino, Utet*.

Lobo, S. 2006. Pousadas de Portugal: Reflexos da Arquitectura Portuguesa do Século XX. Coimbra: Gráfica Coimbra.

Riegl, A. 2014. O culto moderno dos monumentos: a sua essência e a sua origem. Tradução de Werner Rotschild Davidsohn & Anat Falbel.

Ruskin, J. 1885. *The seven lamps of architecture*. John B. Alden.

Viollet-Le-Duc, E. 2000. *Restauração*. São Paulo: Ateliê Editorial.

Vitruvius. 1914. *Vitruvius: The Ten Books on Architecture*. Harvard university press.

Two seismological approaches to the Benavente earthquake (1909): from the network of citizens to the network of instruments

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ABSTRACT: The 23rd April 1909 earthquake (Benavente Earthquake - BE), with catastrophic effects in Ribatejo, including Benavente, relatively close to Lisbon, was the subject of two coeval studies according to different approaches that in the conceptual framework of tectonics can be considered pioneers in the Portuguese seismology: the official one, according to dedicated questionnaires and based on a network of human observers, and the one of private initiative, according to the only seismogram registered in the Portuguese continental territory (Coimbra), but limited by the absence of a (reclaimed) network of instruments. These two studies are described with attention to the protagonists, the contexts and the contributions to the Portuguese seismology, and despite the different approaches, both claim for more instruments and the setting of a desired and necessary national network of seismic stations.

1. INTRODUCTION

The earthquake of April 23, 1909 (Benavente Earthquake - BE), with catastrophic effects in Ribatejo, including Benavente, relatively close to Lisbon, was studied according to two approaches dependent on networks: the official study (Choffat & Bensaúde 1912), according to dedicated questionnaires and directed to a network of human observers, and the study of private initiative (Diniz 1911), according to the seismogram obtained in the only seismographic station operating in Portuguese continental territory (Coimbra), but limited by the absence of a seismic instruments network. These two studies are analysed (see more information in Ferreira 2014) in order to highlight how they contributed to the development of the Portuguese seismology.

Seismic networks were then claimed for the need to have comparable data on the propagation of the earthquake throughout an extensive shaken area, for the location of the epicentres and for the study of the Earth's interior. The British engineer John Milne (1850-1913) promoted an early network of seismographic stations among the British community, based on a seismograph designed by himself, and the Company of Jesus established on its own a network of seismographic stations distributed throughout the world, with precision devices and standard procedures, in the early 20th century, long before the World Wide Standard Seismograph Network (WWSSN). The establishment of networks required a cooperative effort, which resulted in the creation of the International Seismological Association (1905).

Another network seismological approach (with human observers) was initiated by the Marquis of Pombal following the 1755 earthquake in Lisbon, which solicited priests throughout the Kingdom to report on the effects of the earthquake, although the questionnaire was distributed more for reasons of reconstruction (Oldroyd 2007). One that can be considered the first scientific "field" study on intensity was carried out after the earthquake that occurred in southern Italy in December 1857 by Robert Mallet (1810-1881), based on testimony and detailed cataloguing of damage to buildings and land surface. This study is contemporaneous with early seismographic instruments, such as that of Luigi Palmieri (1856), used in Italy and Japan. Mallet and many of his British, Italian and Japanese colleagues then choose the instrumental approach.

The problems that the first instruments revealed, not resolved before the beginning of the twentieth century, led the Swiss to consider the human observers most reliable and inexpensive for the study of local earthquakes. The first commissions for the study of earthquakes began between 1878 and 1880, in Switzerland, Italy and Japan, but only the Swiss commission would have volunteer citizens for this purpose, whose observations were collected through questionnaires or postcards. Citizens were trained in the observation of earthquakes, and communication with scientists was based on standard definitions and accessible language. A seismic activity that is often

felt, but without great destructive effects, made Switzerland suitable for a seismological study based on this type of network (Coen 2013).

2. THE STUDY OF THE BENAVENTE EARTHQUAKE THROUGH A NETWORK OF CITIZENS (CHOFFAT & BENSAÚDE 1912)

Following the BE, two commissions were appointed by the Ministro das Obras Públicas, one related to the reconstruction of settlements and the other for the scientific study of the earthquake. This commission met once and included an exhibition of the Swiss geologist Paul Choffat (1949-1919) on the intensity of the earthquake evaluated with information collected in the newspapers. The study that was later carried out would have been influenced by the education of this Swiss geologist who was working for the Portuguese Geological Services, and by the very own approach to seismology (with the citizens as observers) in Switzerland. Unsurprisingly, the commission decided to distribute to citizens across the country a questionnaire on the effects of the earthquake. The task of this commission was carried out by Paul Choffat, as a contracted geologist, and Alfredo Bensaúde (1856-1941) who had served in the Geological Services as a petrographer.

The corresponding official report of this study, prepared by the two geologists, was published in French (language adopted by the International Association of Seismology), with some delay in its printing and the translation to Portuguese was done only in 1912. The first part of the report had preliminary information and considerations, and it was of Paul Choffat's responsibility. The second, on the earthquake of April 23, 1909, included various observations by Alfredo Bensaúde and the examination of the effects of the quake by natural regions, by Paul Choffat. The third and last part, dedicated to the aftershocks, was in charge of Alfredo Bensaúde.

At the beginning of the report, Paul Choffat explained that the questionnaire was drawn up on the basis of that used by the Swiss Seismological Commission. In addition to questions about the observer, the time at which the observation was made, the location and nature of the ground where it was located, it included questions about the elements that characterize the earthquake, the noises accompanying the quakes, and the effects of the earthquake on furniture, buildings and others. There was a delay in printing the questionnaire and the answers were not given in due time, a situation that took out part of its value, according to Choffat. In addition, the answers: […] certainly, contain large gaps and misunderstandings because most respondents have never focused on these issues. Many of the questions were often misunderstood […][1]

Even before the report was published in Portuguese, Choffat had stated that the answers to the questionnaires on the BE that the commission decided to apply were too contradictory to allow any conclusion on hour, duration and direction of the shakes (*Revista de Obras Públicas e Minas* 1912).

The questionnaires were distributed by postage and the return was free of charge. The percentage of returned respondents was 25% (out of 240) in Lisbon and 58%, (out of 897) in provinces, of whom 91 were telegraphers from the districts of Lisbon and Santarém. Provincial administrators, ecclesiastics, teachers and postal and telegraph employees were the main recipients of the distributed questionnaires. Choffat notes that for some professions more questionnaires were answered than those distributed, attributing this fact to recipients having passed the questionnaires to other individuals. Poverty and lack of "instruction", at a time when about three-quarters of the Portuguese population could not read or write, justify that Choffat would suggest the distribution of questionnaires "by the competent people" (Choffat & Bensaúde 1912, 11).

The lack of information concerning locations for which the questionnaires were not answered was, to a certain extent, offset by the reports sent by the correspondents of the newspapers. Choffat lamented, however, the lack of accuracy in the information provided, referring to the classification of shakes as "strong" or "violent", words that, explained the geologist, may have different meanings depending on who writes it. Choffat points out that newspaper correspondents tend to "exaggerate" (Choffat & Bensaúde 1912, 11) the effects of the shakes. The report also takes into account the intensity scales, integrating the assessment of the duration of the earthquake or the effects on the buildings, and the considerations produced are also in the sense that the empirical observations give rise to "very uncertain data" (Choffat & Bensaúde 1912, 20).

The report includes an extensive list of the BE aftershocks found in the Tagus Valley (the last one included was on February 5, 1910), but according to Alfredo Bensaúde, the list would be more extensive if newspaper correspondents reported on all shakes. He also considered the known number of premonitory tremors lower than what had happened and that this knowledge had been obtained through the newspapers. Still without instrumentation was the information about observations at sea, obtained from the questionnaires, newspapers and personal survey

[1] "[…] contêm certamente grandes lacunas e enganos devido a que a maior parte dos respondentes nunca fixara a sua atenção sobre estes assuntos. Muitas das perguntas foram com frequência mal compreendidas […]" (Choffat & Bensaúde 1912, 11).

(conducted on-site). As they were not perceived on board of the ships anchored in ports, these observations are interpreted as repercussions of an earthquake originated on land, a conclusion that coincides with the interpretation from the seismogram recorded in Coimbra (see next section).

In relation to the observations on the state of the atmosphere on April 23, 1909, it was possible to take into account the instrumental approach, using the sheets and automatic records of the Observatories Infante D. Luís (Lisbon) and University of Coimbra. Alfredo Bensaúde verified that no sudden change occurred, calling into question some information resulting from non-instrument observations. Also, the study of the effects of the earthquake in Lisbon is called into question, since most of the people did not answer or the questionnaires were filled "in haste and in an incomplete way". Even using newspapers and collecting data verbally, this situation implied, according to Bensaúde, a "deficient" (Choffat & Bensaúde 1912, 39) basis for the study of the seismic phenomenon.

The results of the analysis and interpretation of the answers to the questionnaire were presented at the ordinary session of the Associação dos Engenheiros Civis Portugueses, held on December 18, 1911. Paul Choffat lamented the uncertainty of the data collected and claimed the establishment of a network of devices not very sensitive, without "deteriorating", specifically to "accuse" macroseisms occurring in the national territory(*Revista de Obras Públicas e Minas* 1912, 52). The commission appointed to study the BE also reported being desirable to set several recording devices across the country "through which the empirical observations can be interpreted and rectified" (Choffat and Bensaúde 1912, 20). It was demanded access to more instrumentation that should be set in network.

3. THE STUDY OF THE BENAVENTE EARTHQUAKE BASED ON A SEISMOGRAM (DINIZ 1911) AND THE DEMAND FOR A NETWORK OF SEISMOGRAPHS

The instrumental seismology offered the opportunity to compare earthquakes worldwide, whether they were felt in inhabited regions or not. John Milne was an important protagonist who directed the first scientific organization dedicated to the seismological studies, the Seismological Society of Japan, and in 1894 conceived a compact and simple to use seismograph (Ben-Menahem 1995) that was known by his name, capable of detecting seismic waves that propagated several thousand kilometres from their origin. The records of the observatories with Milne instruments were published through a bulletin and served to make world maps of the earthquake's distribution.

The first seismographic observations in Portuguese territory occurred in 1902, from seismographs installed in the Azores, but at the date of BE was located in the Observatório Magnético-Meteorológico of the University of Coimbra (COI station) the only seismograph in the country that "operates regularly" (*Apêndice ao Diário do Governo* nº495 – 1909, 451). Acquired in 1901, it operated continuously since 1903 (Custódio et al. 2012). The apparatus which drew up the register was precisely a horizontal pendulum of Milne, the same type used in the John Milne British network. The earthquake covered an extensive area and was recorded by other European stations, but the use of the seismogram obtained in Coimbra by Ferreira Diniz (1878-19--) was an early approach in the Portuguese seismology. This study of the author's initiative was completed in December 1909 (about eight months after the BE), being mentioned in the report produced by the official commission that studied the earthquake.

A significant part of Ferreira Diniz' text is dedicated to the main earthquakes, with emphasis on the earthquake of 1755 and a series of earthquakes in 1903, to prove that Portugal is a seismic region. Accompanying the text are five intensity charts and the effects on the constructions are illustrated by the photos in 18 figures (the first figure is the seismogram). The author regretted that the country was not equipped with the devices that allowed the recording of unfelt earthquakes and the "rigorous study of earthquakes" (Diniz 1911, 342), with the exception of the Milne horizontal pendulum existing at the University of Coimbra, where Diniz had graduated (in Philosophy).

In the introduction, Ferreira Diniz emphasized the study of the propagation of the seismic movement, which allowed the conclusion of the existence of longitudinal, transverse and surface waves, existence confirmed by seismograms obtained using better devices, especially for long distance shakes, where three vibration phases corresponding to the three types of waves were distinguished. For seismic waves to propagate within the planet, he stated that the nucleus would have to be "stiffer than steel", highlighting the importance of the seismological study for the knowledge of the Earth's interior.

Despite the few elements available, the author stated his use of the instrumental approach:

Now the seismogram of Coimbra without prophase shows that the earthquake came from an approximate region. It tells us little more, for it is not easy to study the amplitudes and periods of the movement, however, knowing […] a magnitude of 10 millimetres corresponds to a dangerous shock and a magnitude greater than 20 millimetres to a destructive concussion; it appears from the graph that the

corresponding quake can be included in the second category.[2]

Although a "fairly confusing" chart, interpreted as a result of the proximity to the epicentral region, Diniz takes into account the seismogram obtained in Coimbra in five parameters (time, duration, intensity, epicentral region and aftershocks) when interpreting the BE (see table 1). Other elements taken into account are the extension, direction of movement, depth and noise. And when he analyses the intensity, he regrets (again) the lack of a network of seismological stations.

Table 1. Ferreira Diniz' interpretation of the BE based on the Coimbra seismogram.

Parameter	Observations and interpretation
Time	17 hours, 6 minutes and 30 seconds, in Coimbra (horizontal pendulum of Milne)
Duration	The information collected is "discordant" but, based on the seismogram, the duration "should not go beyond 30 seconds" (p.345).
Intensity	According to the seismogram, Coimbra (intensity VII) would be close to the epicentre (p.353). Five zones of intensity in Portugal, with maximum intensities (IX and X) in alluviums areas.
Epicentral region	The sudden movement of the pendulum and the absence of preliminary phases "prove well that the shake emanated from the vicinity of the station", but also "the distribution of intensity in the shaken area" (p.357).
Aftershocks	The main quake was followed by "numerous small shakes" (p.358). But the horizontal pendulum of Coimbra registered nothing, being to reject the testimonies of small shakes in regions other than the maximum intensity.

Compared with previous earthquakes, Ferreira Diniz notes that the study of the BE revealed a new seismic focus, which would be a "large hydrographic basin, where successively in horizontal layers came to deposit the Tertiary and the Quaternary" (Diniz 1911, 360) and not one around the western coast. The BE would thus have its origin in a "vertical movement which occurred along a line […] passing through Salvaterra, Benavente and a little east of Samora" (Diniz 1911, 360-361), a tectonic nature origin that the author has no doubt and close to the epicentre, as was evidenced by the seismogram.

Ferreira Diniz used the registration of the University of Coimbra Observatory (COI station), even saying "little", to support his estimations in five of the parameters he considered to study the quake, following an early approach in national seismology based on different vibration phases of seismic waves recorded in seismograms. Although he was dependent on an instrument for the observation of the seismic event, which was still not very precise, the author did highlight the need to develop this approach, claiming the widening of the seismic (instrumental) network, for the rigor of the seismological study.

4. FINAL REMARKS

The official seismological study carried out following the 1909 earthquake in Benavente (BE) was supported by information collected through a network of human observers, inspired by the approach of the Swiss Seismological Commission. The absence of a culture of observation of the seismic event in Portugal, giving rise to "uncertain" data, contributed to Alfredo Bensaúde and Paul Choffat claim the development of the instrumental approach and a seismic network, the same claim that Ferreira Diniz, author of the personal initiative study supported by the seismogram recorded in Coimbra (COI station), did.

At a meeting held in January 1910, by royal convocation, the directors of the observatories and meteorological services, as well as the referred geologists of the commission appointed to study BE, were in charge of choosing venues for observatories and seismic stations. The commission determined that the Infante D. Luís Observatory (Lisbon) became the central Portuguese seismology station, but despite this attempt to organize the seismological observation service after the BE, a network of seismographic stations covering the entire continental territory was only materialized after the earthquake of February 28, 1969.

5. REFERENCES

Ben-Menahem, A. 1995. A Concise History of Mainstream Seismology: Origins, Legacy, and Perspectives. *Bulletin of the Seismological Society of America* 85(4): 1202-1225.

Choffat, P. & Bensaude, A. 1912. *Estudos sobre o sismo do Ribatejo de 23 de Abril de 1909* (versão do original francês). Lisboa: Imprensa Nacional.

Coen, D. R. 2013. *The Earthquake Observers. Disaster Science from Lisbon to Richter*. Chicago and London: The University of Chicago Press.

Custódio, S., Battló, J., Martins, D., Antunes, F., Narciso, J., Carvalho, S., Lima, V., Lopes, F. C., Ribeiro, P., Sleeman, R., Alves, E. I. & Gomes, C. R. 2012. Station COI: dusting off an Old Seismic Station. *Seismological Research Letters, Historical Seismologist* 83 (5): 863-869.

[2] "Ora o sismograma de Coimbra sem prófase mostra-nos que o sismo proveio de uma região aproximada. Pouco mais nos diz, pois não é fácil estudar nele as amplitudes e períodos do movimento, no entanto sabendo-se […] uma amplitude de 10 milímetros corresponde a um abalo perigoso e uma amplitude superior a 20 milímetros a um abalo destruidor; parece pelo gráfico que o sismo correspondente pode ser incluído na segunda categoria" (Diniz 1911, 353-354).

Diniz, J. O. F. 1911. Contribuição para o estudo dos tremores de terra em Portugal. O abalo sísmico de 23 de Abril de 1909. *Revista de Obras Públicas e Minas* XLI: 305-361.
Ferreira, J. 2014. *Da sismicidade à ciência dos sismos*: *para a história da sismologia em Portugal.* Tese de Doutoramento em História e Filosofia da Ciência) – Évora: Universidade de Évora.
Oldroyd, D.; Amador, F.; Kozák, J.; Carneiro, A.; Pinto, M. 2007. The study of earthquakes in the hundred years following the Lisbon earthquake of 1755. *Earth Sciences History* 26(2): 312-370.
Other sources:
Apêndice ao Diário do Governo, nº495–1909 (11 dezembro): 451-470.
Revista de Obras Públicas e Minas XLIII (1912): 31-54.

The Botanic Garden of the University of Coimbra as a Complex Information System

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ABSTRACT: General Theory of Systems, sensu strictu, aims to derive the general definition of "system" as a complex of components in mutual interaction with each other and with the surrounding environment. A theory to be applied to the Botanic Garden of the University of Coimbra, understood as a Complex Information System: a whole with several types of units or information systems, such as a living plant collection, library, museum, archive and herbarium. Júlio Henriques (director between 1873-1918) participated in networks of scientific knowledge and his role is crucial to understand the growth and complexification of the Information System Botanic Garden UC. An example on a new species discovery – Pandanus thomensis Henriq. – illustrates how a systemic and holistic perspective of the information allows a comprehensive knowledge of the information in several supports and locations.

1. INTRODUCTION

Our primary goal is to analyse the Botanic Garden of the University of Coimbra (JBUC) as a Complex Information System. To do so, we applied the General Theory Systems, in particular, highlighting the importance of context. Therefore, we will present examples illustrating how the scientific activity of Júlio Henriques, and the networks he participated in, were crucial to the development and growth of botanical knowledge and plant collections - in the garden, the herbarium, and in amassing a scientific library.

2. GENERAL THEORY OF SYSTEMS (GTS)

In 1997, Piero Mella with the work "Dai Sistemi al pensiero sistemico" updated the systemic theory of Ludwig von Bertalanffy, who in the early 20th century theorised about the "General System Theory". Bertalanffy first presented a theory in 1937, but it was only after the War that he published his first thoughts and works on GST, with application to all kinds of phenomena and systems in general (Bertalanffy 1979; Mella 1997).

In fact, since World War II, several scientific fields, such as logics, mathematics, physics, chemistry, biology, geography and geology, but also, the social sciences, have converted to the new epistemic system (Carreras Gargallo 1984).

2.1. Principles

GTS is a scientific investigation of "sets" and "totalities" which advocates that to understand the whole one needs not only to study its parts or isolated components but also to understand their inter-relations. This means that the whole is greater than the sum of the parts, that the whole is a set of interactive and interdependent parts which, together, form a unit with a definite purpose and function (Bertalanffy 1979; Mella 1997).

Besides, GTS emphasizes the role of context and structural organicity in the genesis of information, providing a complex and comprehensive knowledge of information phenomena (Bertalanffy 1979; Mella 1997).

GTS is thus based on a holistic view and highlights the importance of a comprehensive understanding of phenomena rather than the isolated analysis of its constituents, assessing the inter-relation between all the elements of the system, between these and their parts and with the surrounding environment. (Bertalanffy 1979; Mella 1997).

According to the system thinking, on the one hand, the system becomes a unit in the multiplicity of its components; and on the other hand, the parts lose their individuality in the system, becoming equally essential in the formation of the whole (Silva & Ribeiro 2002).

3. GTS APPLIED TO INFORMATION SCIENCE

3.1. What is information?[1]

The digital environment where "bits and bytes are all equal" broke the "traditional boundaries between various cultural heritage institutions - archives, libraries, and museums" (Timms 2009). The digital technological revolution has raised the discussion about supports and information concepts and promoted the paradigm shift towards a post-custodial, dynamic, informational and scientific view of information.

Silva & Ribeiro define information as a "structured set of codified mental representations (meaningful symbols) socially contextualized and capable of being registered in any material medium (paper, film, magnetic stripe, compact discs, etc.) and thus communicated in an asynchronous and multidirectional way" (Silva & Ribeiro 2002). The focus on the content (information) "eliminates physical distinctions between types of records and thus, presumably, the need for organisational distinctions in the management of the systems within which these records are handled" (Timms 2009).

For Buckland, the concept of information is 'as a thing', 'as knowledge' and 'as process'. The author understands that the first notion of information is the most pertinent for its study in systems, within the scope of Information Science, and we quote: "Information-as-thing: The term "information" is also used for objects, such as data and documents, which are referred to as "information" because they are considered to be informative" (Buckland 1991). In a more recent article, the same author states that if we mean "information-as-thing, we can ask what documents do or, more, correctly, what people do with information-as-thing, with documents, that is to say with data, records, texts, and media of every kind". (Buckland 2012).

3.2. Information System (IS)

An Information System is a unitary complex formed by a plurality of related elements that has information and its management as the central nucleus (Fernandéz Marcial et al. 2015).

In Vickery words: "An information system is an organisation of people, materials and machines that serve to facilitate the transfer of information from one person to another. Its function is social: to aid human communication." (Vickery, 1973). He also considers that "In the broadest sense, a system is a set of interacting components. The components can be entities or processes" and that "Everything outside a system is its environment." (Vickery 1973).

3.3. Complex Information System (CIS)

Piero Mella refers the existence of complex systems which are "systems made up of a very large number of equal (or, at least analogous) elements that interact and which can be studied and interpreted as a unit because they present a unitary, perceptible dynamic, which can have the characteristic of irreversibility and which can give rise to forms of recognizable order or become highly unstable." (Mella 1997).

In 1999 Silva *et al*. adapted the concept to Information Science and used the term "complex heritage system" to define frequent situations in which the Archive, Library and Museum interconnect in a complete unit (Silva et al. 1998: 40).

According to Timms, there are "cultural heritage institutions" such as archives, libraries and museums and also "hybrid" cultural heritage institutions that administer cross-sectoral collections, complex institutions that integrate different types of information systems and generate information in different media (Timms 2009).

The Botanic Garden UC[2] is a 246 years old institution whose mission is research, conservation of biodiversity, education and dissemination of science, with a particular focus on the awareness of the importance of plant diversity, climate change and the sustainable use of resources[3].

From the 18th to the 20th centuries, the Botanic Garden UC was an organic whole, whose management resulted from the interaction and interdependence of the parts (living plant collections, herbarium, museum, library and laboratories). These sections supported the organisation's mission, functions and decision-making, and knowledge production. In the 21st century, due to institutional changes in the UC, the parts of the system are now under different administrative units.

Thus, we will apply the concepts above to understand the Botanic Garden UC as a Complex Information System.

4. THE ROLE OF JULIO HENRIQUES IN THE GROWTH AND COMPLEXIFICATION OF THE COMPLEX INFORMATION SYSTEM BOTANIC GARDEN OF THE UNIVERSITY OF COIMBRA

4.1. Júlio Augusto Henriques (1838-1928)

In 1873 Júlio Henriques (JH), professor of botany, was appointed director of the Botanic Garden of the UC, position that he holds for 45 years.

His action was based on:

- the incentive and increase of the exchange of seeds and plants with other botanic gardens,

[1] About the concept of *information* see also Marques 2017 e 2018.

[2] At present time the Botanic Garden is a Cultural Extension and Training Support Unit of the University of Coimbra.

[3] http://www.uc.pt/en/jardimbotanico

- the development and enrichment of the herbarium and living plant collections, and the museum of botany,
- the acquisition of botany teaching resources and educational materials (3D models, wall charts),
- the vast increase of a specialised library of botany.

4.2. Júlio Henriques and knowledge networks

JH participated in networks of scientific knowledge, built around the Botanic Garden of the UC, which linked scientists that studied flora from the European, American, Australian, and African continents.

At the time, correspondence was crucial for the transmission and sharing of scientific knowledge. Almost 5.000 letters from 1.200 correspondents - national and foreign scientists, academics and non-academics, diplomats and politicians - are a fundamental source of information to understand the growth and complexification of the Information System Botanic Garden UC.

4.3. Júlio Henriques and the Broterian Society (1880-…)

Created by JH in 1880, the Broterian Society[4], named in homage to Avelar Brotero[5], fostered mutual assistance of its members, exchanging among themselves the plants they collected and giving to the Herbarium of the University a certain number of plants. The naturalists of the Herbarium guaranteed the identification of the species and the (re)distribution of the samples collected by the members (Henriques 1883).

At the same time, JH founded the *Bulletin of the Broterian Society* (1st series 1883-1920), a scientific journal that disseminated the researches carried out in the Botanical Garden and Institute of the UC and articles of botany of national and foreign researchers (Silva & Gouveia 2018).

At that period the botanic library only received 5 publications by purchase, all foreign, and 8 acquired by offer. The system of exchange of scientific journals with the *Bulletin* signified a great contribution to the collection meaning 95.9% of the total of the number of entries in the botanical library. And from the 301 periodicals received by exchange with it, 79% were international (Silva & Gouveia 2018).

This is one example of Júlio Henriques' role in the CIS Botanic Garden.

4.4. CIS Botanic Garden growth and complexification: JH's role

The arrival at Coimbra of the *Pandanus thomensis*, an endemic plant of S. Tomé and Príncipe, is one of several examples that illustrates how the scientific activity of Júlio Henriques and the networks he established were fundamental to the development and growth of plant collections in the garden ant the herbarium, the botanic library and of the botanic museum.

In the 19th century, African flora was of great interest for European naturalists. Júlio Henriques always had a great interest in the island of S. Tomé and, in 1885, organised a botanical expedition carried out by the naturalist Adolfo Möller. The plant, first collected by Möller between May and September 1885, and later, until 1887, by Francisco Quintas, a resident in the island, was described and named for the first time by Júlio Henriques. This micro-network Júlio Henriques created and participated in, shows the common interactions in the natural sciences in the 19th century (Gouveia 2014).

This example illustrates how the information on a species – *P. thomensis* Henriq. – is present in several supports. First, the plant material that constitutes the type specimen is held at the Herbarium of the University of Coimbra[6] and, later, the scientific description of this new species (*P. thomensis*, n. sp.) made by Júlio Henriques was published in the *Bulletin of the Broterian Society*[7] and is today at the Library of the Life Sciences Department[8]. Plant products (leaves and fruits) and ethnographical objects (hand-woven mats) made out of *P. thomensis* were part of the Botanic Museum collection, and are today included in the collections of the Science Museum. The relation between JH, Möller and Quintas is recorded in the letters they exchanged, and are housed in the Botanic Archive of the University of Coimbra[9]. Also, of the tropical plants that Júlio Henriques has named, the only one for which a contemporary photograph is known is that of *Pandanus thomensis* Henriq. (Gouveia 2014)[10].

To think and study information as a system implies overcoming conventional divisions or separations (by support, thematic and by institutional category - Archive and Library) (Pinto & Silva 2005).

This is contrary to the idea and practice of a custodial, historicist, patrimonialist and technicist paradigm where different things should go to different spaces, originate specific professional

[4] http://sequoia.bot.uc.pt/sbroteriana/

[5] Félix Avelar Brotero (144-1828) wrote *Flora Lusitânica* (1804) where he identified about 1800 species, many of them unknown until then.

[6] https://www.uc.pt/herbario_digital

[7] Júlio Henriques, (1887). Contribuições para o estudo da Flora d'Africa. Catálogo da Flora da ilha de S. Thomé, *Boletim da Sociedade Broteriana*, vol. 5, 196-232.

[8] https://www.uc.pt/fctuc/dcv/biblos

[9] http://arquivodebotanica.uc.pt/

[10] All of this information can be retrieved in the catalogues of the Botanic Library, Archive and Herbarium of the Life Sciences Department, and Science Museum.

practices and even supposedly independent scientific disciplines (Silva 2015).

As seen in the example above, a systemic and holistic perspective of the information allows a comprehensive knowledge of the information in several supports.

5. CONCLUSIONS

The GTS approach allows a comprehensive knowledge of the origin and circulation of plants and seeds for both the Garden and the Herbarium, the existing scientific publications in the Library of Botany, and the objects in the Botanic Museum (today in the Science Museum of the University of Coimbra).

The networks established by Júlio Henriques show the importance of taking in account the surrounding environment in the systemic view of Information. By looking at surrounding environment and by studying all parts of the system in inter-relation, we have a full understanding of Complex Information System Botanic Garden of the UC.

Today, the digital environment is the setting that can link and bring together the botanical information that is geographically separated but safeguarded by different UC units.

6. REFERENCES

Bertalanffy, L.V. 1979. *Perspetiva en la teoría general de los sistemas*. Madrid: Alianza.

Buckland, M. 1991. Information as Thing. *Journal of the American Society for Information Science*. 42 (5), 351-360.

Buckland, M. 2012. What kind of science can Information Science be? *Journal of Information Science and Technology*, 63 (1), 1-7.

Carreras Gargallo, A. 1984. *Evolución y teoría de los sistemas*. In Blánquez, M. H. (coord.). *Actas II Congreso de la Sociedad Española de Historia de las Ciencias*. Vol. 1. Jaca: Sociedad Española de Historia de las Ciencias y de las Técnicas, 351-364.

Gouveia, A.C. 2014. *Do nome* à *imagem*: *percursos* de uma *planta tropical* de *São Tomé numa fotografia do final* do *século XIX*. In Vicente, F. L. (org.) *O Império da Visão. Fotografia no contexto colonial português (1860-1960)*. ISBN 978-972-44-1811-7 Lisboa: Edições 70, 183-194.

Mella, P. 1997. *Dai Sistemi al pensiero sistemico: per capire i sistemi e pensare con i sistemi*. Franco Angeli.

Fernandéz Marcial, V. & Gomes, L.I.E. & Marques, M.B. 2015. "Perspetiva Teórica e Metodológica em Sistemas de Informação Complexos". *Páginas a&b*, Série 3, 4, 3-21. Retrieved from: http://ojs.letras.up.pt/index.php/paginasaeb/article/view/995

Marques, M.B.P.S.M. 2018. O fenómeno e o processo de construção da memória organizacional na Sociedade do Conhecimento. In Figueira, J.; Peixinho, A: T (ed). *Narrativas Mediáticas e Comunicação: Construção da Memória como Processo de Identidade Organizacional*. Coimbra: Imprensa da Universidade de Coimbra. (Investigação). [Em linha]. ISBN-10 9892615573; ISBN-13 978-9892615578, 145-196.

Marques, M.BP.S.M. 2017. Gestão da Informação em Sistemas de Informação Complexos. *Pesq. Bras. em Ci. da Inf. e Bib*., João Pessoa, v. 12, n. 2, 60-76.

Pinto, M.A., & Silva, A.M. 2005. Um modelo sistémico e integral de gestão da informação nas organizações. In CONTECSI - Congresso Internacional de gestão da Tecnologia e Sistemas de Informação. Retrieved from: http://ler.letras.up.pt/uploads/ficheiros/3085.pdf

Silva, A.M.D. & Gouveia, A.C. 2018. A Permuta de Periódicos Científicos e a Difusão do Conhecimento Botânico: O exemplo do 'Boletim da Sociedade Broteriana' na construção da biblioteca de botânica da Universidade de Coimbra (1883-1920). Fronteiras: Journal of Social, *Technological and Environmental Science*. ISSN 2238-8869V. 7, n. 1 (jan.-abr.) 84-123. DOI http://dx.doi.org/10.21664/2238-8869.2018v7i1.p84-123

Silva, A.M. 2015. Arquivo, biblioteca, museu, sistema de informação: em busca da clarificação possível... *Cadernos BAD*, N. 1, jan-jun, 103-124. Retrieved from: http://www.bad.pt/publicacoes/index.php/cadernos/article/viewFile/1482/pdf_7

Silva, A.M. & Ribeiro, F. 2002. *Das "Ciências" Documentais à Ciência da Informação: ensaio epistemológico para um novo modelo curricular*. Porto: Edições Afrontamento. (Biblioteca das Ciências do Homem. Plural; 4).

Silva, A.M. & Ribeiro, F. & Ramos, J. & Real, M. 1998. *Arquivística: teoria e prática de uma ciência da informação*. Porto: Edições Afrontamento.

Timms, K. 2009. New Partnerships for Old Sibling Rivals: The Development of integrated Access Systems for the Holdings of Archives, Libraries, and Museums. *Archivaria* 68 (Fall): 67–95. Retrieved from: archivaria.ca/index.php/archivaria/article/download/13230/14549

Vickery, B.C. 1973. *Information Systems*. London: Butterworth.

Cabinet of Curiosities – Pickstone's Ways of Knowing and the Natural History of Climate Change Exhibition in Portugal and Spain

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ABSTRACT: Climate change has been gaining space in both art and science exhibitions in the last decade. Understanding what influences museums to choose exhibitions themes gives us a chance to debate the role of science museums in communicating climate change. Pickstone organizes the history of science, technology, and medicine into four different ways of knowing: Natural History, Analysis, Experimentalism, and Technoscience. We assume that it is possible to apply those four Ways of Knowing to study the history of climate change exhibitions. Scientific exhibitions are built from both scientific and technical knowledge. The first kind of knowledge is essential to build contents and the second one helps with the way those contents are presented. In this paper, we present the first way of knowing - the "natural history" – in relation to climate change exhibitions in Portugal and Spain, and look at how 64 exhibitions have appeared through the last decade in this Cabinet of Curiosities. We also discuss the role of the international debate on climate change, and some of its landmarks, on the launch of those exhibitions. This paper is part of the author's PhD research in progress.

1. INTRODUCTION

There is a consensus that museums have an important role in the building of citizenship, working as connectors between different sectors of society and catalysts for changes (Salazar, 2011). In this context, the study of museums as scientific knowledge producers, mediators and diffusers has some attention (Andrade, 2010; Lopes, 2010; MacDonald, 1996; Salazar, 2011).

To inform and communicate are different things, and museums may assume an important role in improving climate change literacy, going beyond new information transference (Salazar, 2011), and giving citizens the knowledge that they need to actively participate on actions and debates about climate changes and their impacts on the future (Cameron *et al*, 2013).

On the stage of scientific and political debates for decades, climate change is also gaining space in scientific exhibitions, first through temporary exhibitions inside or outside museums spaces and most recently in science museums' permanent exhibitions.

Despite the scientific community's recognition of the importance of climate change communication by different actors, few studies have been carried out to examine the role that museums are playing in the communication of this theme. The attention of the academia has been focused on the study of climate change communication in the media (Salazar, 2011).

Understanding what influences museums to choose exhibitions themes gives us a chance to know better the role of science museums as part of a dynamic society. We can also debate museums as actors on the goal of communicating climate change and promoting scientific literacy.

Pikstone says that "to do justice to the past and *use it in the present*, we need broad frames in which to think comparisons", so to understand the communication of climate change through exhibitions in the 21st century we need to understand both the evolution of climate change exhibitions through time and how the knowledge and influences flow between science, politics, and museums.

The first question that popped-up when starting this research was: is climate change a present subject in science museums exhibitions?

To draw light on this question, we carried exploratory visits on science museums in Portugal and Spain to verify the presence of climate change as a subject in permanent exhibitions. To complement those visits, we have dived into the *World Wide Web* to look for any exhibitions, permanent or temporary, that took place in those countries in the last decade.

In this paper, we present the "natural history" of science museums on the Iberian Peninsula and how climate change appears in this Cabinet of Curiosities.

If in the XVI century the cabinets of curiosities were composed of many and varied objects in a striking collection, and each object had its own story

and message (Pikstone, 2000), here the Cabinet of Curiosities is composed of science museums, climate change exhibitions, and their relations.

To take this proposal forward, we kept in mind that Pickstone presents the expression 'Natural History' in a very broad way, as a path of knowledge construction through the collection, description, identification, classification, use, and exhibition. So, the 'natural history' would be "the register of facts, the compilation of what was in the world" (Pikstone, 2000).

2. CLIMATE CHANGE: (UN)TOLD SUBJECT IN SCIENCE MUSEUMS PERMANENT EXHIBITIONS

Exploratory visits were made to 21 science museums between August 2016 and August 2017, 11 of them in Portugal and 10 in Spain, classified as science and/or natural history museums (8) and science centres (13).

References to climate change in permanent exhibitions are not common and when present are mostly about climate changes in the deep past and its influence on the evolution of life (Figs. 1-2).

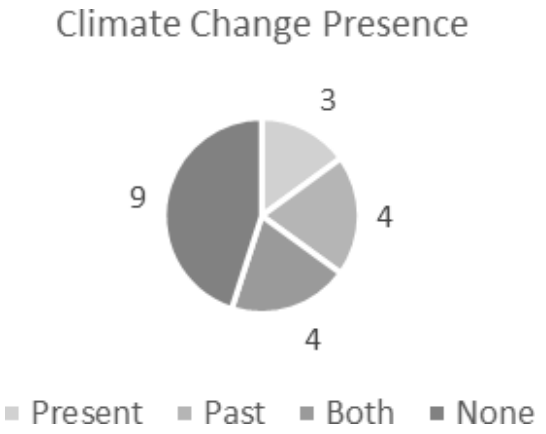

Figure 1. Total of presence/absence of past and present climate changes as a subject of permanent exhibitions.

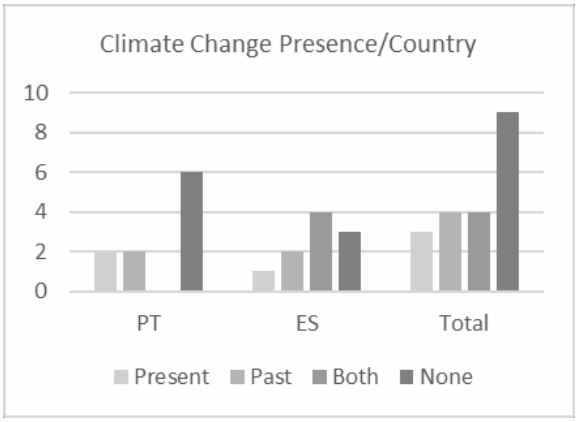

Figure 2. Past and present climate changes as a subject of permanent exhibitions by country.

But 2016 seems to be an important year on the appearance of temporary exhibitions about contemporary climate changes.

Three of these temporary exhibitions found during exploratory visits bring new questions to the research about the role of politics, more precisely of the United Nations (UN) international meetings and the International Panel on Climate Change (IPCC) reports presentations, on the appearance of thematic exhibitions. Visiting CosmoCaixa Barcelona we found a catalogue of the exhibition "*Comprender para Sobrevivir: el Clima*", made for Expo Zaragoza 2008. The second exhibition, *Clima – Expo 360º* took place in 2016 in the MUHNAC – National Museum of Natural History and Science/University of Lisbon, and came from an exhibition made in Paris for COP 21. The third exhibition, *Antropoceno: la era del Cambio Global*, took place also in 2016 in the National Museum of Natural Sciences, Madrid.

Looking at the calendar of those exhibitions, we could speculate the influence of international debates on the choice of exhibitions themes. To confirm and understand better this influence, it was necessary to try to put together a large number of climate change exhibitions and look how they are organized through time.

3. A BRIEF CATALOGUE OF CLIMATE CHANGE EXHIBITIONS IN PORTUGAL AND SPAIN

To dive safely in turbid waters, or in a cave where the sun does not shine, a diver needs to use guidelines in order to not be lost. Dive in the *World Wide Web* is no different. As a very rich environment with all kind of information, the internet provides both good research material and the kind of distractions that cause delays in researching.

So, we have defined some guidelines when looking for climate change exhibitions. We have considered art exhibitions, including photography, and science exhibitions with text, image, digital media, hands-on equipment or/and natural objects.

We have searched for three terms (climate change exhibition, global warming exhibition, and anthropocene exhibition) in two different languages (Portuguese and Spanish). The results were organized by relevance and, since all the terms had thousands of results associated, the search was limited to the first ten pages of results for each term of search. It means 60 pages of results showed on the browser, or a total of 600 results for the two languages.

With this methodology, we found a total of 110 different climate change exhibitions, 64 of them in Portugal and Spain. It was not possible to determine yet the year of the launch of six of those 64 exhibitions.

It is necessary to bear in mind that this kind of search has some limitations since the algorithms define most of what appears first. But using the option of organizing results for relevance, and since the results showed a significant number of exhibitions from 1992 to 2019 and from around the world, we are confident that we have, if not a photography, a good portrait of the exhibitions on climate change in the last fifteen years.

If we look to the 2005-2015 period (the decade before the 21st Conference of Parties (COP 21), that took place in December 2015 in Paris, Portugal and Spain had together a total of 28 exhibitions related to Climate Change, Global Warming and the Anthropocene. During the three years following the COP 21, the number of climate change exhibitions increased twice, with more 30 exhibitions created between 2016 and the first months of 2018.

It seems that the COP 21, and the international agreement that came out of from the meeting, had an impact on the emergence of climate change related exhibitions. However, is this the only historic mark to point out?

The chronological organization of climate change exhibitions, in Portuguese and Spanish, reveals an increasing number of exhibitions in some years even before COP 21 (Fig. 3). Namely, in 2007, 2010, and 2013.

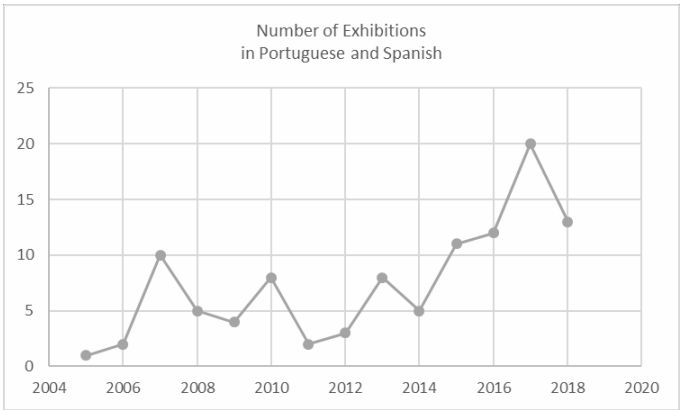

Figure 3. Number of exhibitions in Portuguese and Spanish by year (2005-2018)

We found almost the same distribution when isolating the exhibitions that took place in Portugal and Spain (Fig. 4), with an exception in 2010 that has a smaller increase in exhibitions number.

Each one of those highlighted years has some climate change discussion landmark associated.

In 2007 the IPCC launched the 4th Assessment Report, one year after the release of Al Gore's documentary *An Inconvenient Truth* (2006). This report was probably the first IPCC report with great impact on media and societal debates. Both Al Gore and the IPCC shared the 2007 Peace Nobel Prize "*for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change*."[1]

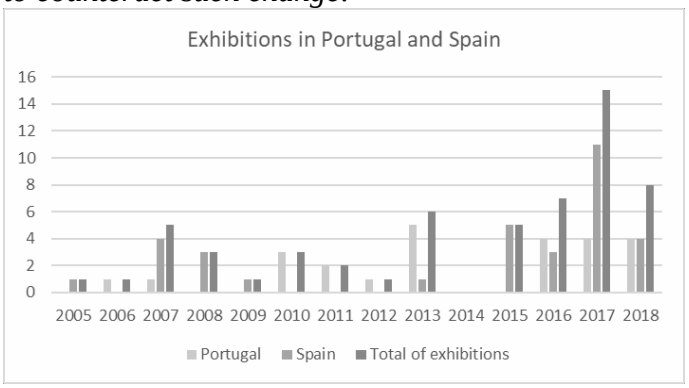

Figure 4. Number of exhibitions in Portugal and Spain by year (2005-2018)

2010 is the year just after COP 15 in Copenhagen. The increase in the number of climate change exhibitions in this year may be a response to the COP 15 fiasco. With the expiration of the Kyoto Protocol scheduled for 2012, a new agreement was expected to emerge from COP 15. The participating countries did not reach a deal and that goal was impossible to achieve. It is possible that society, and museums as important actors of this debate, have responded to COP 15 fiasco with more noise and wake-up calls, including new exhibitions about climate change.

But why is the increase of exhibitions in Portugal and Spain smaller in 2010 when compared to the total number of exhibitions in Portuguese and Spanish, that includes mainly countries in Latin America? To answer this question, a deeper look would be needed into the numbers and especially on the social and economic conjuncture in each country. However, a hypothesis is that in 2010 Portugal and Spain struggled more with the economic crisis than countries in Latin America.

After a small number of exhibitions in 2011 and 2012, in 2013 we have a new peak in the number of climate change exhibitions. As before, there is a climate change landmark that can be associated with this event: the launch of the IPCC 5th Assessment Report.

The pattern repeats itself with a decrease of exhibitions in 2014 and the fourth peak of the decade in 2015, precisely the year of COP 21, in Paris. After years without a new agreement to replace the Kyoto Protocol, the expectation about COP 21 was high and the French government made a huge effort to communicate climate change, listen to opinions around the world and bring a new agreement to life. This effort culminated in both the Paris Agreement, that entered into force in 2016, and an increasing number of climate chance exhibitions, not only in 2015 but also in the following years.

[1] https://www.nobelprize.org/prizes/peace/2007/summary/

From 2015 to 2017, the number of climate change exhibitions has increased each year. In May 2018, the number of exhibitions was already more than half of the number of exhibitions created in 2017, which seems to point to the maintenance of the pattern of growth in the number of climate change exhibitions.

4. CONCLUSIONS

Climate change is gaining space in scientific exhibitions. However, exploratory visits carried in 21 science museums between August 2016 and August 2017, in Portugal and Spain, showed that references to climate change in permanent exhibitions are not common and, when present, are mostly about deep past climate changes and its influence on the evolution of life.

On the other hand, a search on the World Wide Web looking for exhibitions on Climate Change, Global Warming, and Anthropocene (both in Portuguese and Spanish), brought a significant number of results.

The chronological organization of those climate change exhibitions reveals an increasing number of exhibitions in some years. Namely, in 2007, 2010, 2013, and 2015. All those years can be related to a landmark on climate change debate. For example, the launch of IPCC Assessment Reports in 2007 and 2013 or the realization of the Conference of Parties in 2009 and 2015.

The increase in the number of climate change exhibitions in 2010 instead of 2009 may be a response to the COP 15 fiasco, in which a new agreement was expected to emerge from, but participating countries did not reach a deal and that goal was impossible to achieve. It is possible that society, and museums as important actors of this debate, have responded with more wake-up calls, including new exhibitions about climate change.

In the same year, 2010, the increase of exhibitions in Portugal and Spain is smaller when compared to the total number of exhibitions in Portuguese and Spanish, that includes mainly countries in Latin America. To better understand this numbers, a deeper look would be needed into the social and economic conjuncture in each country at that time. However, a hypothesis is that in 2010 Portugal and Spain struggled more with the economic crisis than countries in Latin America.

After the COP 21 in 2015, the number of climate change exhibitions has increased each year. In May 2018, the number of exhibitions was already more than half of the number in 2017, which seems to point to the maintenance of the pattern of growth in the number of climate change exhibitions.

If we look to the 2005-2015 period, Portugal and Spain had together a total of 28 exhibitions related to Climate Change, Global Warming, and the Anthropocene. This number doubles in the following three years – 30 exhibitions between 2016 and the first months of 2018.

At this point, it is too soon to know if the number of climate change exhibitions will keep the path of constant increasing numbers or will be back to the up and down pattern associated to events like IPCC reports launch and the Conference of Parties. Any way we can probably say that those events have influenced the number of climate change exhibitions launched in the last decade.

The next steps in this research are to incorporate exhibitions in French and English in this scenario, and analyse the anatomy and storytelling of these scientific exhibitions, determine the web of actors involved in building them, and how and why the exhibitions change through time and space.

5. REFERENCES

Andrade, P. 2010. A museabilidade e a literacia da ciência: consumo, cidadania e cultura. In Andrade, P. (coord.). *Museus, Públicos e Literacia Científico Tecnológica. Redes de Comunicação de Significados no Espaço Interdimensional do Museu*. Lisboa: Edições Colibri.

Cameron, F., Hodge, B. & Salazar, J.F. 2013. Representing climate change in museum space and places. *WIREs Climate Change* 4: 9-21.

Lopes, C. 2010. A sócio-ecologia do museu de história natural. In Andrade, P. (coord.). *Museus, Públicos e Literacia Científico Tecnológica. Redes de Comunicação de Significados no Espaço Interdimensional do Museu*. Lisboa: Edições Colibri.

MacDonald, S. 1996. Authorising science: public understanding of science in museums. In Irwin, A. & Wynne, B. (eds.), *Misunderstanding science? The public reconstruction of science and technology*. Cambridge University Press.

Mourão, J.A. 2010. O Museus como acto comunicativo: produção e interpretação. In Andrade, P. (coord.). *Museus, Públicos e Literacia Científico Tecnológica. Redes de Comunicação de Significados no Espaço Interdimensional do Museu*. Lisboa: Edições Colibri.

Pickstone, J.V. 2000. Ways of Knowing. A new history of science, technology and medicine. Manchester University Press.

Salazar, J.F. 2011. The mediations of climate change: museums as citizens' media. *Museum and Society* 9(2): 123-135.

Looking to the future in 17th and 18th century Portugal: Luís Serrão Pimentel, his descendants and their library

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ABSTRACT: The aim of this paper is to assess how knowledge in the fields of military architecture, fortification and cosmography was being updated in Portugal in the 17th and 18th centuries, considering the European context. This knowledge was built by figures currently recognized as key for the definition and assertion of the country's scientific culture in the early modern period, such as Luís Serrão Pimentel. Specifically called upon to intervene in the context of the Restoration War with Spain (1640-1668), he left an important legacy, both to his closest relatives (children, grandchildren and great-grandchildren) and to a generation he trained together with his descendants, which marked the history of Portugal and the Portuguese Empire with a paradigm shift in cosmography, border definition, and defensive military buildings. This legacy includes also scientific literacy, witnessed by the library that came to one of his descendants and that Serrão Pimentel certainly.

1. INTRODUCTION

In the modern period, particularly from the mid-16th century onwards, Portugal was visited by various foreign experts in the field of fortification and military architecture, whose knowledge was based on the treatises that had recently been published in Europe and had their roots in the Italian Renaissance. The conditions were created for the development of an active attitude, based not only on experientialism and practice, but also on a humanist and rational knowledge of which Luís Serrão Pimentel became, in the 17th century, one of the major representatives in Portugal[1] (Carvalho, 2000; Mori et al., 2003; Cotta, 2007; Flores, 2008; Ferreira, 2009; Sousa, 2014). His best-known work - *Método Lusitânico de desenhar as fortificações* -, based on mathematics, geometry and accurate drawings, was innovative due to its pedagogic and didactic nature; it's a work in which image and text complement each other, seeking to establish relations between mathematical theory, geometrical representation and military practice in an accessible way. It also attests to the pedagogic and didactic aspects that permeated a substantial share of the Author's activity as a lecturer at the *Aula de Fortificação e Arquitectura Militar* (1647), pioneering a trend that would be followed by Manuel de Azevedo Fortes in the 18th century: writing Manuals to teach military engineering, with a strong emphasis on Arithmetic, Geometry and Trigonometry. The importance of his work for the history of mathematics and engineering in Portugal was demonstrated in several works (Santos, 1812; Garção-Stockler, 1819; Guimarães, 1904; Teixeira, 1934; Macedo, 1940; Guerra, 2010); at the same time, in some woks he is not quoted (Queiró, 1993). In 1641, King D. João IV provided for the creation of the *Aula de Artilharia e Esquadria* at Paço da Ribeira, which Serrão Pimentel helped found, and, in 1647, the king agreed with Luís Serrão Pimentel's request to create the *Aula de Fortificação e Arquitetura Militar* at Ribeira das Naus, aimed at training military engineers; Serrão Pimentel was the first to teach both of them, and taught the latter for nearly thirty years. In *Método Lusitânico*, the Author focuses on exact demonstration, proving that both theory and practice were necessary when it came to training engineers, an alliance that was also key in the practice of military engineering, a fact that cannot be dissociated from the birth of modern science in the European context (Rossi, 2001).

2. LUÍS SERRÃO PIMENTEL, HIS WORK AND HIS LEGACY

Today, Luís Serrão Pimentel is recognized as one of

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the leading figures of 17th-century Portugal. He was born in 1613, in Lisbon; he was the great-grandson of the merchant Jorge Serrão (a New Christian), from Évora, and Isabel da Paz, also a New Christian (daughter of Jorge Serrão Pimentel and Ana de Tovar e Miranda). With regard to education, Barbosa Machado notes that he began by studying Letters at the Jesuit College in Lisbon. At 19, he resumed his studies in Mathematics, Cosmography and Fortification for another ten years, both at the *Aula da Esfera* - based since 1590 at the College of Santo Antão (where he was taught by the Irish priests Ignacio Stafford and Simon Fallonio, Professors in the art of Fortification, and where Cristóvão Borri, Cosmander, Valentim Estancel, Francisco Costa and Tomás Berton were also teaching at the time) - and with Master Cosmographer Valentim de Sá. Thanks to the work he developed, he soon stood out from among the various master cosmographers of the kingdom (he was the eighth), a position held for the first time by Pedro Nunes in 1547 and which remained in his family's hands for four generations, asserting the Pimentel *dynasty*: Luís Serrão Pimentel was followed by his son Manuel Pimentel, in 1687; his grandson Luís Francisco Serrão de Miranda - or Luís Francisco Serrão Pimentel (Ferreira: 2012) -, in 1713, and his great-grandson, Francisco da Silva Serrão Pimentel, in 1764. The term of office of the last Pimentel ended in 1779, as the hereditary transmission of the *arts of navigation* was extinguished, together with the position, following the Pombaline educational restructuring.

On the other hand, and given the political circumstances of the Kingdom in the context of the Restoration War (1640-1668), Luís Serrão Pimentel was appointed, since 1663, as master engineer of the kingdom and the army for Alentejo, with the rank of lieutenant-general in artillery; in 1669, King D. Afonso VI praised the way he was teaching masters, pilots and second pilots for clarity in navigation; his update of sea *Regimentos* (Regulations) and *Cartas* (Charts); the methods he used and his well-defined objectives, as well as his ability to set a trend among his students (both in navigation and in the design of fortifications). He also acknowledged his skills to work on site, in the battle fields of the Restoration War campaigns.

Author of several printed works and manuscripts, some of which have only survived to this day because some of his students compiled his lessons, his best-known work is, undoubtedly, *Méthodo Lusitânico de desenhar as Fortificações das Praças Regulares e Irregulares*, the first treaty written in Portuguese on militar architecture issues, which served as a handbook for the following generations. It was published posthumously, with a dedication to the then Prince Regent D. Pedro. Nevertheless, the work embodies his role as founder of a new generation of military engineers, underpinned by a combination of on-site practical questions and a theoretical training with European roots, and focused on the mobility and territorial coverage of the work developed by the military engineers across the Portuguese empire.

Among his most renowned students we find two of his sons - Manuel Pimentel and Francisco Pimentel; the former, who studied Law in Coimbra, developed his work in the fields of navigation, mathematics and cosmography, while the latter focused on military and fortification issues. Among the engineers who travelled to Brazil, we also find one of Luís Serrão Pimentel's grandsons - Luís Francisco Serrão Pimentel -, an engineer in the captaincy of Pernambuco who dealt mainly with fortifications in northern Brazil, being responsible for both the reinforcement of existing ones (Santa Catarina do Cabedelo) and the construction of new ones (Pau Amarelo).

The characteristics of the work left by Luís Serrão Pimentel allow highlighting the plural dimension he came to assume, both as a cosmographer, mathematician, and engineer, and as a lecturer (Conde & Massa-Esteve, 2018). It is also clear in the manuscripts and books he wrote (and surely in the ones he read) that he was a man of great leaning, as he quoted classical authors in Latin and other languages, such as French, English and Italian, a knowledge that certainly helped him to be intellectually up-to-date within the European context. The fact that he was educated by Jesuits and acknowledged for the work he developed in the positions he held, led him to be well accepted by the elites of the time, appearing regularly at a Literary Academy - *Academia dos Generosos*, based at D. António Alvarez da Cunha's house -, where he recited several lessons in Mathematics.

3. THE PIMENTEL'S LIBRARY: *WORK IN PROGRESS*

The primary objective of this paper is to present a work in progress on the composition of the Pimentel library, establishing a connection between what existed when Luís Serrão Pimentel died (1679) and was passed on to his descendants, and what is described in the 1764 *Inventário*, produced upon the death of Luiz Francisco Pimentel - Luís Serrão Pimentel's grandson -, a "master cosmographer of the Kingdom who lived at Rua Direita dos Anjos, also known as Direita de Arroios" (ANTT Feitos Findos, Letra L, mç. 44, n.º 14). This comprehensive *Inventário* (Inventory) refers approximately 964 books, plus 30 manuscripts bound in parchment (nondescript) and 3 books bound in parchment. Based on this extensive book list we were able, in a first approach, to group the titles (not the volumes) by subject (obviously excluding the ones classified in the Inventory as nondescript):

Table 1: Book subjects

Book Subjects	Sub- total	Published after 1680	Total
Atlas	4		**4**
Maps	1 1(col.)		**2**
Astrology/Astronomy	38		**38**
Cosmography and Navigation	31	1	**32**
Genealogy	5	2	**7**
Architecture	11		**11**
Hydrography	2		**2**
Dictionary/Encyclopaedia/Lexicon/Glossary/Almanac/Grammars	17	2	**19**
History (many chronicles from Religious Orders)	118	12	**130**
Natural History/Medicine	11	2	**22**
Geography	13	1	**14**
Fortification/Military Engineering and Architecture, Military, Cavalry, Artillery	48	1	**49**
Theology; Moral Theology; Religion and History of Religion	35	2	**37**
Instruments and Machinery	6		**6**
Diplomacy	13		**13**
Philosophy	42	1	**43**
Law (civil and canon)	12	1	**13**
Literature (a lot of poetry)	76	2	**78**
Ethics/Education, Moral, Sermons	9	3	**12**
Biographies	25	1	**26**
Arts (Theatre)	10		**10**
Mathematics	62	6	**68**
Travel	16		**16**
Gazettes (journal)		4	**4**
Untitled	271		**271**
Undetermined after reading (lack of information)	96		**96**
TOTAL	973	41	**1014**

Of this total, the books that most likely belonged to or integrated Luis Serrão Pimentel's libraryare the ones printed before 1680. The Inventory mentions a number of titles without publishing dates, namely 3 volumes of the so-called *Mercatoris Atlas* ([Gerardi Mercatoris et I. Hondi. *Atlas ou Representatio du Monde Universel, et des Parties d'icelui, faicte en Tables et descriptions tresamples et exactes]. Divisé en deus tomes. Augmenté d'un Appendice* .... Amsterdam, 1633; Gerardi Mercatoris, *Atlas Minor*, 1608). There is also a copy of Ioannes Bayeri's *Uranometria omnium asterismorum continens schemata, nova methodo delineata, aereis laminis expressa* (Uranometry of all the asterisms, new method graved in….), Augsburg [1603] and Niceron's *La perspective Curieuse* [Paris, 1663].

Among those works, in addition to Ptolemy's *Geography*, there are also Francesco Giuntini's *Speculum astrologiae: universam mathematicam scientiam, in certas classes digestam complectens* [1573]; the Jesuit Georges Fournier's *Hydrographie contenant la théorie et la pratique de toutes les parties de la navigation* Paris. [1647, 2nd ed.]; also, Maria Cunitia's *Urania propicia* [1650] (this work is referenced in the Inventory as "Cunicia uranea propicia emcader/nado em porgaminho") as well as the work by Apollonius of Perga (262-190 a.C.), the famous Greek geometer. Only *De Rationis Sectione* (Arabic translation, not the original) and *Conics* (only half of the original, the rest in Arabic) have been preserved to the present day. The latter, together with Euclid's *Elements*, is considered one of the most important works in Mathematics (in the Inventory, mentioned as "*Apulonio pergeo* em pasta Branca"). The Jesuit Iosepho Blancano's work *Sphaera mvndi sev Cosmographia demonstratiua, ac facili methodo tradita: in qva totivs mvndi fabrica, vna cvm novis, Tychonis, Kepleri, Galilaei, aliorumque astronomorum adinuentis continetur. Accessere I. Breuis introductio ad Geographiam. II. Apparatus ad Mathematicarum studium. III. Echometria, id est Geometrica traditio de Echo.* [Bononiæ Bonomius 1620] and Galileo Galilei (without any reference to a specific work) are also mentioned, as well as Valentin Stansel (*Uranophilus coelestis peregrinus, sive mentis Uranicæ per mundum sidereum peregrinantis ecstases* (Antwerp e Ghent, 1685?).

In the field of geometry and mathematics, we also highlight the Jesuit P. Gregorio de San Vicencio's *Opus Geometricum Quadraturae Circuli, ou numa segunda capa Problema Austriacum Plus Ultra Quadratura Circuli*, Antwerp [1647]; Fransisci Vietae's (François Viète) *Opera mathematica* [1646]; Pedro Nunes' *Tratado da Esfera*; Euclid's *Elements* and Archimedes' *Mathematics*; Adrien Ulacq's *Trigonometria artificialis, sive magnus Canon Triangulorum logarith. ad radium*…[Goudae, 1633] and Joannis Germani de Regiomonte's *Tabulae directionum profectionumque in Nativitatibus multum utiles* [1503]; Clavius' *Gnomonices Libri VIII* [Rome, 1602]. a copy of *Trigonometry*; Simon Stevin's *Œuvres mathématique*s..., [Leiden, 1634.];

Oronce Fine's (1494-1555) *De rebus mathematicis, hactenus desideratis, libri IIII. Quibus inter caetera, circuli quadratura centum modis, & suprà, per eundem Orontium recenter excogitatis, demonstratur* [Paris, 1556]. The Inventory also mentions the 9 Volumes of Tomás Vicente Tosca y Mascó's *Comprendium Mathemathicum*.

With regard to works on fortification and military art, the Inventory mentions, among others, Francesco Tensini's *La fortificatione, guardia, difesa, et espugnatione delle fortezze esperimentata in diuerse guerre* [Venice, 1624]; Pietro Sardi's *Corona Imperiale d'Architectura militare.* [Venice, 1618; 1639]; Matthiae Dögen's *Architectura militaris moderna varijs historijs, tam veteibu*, [Amsterdam, 1647]; Adam Frietag's *L'architecture militaire ou la fortification nouvelle*, [1635, 1668], and Antoine de Ville's *Les Fortifications* [1628, 1640].

4. CONCLUSIONS

Given the documentary richness of this information, we consider that this approach requires additional studies. Considering the variety of interests that populated Luís Serrão Pimentel's inquisitive mind, and the fact that we wanted to keep up-to-date with the information that was circulating across Europe concerning its main fields of interest, we can outline the profile of the works he chose to read, many of which were certainly referenced in this *Inventário*. It portrays a library that surely took many years to put together and that, given the significant presence of *in folio* and *in 4º* copies, was rather unusual for the beginning of the second half of the 18th century, particularly in Portugal.

The richness of Luís Serrão Pimentel's education was also surely reflected in the demanding training, not only of his students, but particularly of his descendants, instilling in them the will to pursue his interest in books, as proven by the presence of copies which were published after his death. The rather careless attitude of those responsible for making the inventory, who classified numerous items as "nondescript", considerably limits the access to all the potential information that this document could have contained, 250 years after it was drafted.

5. REFERENCES

ANTT, Feitos Findos, Inventários post mortem, Letra L, mç. 44, n.º 14, and reference code : PT/TT/IFF/011/0044/00014. http://digitarq.arquivos.pt/ViewerForm.aspx?id=4463170.

Carvalho, J. F. de. 200). *Luís Serrão Pimentel, o Método Lusitano e a Fortificação*. Master Thesis in Universidade Lusíada, Lisboa.

Conde, Antónia Fialho; Massa-Esteve, Maria Rosa. 2018. Teaching engineers in the seventeenth century: european influences in Portugal. In *Engineering Studies, Journal of the International Network for Engeneering Studies (INES).* DOI: 10.1080/19378629.2018.1480627.

Cotta, Francis Albert. 2007. *Quando os filhos de Marte partem da lusitânia: o processo de mundialização da cultura militar portuguesa*. Available in: http://www.fafich.ufmg.br/pae/apoio/quandoosfilhosdemartepartemdalusitania.pdf

Ferreira, Nuno Alexandre Martins. 2009. *Luís Serrão Pimentel, 1613-1679: cosmógrafo-mor e engenheiro-mor de Portugal*. Master Thesis Universidade de Lisboa, Faculdade de Letras.

Flores, C. 2008. Saber, tecnologia e representação na arte Militar do século XVII. A propósito da obra de Luís Serrão Pimentel. In *Educação Matemática Pesquisa: Revista do Programa de Estudos Pós-Graduados em Educação Matemática*, S. Paulo: [s.n.], *10* (2): 279-293.

Garção - Stockler, Francisco de Borja. 1819. In *Ensaio histórico sobre a origem e progressos das mathematicas em Portugal.* Paris: Oficina de P.N. Rougeron

Guerra, Franklin. 2010. *História da Engenharia em Portugal*. (1st ed. 1995). Porto: Publindústria. Cap. X: 131,132.

Guimarães, Rudolfo Ferreira Dias. 1904. Sciencias Physico-Mathematicas – Les Mathématiques au Portugal. In *O Instituto: Jornal Scientifico e Litterario.* 51:501-502. Available in at http://webopac.sib.uc.pt/search~S17*por?/tinstituto/tinstituto/1,291,309,E/l856~b1594067&FF=tinstituto&1,1,,1,0

Macedo, Luís da Costa.1940. Luiz Serrão Pimentel e a «Escola Portuguesa de Fortificar». In *Congresso do Mundo Português*. Lisboa: Comissão Executiva dos Centenários. 12: 401 -411. Available in Biblioteca Nacional Digital at http://purl.pt/414/1/P396.html.

Mori, Victor Hugo; Lemos, Carlos; Castro, Adler de. 2003. *Arquitetura Militar. Um panorama histórico a partir do porto de Santos*. São Paulo, SP: Imprensa Oficial do Estado, FCEB.

Queiró, Filipe J. 1993. A Matemática (1537-1771). In *História da Universidade em Portugal – Sec. 5, Cap. V - O saber: dos aspectos aos resultados*. Ed. A. Ferrer Correia, L. A. Oliveira Ramos, Joel Serrão, A. Oliveira). Coimbra: Univ. Coimbra - Fund. Gulbenkian. I (2), (1537-1771). Available at http://www.mat.uc.pt/~jfqueiro/HistUniv.pdf

Rossi, Paolo. 2001. *O nascimento da ciência moderna na Europa*. Bauru, SP: Edusc.

Santos, António Ribeiro dos. 1812.. Memorias historicas sobre alguns Mathematicos Portuguezes, e Estrangeiros Domiciliarios em Portugal, ou nas Conquistas. In *Memórias de Literatura Portuguesa publicadas pela Academia Real das Ciências de Lisboa*. Lisboa: Oficina da Academia das Ciências, VIII (I): 148-229.

Sousa, P. A. M. M. D. 2014. *Tenente-General de Artilharia e Engenheiro Mor Luís Serrão Pimentel (1613-1679).* Academia Militar.

Teixeira, Francisco Gomes. 1934. *História das matemáticas em Portugal*, Lisboa: Academia das Ciências de Lisboa. Available in: http://www.mat.uc.pt/~jaimecs/livrogt/indice.html

The building up of an azulejoteca and a digital database on azulejos

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ABSTRACT: We present the azulejoteca, a physical archive of Portuguese azulejos specimens and test items, as well as a digital database with their characterization data, both accessible to the scientific community for research on this iconic cultural heritage of Portugal. In time, the digital database will be integrated into DIGILAB, the digital platform of the forming European Research Infrastructure for Heritage Science (E-RIHS).

1. INTRODUCTION

Architecturally integrated Portuguese faïence tiles (*azulejos*) are important, both to Portuguese culture and, for their uniqueness, to the art heritage of Mankind. Their continuous use in Portugal for over 500 years in a well dated succession of stylistic solutions and applications adapted to the needs of each time defined a national affinity which is, in itself, a rich field for social study (Santos 1957, Meco 1993).

There are however important gaps in the knowledge of the history of Portuguese *azulejos*, not least the elusive origin of the manufacture in the country and its technological sources, which need additional research (Simões 1990, Pais 2012). In the framework of the project FCT-AzuRe,[1] we aim to contribute to bring clarification on those issues, not only through dedicated research, but also by giving others the opportunity to share characterization data specifically gathered, as well as data already extant but not generally available. With this idea in mind, and aware that sharing information could play a crucial role in the explanation of unclear aspects in the studies of this unique historical and cultural heritage, we set out to create a "library" of Portuguese *azulejos* - the so-called *azulejoteca*, together with online information on their morphological and analytical characteristics.

2. THE AZULEJOTECA

The *azulejoteca* concept results from a pioneering idea of creating a collection of *azulejo* tiles and samples, to which all researchers will be able to resort to integrate in their studies or to gather supplemental data that will be add to that already extant. It consists of a physical archive of characterized *azulejo* specimens, from the 16th to the 20th century, representing 400 years of *azulejo* chronology, and will be located at the Museu Nacional do Azulejo (National Azulejo Museum) in Lisbon, Portugal.

For each *azulejo* different types of samples will be placed in the archive: fragments (when possible or available), polished sections used for instrumental characterization, including micro-samples for SEM-EDS analysis, and ground ceramic body samples (when available) for XRD analysis (see Fig. 1). Any samples kept in the archive are easily traceable to the *azulejos* from which they were collected.

Figure 1. Example of the type of samples that can be found in the archive.

[1] http://azulejos.lnec.pt/AzuRe/index.html

3. THE DIGITAL DATABASE ON AZULEJOS

The characterization data of all azulejos specimens placed in the archive are available through a digital database, which researchers can easily access by the Internet. The data is organized in three main areas: i) morphological characterization data; ii) physical characterization data and iii) chemical and mineralogical characterization data.

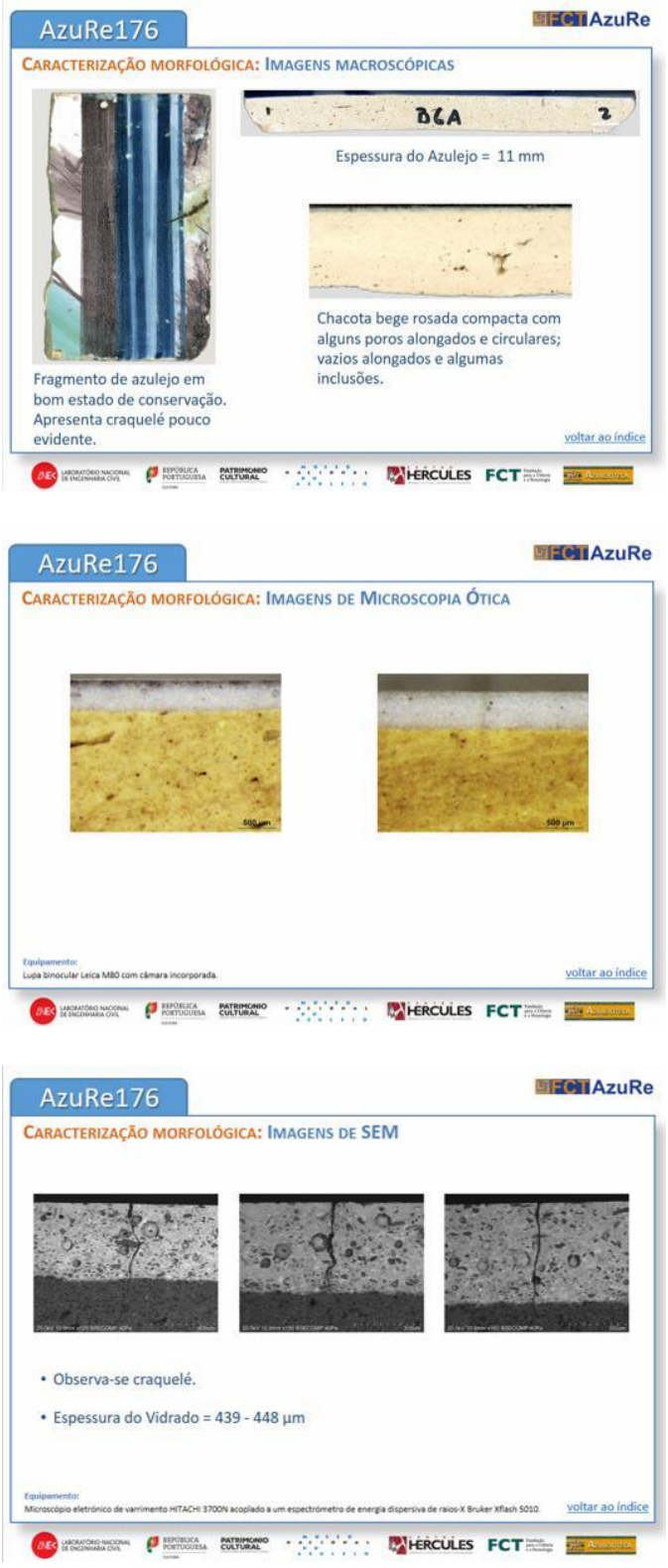

Figure 2. Morphological characterization data that can be found in the digital database: macroscopic observations; OM images and SEM images (top to bottom).

4. MORPHOLOGICAL CHARACTERIZATION DATA

Under this heading is presented data related to macroscopic observations, such as the dimensions of the *azulejo*, surface colours or notes on the ceramic body features and manufacturing defects (Fig. 2), as well as information on other morphological characteristics obtained by optical microscopy (OM) and scanning electron microscopy (SEM). Both optical and electronic images are shown and may be retrieved in high resolution (Fig. 2).

5. PHYSICAL CHARACTERIZATION DATA

Whenever available, the physical properties of the azulejos, particularly their porosity and hydric behaviour, are presented (Fig. 3).

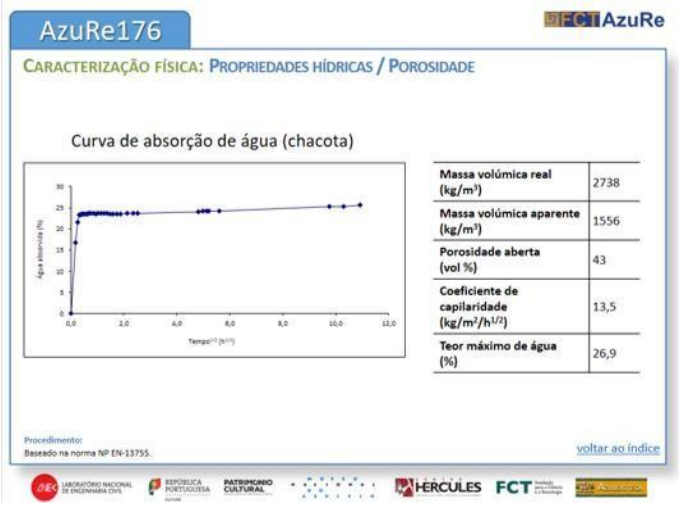

Figure 3. Example of the porosity and hydric behavior data that can be found in the digital database.

6. CHEMICAL AND MINERALOGICAL CHARACTERIZATION DATA

Characterization data concerning the chemical composition of the glaze, ceramic body and pigments is provided. Here, one can find data obtained by SEM-EDS analysis (scanning electron microscope coupled to an energy-dispersive spectrometer), X-ray fluorescence analysis (ED-XRF) and thermogravimetric and differential thermal analysis (TGA-DTA) (Fig. 4). In the case of the SEM-EDS and XRF analyses, it is also possible to accede the raw data.

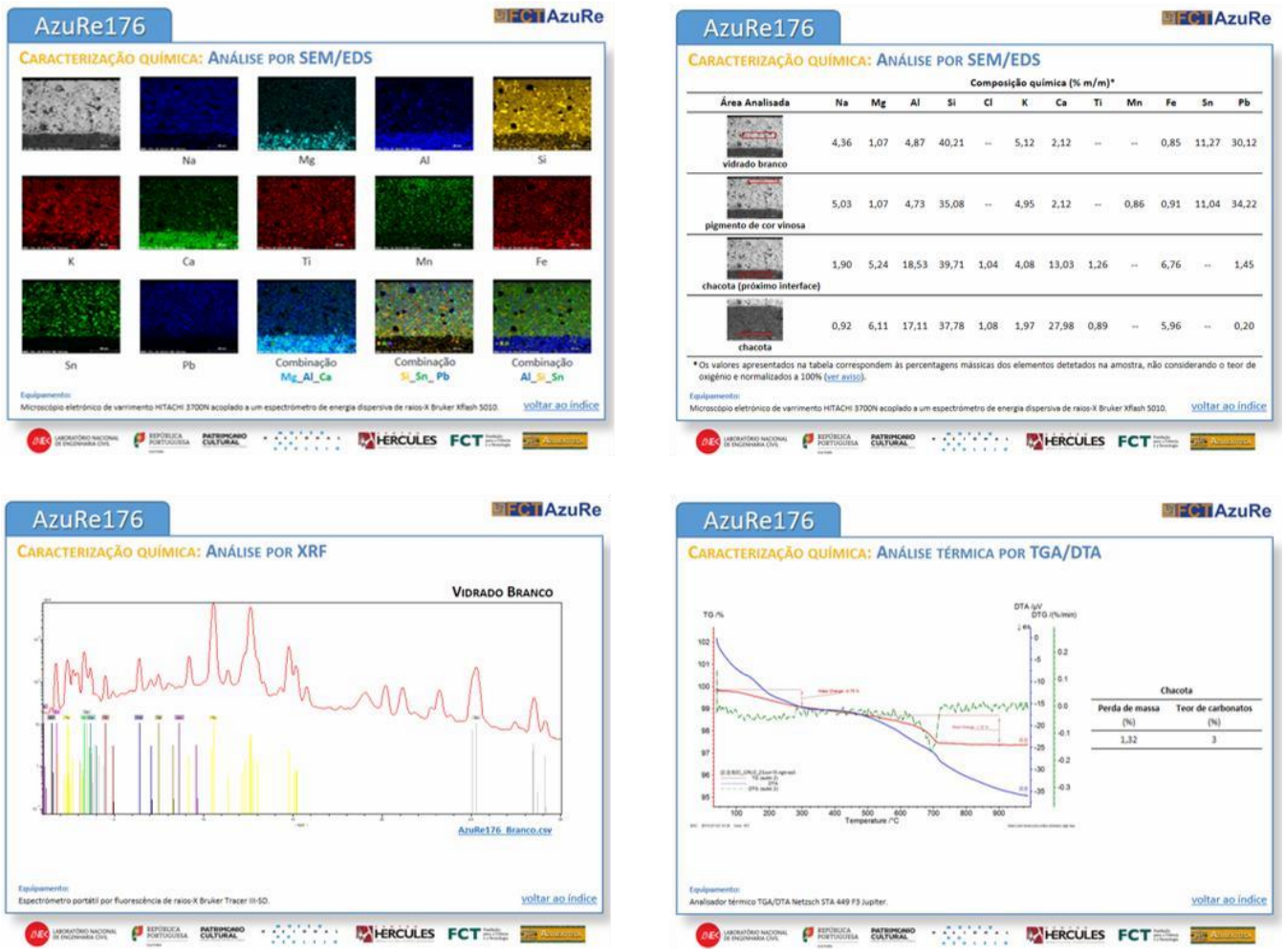

Figure 4. Example of the chemical characterization data that can be found in the digital database: SEM-EDS data; XRF spectrum and TGA-DTA data (left to right and top to bottom).

Whenever available, data related to the mineralogical composition of the ceramic body, obtained by X-ray diffractometry (XRD) is also presented (Fig. 5).

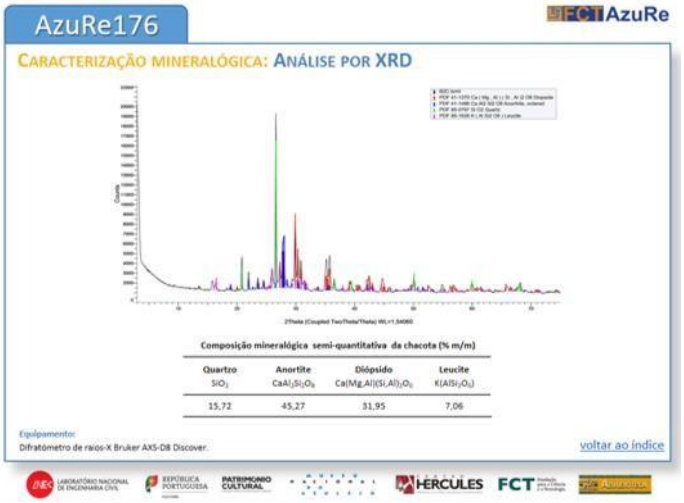

Figure 5. Example of the mineralogical characterization data that can be found in the digital database.

7. THE DIGILAB PLATFORM

Portugal, through LNEC and the HERCULES Laboratory of the University of Évora, are involved in the organization of the European Research Infrastructure for Heritage Science (E-RIHS)[1] which entered the European strategic roadmap for research infrastructures in 2016 and is expected to be fully functional by 2022. E-RIHS will provide state-of-the-art tools and services to cross-disciplinary research communities through several platforms, one of which - DIGILAB for virtual access to tools and data hubs for heritage research including measurement results, analytical data and documentation (Striova 2017). The digital database on azulejos is set to integrate DIGILAB at its first stage.

8. CONCLUSIONS

The "azulejoteca" (a library of azulejos) that will consist of a collection of azulejos and samples, together with the respective analytical results, it's an

[1] http://www.e-rihs.eu/

innovative concept, henceforward open to all researchers. These will also be made available to the scientific community through an Internet database, to help researchers on their studies and to support the expansion of knowledge about this relevant artistic heritage.

9. REFERENCES

Meco, José 1993. *O azulejo em Portugal*. Lisboa: Publicações Alfa.

Pais, A. N. 2012. *"Fabricado no Reino Lusitano, O que antes nos vendeu tão caro a China": a produção de faiança em Lisboa, entre os reinados de Filipe II e D. João V*. Porto: Escola das Artes da Universidade Católica Portuguesa (Tese de doutoramento).

Santos, Reynaldo dos 1957. *O azulejo em Portugal*. Lisboa: Editorial Sul.

Simões, J.M. dos Santos 1990. *Azulejaria em Portugal nos séculos XV e XVI*. 2ª ed. Lisboa: Fundação Calouste Gulbenkian.

Striova, Jana & Pezzati, Luca 2017. *The European Research Infrastructure for Heritage Science (E-RIHS)*, The Int. Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol.XLII-2/W5, pps. 661-664. 26th Int. CIPA Symp. - Ottawa, Canada.

Backstage of a new archaeology – 'Invisible' institutions in the 60s

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ABSTRACT: The 60ies were crucial for the future of archaeology in Portugal, leaded by people aware of the epistemic changes taking place abroad, speaking several languages and conscious of the need to update scientific knowledge to avoid the incidence of foreigner researchers in the territory. This was a time when a new institution – the 'Fundação Calouste Gulbenkian' -, together with the 'Instituto de Alta Cultura', began and continued to finance archaeological research in Portugal. Other institutions, such as the 'Sociedade Martins Sarmento' (Guimarães) and the 'Associação dos Arqueólogos Portuguese' (Lisbon), much contributed to the increasing number of young scholars dedicated to archaeology. Focusing on the first of these two institutions, we will recognize some actors, strategies, means, liaisons and outputs of this "transition generation" and the role it played in the modernization of archaeology in the country.

1. CONTEXTS, QUESTIONS AND HYPOTHESIS

Subsequently to the end of the 1st National Archaeological Congress (Lisbon, 1958) (NAC), the members of the recently established (1954) Department of Prehistoric archaeology of the Geographic Society of Lisbon (1875) intensively discussed the organizations devoted to this science in the country. Being a natural consequence of the scientific interest produced by that event, it was also the confirmation of a certain specificity of our territory regarding archaeology: the fact that despite the its general relevance, archaeology continued to be studied and financed mainly by privates.

Nevertheless, there was a significant number of institutions comprising archaeology or archaeological work. A reality which related to the increasing number of people searching for archaeology as a way of knowing better the ancestry of the territory according to the newest theories and methods settled by wester archaeological schools.

The interesting thing is that the members of the above-mentioned Department split the existing institutions giving their legal condition, hierarchized as follows:

1) Institutes and research centres dedicated to archaeology and responsible for the under graduation of future archaeologists (Institute of Archaeology of Coimbra; Institute of Anthropology of Coimbra; Centre of Archaeological Studies of Lisbon; Research Centre for Iberian Ethnology of Porto);
2) Private scientific societies assuming archaeological research as central in their activities (Association of Portuguese Archaeologists (Lisbon); Portuguese Institute of Archaeology, History and Ethnography (Lisbon); Portuguese Society of Anthropology and Ethnology (Porto); Society Martins Sarmento (Guimarães));
3) Institutions contributing indirectly to the development of Portuguese archaeology in the Metropolis and Overseas territories/provinces (Research Centre of Art and Museology (Lisbon); Portuguese Society of Numismatics (Porto); Research Centre for Overseas Territories and Ethnology (Lisbon)).

Most of these institutions was created in the main Portuguese cities. An understandable situation compared to similar ones known from other western countries, although some of them, like the *Société des Antiquaires de Normandie* (1823), were established in the "periphery". In Portugal, the only real exception goes to the 'Society Martins Sarmento' (SMS), founded by a wealthy gentry from a small northern city, promoting excavations, building a museum with library and publishing a journal.

But the list unveils more. For instance, the need – conscious or not -, to indorse the pertinence of archaeology as a science in Portugal by comprising it within: 1st – universities; 2nd – prestigious erudite societies; 3rd – institutions linked to colonial policy.

Perhaps more than that, the list exposes one absence: the absence of small local societies founded by erudite (librarians, teachers, journalists, physicians, priests, etc..) allied to modest but knowledgeable citizens worried with the future of their common heritage. Together, they organized conferences, guided tours whereas promoted the study and safeguard of archaeological sites and monuments situated in their territories.

Compared to the number, motivation and financial strength of analogous societies acting in most western countries, one could say that they were almost insignificant. On the contrary. We argue that, exactly because of the lack of facilities, their efforts and enthusiasm must be emphasized within this scope of ideas, believes, intentions and achievements. Yes, achievements. All of them, independently of their lifetime, (re)affirmed the importance of their geographies in opposition to the growing centralist role played by Lisbon and the yet deeply engrained idea of cultural and scientific periphery, when it was the peripheries which shaped the country. The concept of periphery was and is not exclusively applied when comparing countries unrelatedly to its actual motives.

Apparently disregarding these small "peripherical" erudite societies - maybe because they had no official links to the Academy -, and not mentioning any southern ones, the list leads us to conclude that by the end of the 50s (and throughout many more years) there were few (but sometimes effectiveness) ways of opposing Lisbon demands, either by imposing the scientific, scholar and social prestige of some of theirs members; attaching (in)directly others to the predominant political agendas; and, last but not the least, appealing to financial independency of their members belonging to an untouchable social rank (local, regional and/or national).

Independently of these reasons and hypothesis, those listed institutions were founded and endured thanks to individual interests and efforts.

Equally to other human activities, science is encouraged by individual desires, expectations, believes and needs. Without them and reinforced by a well tangled network, projects stay as they are - projects (even if reasonable and required) – without being accomplished. Example? The project and organization of the above mentioned 1st NAC, celebrating the 150th birthday of José Leite de Vasconcelos (1858-1941), the mastermind and first director of the nowadays known as the National Museum of Archaeology (Lisbon, 1892), the official reason for the unofficial intent of shaping the first national meeting of archaeologists in Portugal. Deprived of the efforts of some institutions and personal wills, it would not take place, as (if we wish to analyse it this way) as a model or cordiality (or should we say survival?) in Portuguese archaeology (Coelho, 2018).

An intent immediately supported by the Association of Portuguese Archaeologists (AAP), the oldest and more respected private institution devoted to heritage and archaeology. Moreover, many of its associates were archaeologists; taught at universities; leaded institutes, projects and research groups, directed excavations with the participation of foreigner colleagues, young scholars and students; presented oral papers in international conferences; began to be included in important scientific networks; belonged to governmental institutions responsible for archaeology in the country. But, does this mean that they controlled its practice or on the contrary they were (un)conscious accomplices to the over-all governmental disregard over this science? Or was it their way of contributing to the undergoing archaeological activity in the country, helping its ultimate institutionalization through the financing of some works and the sending of students to other countries to complement their archaeological knowledges? In other words, we believe it was through these official mechanisms that Portuguese archaeology testified (though very scarcely) some innovation and eagerness for innovation, even before 1974.

Additionally, the AAP leaders were perfectly aware of the urgency of innovating the archaeological practice in Portugal, its theories, fieldwork methods and laboratory analyses with the help and/or direct involvement of other sciences, mainly natural ones.

It was the antechamber of the multidisciplinary approach in archaeology, yet long way before the coming of the desirable interdisciplinary one. A path to be accomplished by a young generation of archaeologists responsible for the future of this science in Portugal after the Revolution of 1974 (25th April). Until then, archaeology tried to survive occasionally in an adverse political atmosphere, even if mostly protected by the (in some way illusional) university autonomy assured (or allowed) by the authoritarian 'Estado Novo' ('New State'), even during the deceived and most expected 'Primavera Marcelista' ('Marcelo's Spring').

In the meanwhile, the private 'Fundação Calouste Gulbenkian' ('Calouste Gulbenkian Foundation') (FCG) (1956), politically untouchable (thanks to its very healthy and foreigner finances) cultural and scientific institution began to fund various archaeological projects and to provide scholarships. Additionally, Portuguese archaeology started to benefit from the regular presence of European archaeological schools in its territory, such as the German one through the participation of archaeologists from the 'Deutsches Archäologisches Institut's' (1829) delegation headquartered in Madrid. This was only the starting point for a systematic process of internationalization of Portuguese archaeology.

2. THE 'SOCIEDADE MARTINS SARMENTO' (1881) AND ITS 'REVISTA DE GUIMARÃES' (1884)

Contradicting the idea of scientific periphery in Portugal, as Francisco Tavares Proença Júnior (1883-1916) did during the two first decades of the 20th century, linking the northcentral city of Castelo Branco to European archaeology, thanks to the wealth and political influence of its family (Martins, 2016), the SMS began to play a renovated role in the development of archaeology in the country since the 50s onwards under the supervision of its president Mário Cardozo (1889-1974).

The first step was related to the obvious disinterest of Lisbon politicians in financing the 2nd NAC which should have taken place at the University of Coimbra honouring the life and work of Professor Virgilio Correia (1888-1944). A surprising indifference if we remember the unquestionable success of its first edition. A picture that reminds the one emerged after the 9th International Congress of Anthropology and Prehistoric Archaeology (Lisbon, 1880) (Martins, 2014) and which was not solved by its 15th edition organized once again in Portugal (Coimbra and Porto, 1930).

In face of this, the SMS decided to sustain the decision of the University of Porto in organizing the 'Colóquios Portuenses de Arqueologia' ('Porto Archaeological Colloquiums) (CPA) (1961-1966), hosted by different institutions, including the SMS and several Northern municipalities, at the same time as in 1963 the AAP celebrated its first 100 years with a colloquium and a bibliographic exhibition with the presence of key-note speakers from Spain, France and Germany (Martins, 2005).

And this was most interesting. First, it allowed to create an almost annual space for archaeological discussion attended by professionals (even if this titration should be carefully used when referring to those times), amateurs and foreigner colleagues, namely Spanish. Second, it permitted to decentralize – from Lisbon -, the archaeological activity, making it more visible to a larger auditorium of putative future archaeologists. Third, it facilitated the dialogue be-tween archaeologists and politicians (namely local and regional) by reinforcing the relevance of archae-ology in the shaping of identities, specifically north-ern ones. Finally, it stressed the importance of the University, institutes and museums of Porto, along-side with many local erudite societies – besides the SMS -, in the assertion and progress of archaeology in the country.

An unofficial pronouncement noticeable in many other activities. For instance, in the official journal of the SMS, 'Revista de Guimarães' ('RG').

In fact, the president Mário Cardozo filled some of its pages whit detailed reports from the international archaeological meetings which he attended, to divulge the most recent theoretical discussions and working methods concerning the field and in the laboratory. It was the case for the 'Luso-Spanish Congresses for the Advancement of Sciences' which included sections of prehistory and of archaeology in general (Cardozo, 1960: 562). There, M. Cardozo was getting more aware of the lack of specialization of our archaeologists and, what was more, the outdated way of doing archaeology when compared to what was going abroad, especially in Germany, Britain, France and even Spain which had a long story of close contacts with these (re)innovating schools, to which it was already re-quired to add the American one (Díaz-Andreu, 2012).

And M. Cardozo was peremptory in defending the organization of some of these editions in other cities besides Lisbon, Coimbra and Porto, decentralizing them to Braga, Viana, Guimarães (of the SMS), Viseu or (apparently disregarding Santarém) even Évora, the only city referred by him southern Lisbon. As a matter of fact, M. Cardozo could not ignore the importance of Évora in the establishment of heritage policy in the country since the 19th century and the work done by some of its intellectuals, mostly belonging to the AAP, Institute of Archaeology of the University of Coimbra or to the National Academy of Sciences.

But M. Cardozo went further in his thoughts, considering a holistic approach to the past which should include a multidisciplinary (though he does not name it as so) insight over the local and regional pasts, traditions and natural uniqueness's. Singularities which could eventually and ultimately incentivize and develop the tourism, one of the national panaceas incremented by the journalist and politician António Ferro (1895-1956) based on his 'Política do Espírito' ('Politics of the Spirit') (Acciaiuoli, 2013). Or perhaps linking history, art, archaeology, ethnography and tourism, M. Cardozo hoped to persuade local politicians to capitalize scientific research and culture.

During the 60s, M. Cardozo wrote several papers published at the 'RG' dealing with the need for more adequate national heritage legislation accordingly to UNESCO standards (Cardozo, 1960: 537-550). More than that, he advised rulers sending young students abroad, mainly to England and Germany, to graduate in archaeology. Only then – he underlined -, could be possible to have specialized professors needed to shape an archaeological school in Portugal (Cardozo, 1961: 185-198). And one of these outstanding examples came from the University of Coimbra. With a grant from the FCG, Jorge de Alarcão (1934-) stood for two years at the Institute of Archaeology of the University College of London. Returning to Coimbra, he began to teach archaeology at the University, becoming one of our leading experts in the roman period. In the meanwhile, he divulged recent field and laboratory techniques and methods, namely in the

'RG', the first journal to publish some of his most recent archaeological thoughts and reflections (Alarcão, 1964: 379-380).

Moreover, the 'RG' was the first place to give space to such young scholars as Vítor Oliveira Jorge (1948-), from the University of Porto, with the paper "Introdução à aplicação de computadores electrónicos em arqueologia" ("Introduction to the use of electronic computers in archaeology") ('RG', 1968), as an attempt to transform archaeology from an exercise of historical construction into a science with its own cultural laws (Oliveira Jorge, 1968: 4-48).

As for others, M. Cardozo considered urgent that archaeology could reach collaboration – including international -, with natural and exact sciences, to be accepted once for all as a science in Portugal, particularly in the eyes of politicians and – more important than that -, of the governmental institutions which dealt with science in Portugal – 'Instituto de Alta Cultura' ('Institute for High Culture') (IAC) (1952-1976).

3. FINAL REMARKS

In 1970, M. Cardozo wrote: this contribution of a new generation, including a notable number of ladies […] – assure us that there is being shaping among us a numerous and active team of future archaeologists; a team that must be oriented toward new theories and modern research techniques existing for a long time in other countries (Cardozo, 1970: 4)

Again, these words were published in a journal edited by a private erudite society. Of course, there was 'official' publications considering equivalent reflexions. For instance, and like the ones from the 1st CAN (see above), the proceedings of the five already mentioned CPA were published in the series 'Lucerna', of the journal 'Studium Generale', from the Centre for Humanistic Studies of the University of Porto, with the IAC financial support.

Nonetheless, the most recent archaeological news, engendered, applied and disseminated by some referential western archaeological schools, were mostly publicizes in Portugal through private or private-public initiatives. This is to say that efforts were made to institutionalize even more the archaeological practice in the country, trying to get together all the (then considered) main institutions partially or entirely dedicated to this science among us. An unofficial joint venture essential to update this science accordingly to international standards, preparing in this way the generation responsible for its near future.

A picture to be profoundly modified after April 1974 thanks to a new generation motivated by the "transition" group to which belonged M. Cardozo. Even so, the role he played then is still scarcely known maybe because he did not teach at University, directed a national museum or the AAP. But as president of the SMS and director of the 'RG' he contributed to the spreading of new theories and practices and incentivized youngers to go abroad and to collaborate with foreigner colleagues, as the future of archaeology depended on that. And the subsequent years would confirm this scenario.

4. REFERENCES

Acciaiuoli, M.. 2013. *António Ferro. A vertigem da Palavra. Retórica, Política e Propaganda no Estado Novo*. Lisboa: Bizâncio.

Alarcão, J. de. 1964. "Bibliografia: «The preparation of archaelogical reports», de Leslie Grinsell, Philip Rahtz e Alan Warhurst". *Revista Guimarães.* 74 (3-4) Jul.-Dez. 1964, p. 379-380.

Cardozo, M.. 1960. Congressos. Congresso Luso-Espanhol para o Progresso das Ciências. *Revista Guimarães.* 70 (3-4) Jul.-Dez. 1960, p. 562.

Cardozo, M.. 1960. Escavações arqueológicas. Formação de arqueólogos e protecção das antiguidades. *Revista Guimarães.* 70 (3-4) Jul.-Dez. p. 537-550.

Cardozo, M.. 1961. Discurso do Presidente da Sociedade Martins Sarmento na Sessão de Encerramento do I Colóquio Portuense de Arqueologia, no dia 4 de Junho de 1961. *Revista Guimarães.* 71 (1-2) Jan.-Jun, p. 185-198.

Cardozo, M.. 1970. II Congresso Nacional de Arqueologia. Sep. *Revista de Guimarães*, n.º LXXX. Guimarães: SMS, 1970, p. 4.

Coelho, R. G.. 2018. *O arqueólogo cordial: a Junta Nacional da Educação e o enquadramento institucional da arqueologia portuguesa durante o Estado Novo (1936-1974)*/. Lisboa: Imprensa de Ciências Sociais.

Díaz-Andreu, M.. 2012. *Archaeological encounters. Building networks of Spanish and British archaeologists in the 20th century*. Cambridge: Cambridge Scholars Publishing.

Jorge, V. O.. 1968. Introdução à aplicação de computadores electrónicos em arqueologia. *Revista de Guimarães*. 78 (1-2) Jan.-Jun. 1968, p. 5-48.

Martins, A. C.. 2005. *A Associação dos Arqueólogos Portugueses na senda da salvaguarda. 1000 anos de (trans)formação (1863-1963)*. [Texto policopiado]. Tese apresentada à Universidade de Lisboa, para obtenção do grau de Doutor.

Martins, A. C.. 2014. Entre a metamorfose e a adaptação (1863-1896): de Associação dos Arquitectos Civis Portugueses a Real Associação dos Arquitectos Civis e Arqueólogos Portugueses. *Revista Arqueologia e História - 150 anos de Associação dos Arqueólogos Portugueses – memória e construção (1863-2013)*. Vol. 64-65 (2012-2013). Lisboa: AAP, p. 7-21.

Martins, A. C.. 2016. Mission": *modernize!* Portuguese archaeology in the 1960s (a preamble). In Delley, G., Díaz-Andreu, M., Djindjian, F., Fernández, V. M., Guidi, A. and Kaeser, M.-A. – *History of archaeology: international perspectives.* Proceedings of the XVII UISPP World Congress (1–7 September 2014, Burgos, Spain). Volume 11 / Sessions A8b, A4a and A8a organized by the History of Archaeology Scientific Commission. Oxford: Archaeopress Publishing Ltd, p. 179-186.

Translation and Visibility in scientific communication in multilingual context

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ABSTRACT: This study sheds light on the importance of visibility in scientific communication and its relation to the language used as a medium for dissemination in academic journals. Considering the multilingual context in which global knowledge production takes place, translation is presented as way to decrease asymmetries found between Anglophone and non-Anglophone scholars, and, also, as a possible answer to the dichotomy "opportunity-threat" involved in the status of English as the dominant language of science. This study expects to contribute in the debate of disparities and inequities in scientific multilingualism by raising some pertinent questions that are expect to instigate further investigations.

1. INTRODUCTION

Considering the collective nature of scientific activity (KUHN, 2017), scholars are expected to share their findings with fellow researchers, disseminating results through scientific events and publications in journals of specific areas. Therefore, scientific communication plays an important role in the development of science. With the advance of technology, geographical barriers are smaller and, to many researchers, the access to information has never been easier. However, as globalization practices increase, international exchanges are become more and more common, and this fact may raise a challenge: the language barrier.

The ideal of a universal science, supported by the concepts of objectivism, neutrality and truth that are related to the scientific knowledge can be questioned to a certain extent when the particularities of different ways knowledge production occur are brought to light. The differences in reporting scientific findings is one of them. Thus, writing an academic article in Portugal might be significantly different from writing an article in the USA, for instance. More than a different linguistic code, the international circulation of knowledge presupposes adaptations in terms of discourse, that is, to have the content accommodated into the rules of acceptance of a speaking community (BOURDIEU, 2002).

Considering the importance of communication in multilingual context, this study has the objective to discuss the role of translation in academic publication practices of knowledge dissemination. First, we address the issue of disparities within scientific community in order to comprehend the increase of efforts from peripheral countries for gaining visibility through the attempt to publish texts in English instead of local languages. Later, the ambivalence of English as the dominant language of science is emphasized. Finally, translation is presented as a possibility of decreasing the existing gap between English and other local languages, since it represents a way to congregate different languages in knowledge dissemination practices, avoiding a complete monolingualism in global scientific communication.

2. SCIENTIFIC COMMUNICATION IN MULTILINGUAL CONTEXT: FROM LOCAL TO GLOBAL

2.1. Multilingualism and disparities

Much has been written about the extent that language affects publication practices in multilingual academic environment (Hamel, 2007, Salager-Meyer, 2008, Stolerman & Stenius, 2008 etc.). With the dominance of English as a *lingua franca* of science, scholars from non-Anglophone backgrounds have to choose between publishing their articles in English or in their local languages. The prevalence of English for international communication purposes can be observed in many contexts, including countries where the use of more than one language is accepted, such as Canada, with English and French as official languages in the provinces of Ontario and Quebec (Gentil & Séror, 2014), and Sweden, where the policy of "parallel language use" fosters the use of both local language and English (Mcgrath, 2014). In the

academic context, this fact means that scholars from those countries can choose in which language they prefer to publish their studies.

In other non-Anglophone countries, however, scholars might not have the same choice, and writing in English becomes an imperative, considering the value English publications accrue in institutional system (Curry & Lillis, 2004, Murasen & Pérez-Llantada, 2014). The fact is that English has consolidated its place as the medium for academic publishing, and multilingual scholars cannot ignore that when seeking greater participation in the global scientific community.

In this scenario, where the dominance of English as an academic language seems to be undeniable, many authors recognize the existence of inequalities, especially in the domain of scientific publication. Bennett (2014), focusing on the geopolitics of academic writing, refers to the correlation between national wealth and scientific achievement of countries. While scholars from centrally positioned countries in terms of knowledge production have linguistic advantages and wider access to updated literature, the ones from semi periphery and periphery need to apply more efforts in order to adapt their production to make it acceptable in an unfamiliar academic culture.

Although academic writing requires skills that must be formally learned and practiced, as pointed out byHyland (2016), non-Anglophone authors may face other challenges that go beyond writing styles, such as: dated literature, related to the difficulty in information access; excessive localized discussion, which could result in a parochial article; absence of authorial voice, and, thus, a rather derivative investigation (Canagarajah, 2010, Flowerdew, 2001).

Hence, it is reasonable to argue that the well-known expression *Publish or Perish* could be updated to *Publish in English or Perish in other languages*, since not doing so would mean being isolated from important discussions in international scientific community.

2.2. Visibility

Salager-Meyer (2008) refers to visibility as the condition for survival in the academic world. Considering that the impact of an article can be measured by the number of access and citations it receives, having a wide readership becomes essential to meet the requirements considered in the systems that evaluate the quality of a research. In other words, the value of an article or study is currently measured by bibliometric indices used to assess its relevance in a certain the area. Therefore, being seen is a crucial element, and scholars depend on visibility to answer to institutional demands and to gain prestige within the scientific community.

Thus, writing in English becomes a necessity for those who seek an increase in their visibility, since it allows dissemination beyond national boarders, expanding significantly the reach in terms of readership. As Stolerman & Stenius (2008) point out, widely used databases tend not to index non-English journals, which prevents important discoveries to be shared with the international community. The so-called domain of lost science (Ferguson, 2007), is a consequence of isolation and it is deeply-related to the lack of visibility.

Countries with multilingual policies, where scholars can choose between publishing in English or another local language are interesting cases and can provide insightful elements to comprehend the motivations for choosing English over local languages.

Interested in the relationship between parallel language policy and the actual practice of publishing in the Scandinavian context, McGraph (2014) conducted a survey with scholars from different areas – History, Anthropology and Linguistics – and concluded that factors such as: the target audience – academic readership or practitioners –, publication outlet – level of formality of spaces of publication; as well as the topic discussed, are determinant factors when choosing the language used as a medium.

With two official languages, English and French, Canadian scholars reported choosing English for scientific communication considering the advantages in terms of visibility, and its connection to "impact, and status as per indicators such as citation statistics, presentation attendance, and impact factors" (Gentil & Séror, 2014: 21).

Thus, visibility in the field of international knowledge production is crucial and it is strictly related to publication practices and, therefore, with the use of English as a medium.

2.3. The ambivalence of English as the dominant language of science

If on the one hand the use of English for scientific communication offers visibility and opportunities for knowledge exchange and potential collaborations among researchers from different countries, on the other, it could mean a threat to plurilingualism, fact that concerns authors such as Hamel (2007: 67): "Plurilingualism entails a view of intercultural communication where ones' own position or academic standpoint recognizes that other perspectives and procedures are also part of the possible world knowledge".

Hence, for the author, an English-only policy would affect the development of science, since it would perpetuate the asymmetrical power relations between native speakers of English and non-native. Another argument in favour of a multilingual scientific environment has to do with the belief that learning different languages increases the "conceptual sensibility" of scholars (Stolerman & Stenius, 2008),

which implies that scholars would benefit from learning foreign languages also in a cognitive level.

In a different perspective, according to some Anglophone scholars' report the use of English for scientific communication represents a threat to the English language itself, since non-proficient scholars from other linguistic background could use it improperly (Bocanegra-Valle, 2014).

Hence, the dichotomy "opportunity-threat" is still present in the debates over international scientific communication and it certainly foster further and deeper discussions. Far from providing a definite answer for this debate, the practice of translation could mean a possible measure in the efforts to the maintenance of multilingual practices in effective scientific communication.

2.4. Translation and Plurilingualism

Considering the circulation of knowledge production, a journal can be either international, publishing articles written in English, or domestic, usually written in local languages. Among the differences in the language medium, these journals might also be addressed to distinct readerships.

Curry & Lillis (2004) point out seven different categories to describe the different target communities aimed by researchers when publishing their work. According to which audience it is intended, the language used as a medium may also vary. Texts addressed to practitioners or local academics might not be written in English, but in the local languages.

There are domestic journals, however, that publish articles in both English and local languages. Petrič (2014) mentions that in bilingual journals, both languages are needed because readership includes practitioners and researchers. In this case, the same articles are accessible for a wide readership, which includes, at the same time and space, both local and international audiences.

Although having the articles translated from local languages into English for a bilingual format dissemination could represent an increase in costs, and, therefore, a significant challenge for the strict budgets of national journal (Stolerman & Stenius 2008, Salager-Meyer, 2014, Petrič 2014), it provides a possible way to solve the already discussed dichotomy "opportunity-threat" related to the use of English for scientific communication.

Momen (2005), emphasizes the relevant role translation has in the context of multilingual scientific communication and points out that by using machine translation the problems regarding the high costs and time spent in the translation process would be significantly reduced. It is, however, still important to emphasize that translations should be carefully checked in terms of quality.

By considering the possibility of bilingual journals to disseminate global knowledge production, a less unequal scenario could be achieved, where multilingual scholars could still have the choice of writing in their own languages without having their production invisible.

However, there is still much to be discussed in terms of the challenges involved in the complex process of translation of scientific production.

3. CONCLUSIONS

Having presented some relevant aspects involved in publication practices in a global scientific community, it is possible to conclude that publications are highly valued within in the system of evaluation of scientific production. Considering the importance of visibility and its connection to access and citations, language can act as a barrier, since it could represent a limitation for a wider readership, isolating research from global scientific scenario.

In this context, many multilingual scholars prefer to write in English, the dominant language of science, instead of writing in their own local language. By doing so, however, local languages are less and less used for knowledge dissemination and scientific community could be one step closer to becoming a monolingual space, fact that would have serious consequences.

The circulation of bilingual journals, presenting articles in both English and local languages, is seen as a possible way of diminishing the gap between languages. Thus, translation plays a major role in this context. Pertinent questions may still be raised regarding the efficiency of such argument, since it could represent a challenge in terms of costs and quality of translations.

In the Brazilian scenario, for instance, scientific journals have been increasing the number of articles published in English in an attempt to expand the readership. According to a document published in 2014 by the most prestigious electronic library in the coun- try – the Scientific Electronic Library Online (SciELO) – articles in English should reach 85% of the total of published articles in areas such as Biology and Engineering.

In the so-called "soft sciences", however, the percentage recommended is not as high, an average of 30% of the total (Scielo, 2014). This difference in numbers might be related to the specificities of each area. Considering that fields such as social sciences and language studies, for example, analyse objects deeply-related to cultural and social aspects, which can vary greatly from one culture to another. For this reason, it is possible to argue that such areas can benefit even more from bilingual publications so that the particularities of each culture could continue to be published in local communities without the threat of linguistic isolation.

Hence, emphasized the relationship between visibility and language practices, translation emerges as a possibility to answer the demands of a globalized world without silencing local cultures and languages.

4. REFERENCES

Bennett, K. 2014. The 'butler' syndrome: academic culture on the semiperiphery. *Revista Canaria de Estudos Ingleses*, n. 69, December: 155-171.

Bocanegra-Valle, A. 2014. English is my default academic language': Voices from LSP scholars publishing in a multilingual journal. *Journal of English for Academic Purposes* 13: 65-77.

Bourdieu, P. 2002. Les conditions sociales de la circulation internationale des idées. Actes de La Recherche En Sciences Sociales : Actes de la recherche en sciences sociales, [s.l.], v. 145, n. 5 : 3-8.

Canagarajah, S. 2010. Internationalizing Knowledge Construction and Dissemination. *The Modern Language Journal*, Vol. 94, N. 4: 661-664.

Curry, M. J.; Lillis, T. 2004. Multilingual Scholars and the Imperative to Publish in English: Negotiating Interests, demands, and Rewards. *TESOL Quarterly*, v. 38, n. 4, winter: 663-688.

Ferguson, G. 2007. The global spread of English, scientific communication and ESP: questions of equity, access and domain loss. *Ibérica* 13, 2007, p. 7-38.

Flowerdew, J. 2001. Attitudes of Journal Editors to Nonnative Speaker Contributions. *Tesol Quarterly*, vol. 35, n. 1, Spring: 121-150.

Gentil, G.; Séror, J. 2014. Canada has two official languages – Or does it? Case studies of Canadian scholars' language choices and practices in disseminating knowledge. *Journal of English for Academic Purposes*, 13: 17-30.

Hamel, R. E. 2007. The dominance of English in the international scientific periodical literature and the future of language use in science. *AILA Review* 20. John Benjamins Publishing Company: 53-7.

Hyland, K. 2016 Academic Publishing and the myth of linguistic injustice. *Journal of Second Language Writing* 31: p. 58-69.

Kuhn, T. 1962 / 2017. *A estrutura das revoluções científicas*. Translated by Beatriz Viana Boeria e Nelson Boeria. Perspectiva.

Momen, H. Language barriers and translation. Implications for open access journals. Paper presented at the International Seminar on Open Access for Developing Countries, Salvador, September 2005, Bahia, Brazil.

McGrath, L. 2014. Parallel language use in academic and outreach publication: A case study of policy and practice. *Journal of English for Academic Purposes*. 12: 5-16.

Murasen, L. M.; Pérez-Llantada, C. 2014. English for research publication and dissemination in bi-/multiliterate environments: The case of Romanian academics. *Journal of English for Academic Purposes*, 13: 53-64.

Petrič, B. 2014. English-medium journals in Serbia: The editor's perspective. In: BENNETT, Karen (ed.). *The semiperiphery of academic writing*: Discourses, communities and practices. Basingstoke: Palgrave Macmillan:189-209.

Salager-Meyer, F. 2008. Scientific publishing in developing countries: Challenges for the future. *Journal of English for Academic Purposes*, 7: 121-132.

Salager-Meyer, F. 2014 Writing and publishing in peripheral scholarly journals: How to enhance the global influence of multilingual scholars? *Journal of English for Academic Purposes*. 13: 78-82.

Scielo 2014. Críterios, política e procedimentos para a admissão e a permanência de periódicos científicos na Coleção SciELO Brasil. São Paulo, set. 2014.

Stolerman, I.; Stenius, K. 2008. The language barrier and institutional provincialism in science. *Drug and Alcohol Dependence*. December, 92: p. 1-2.

Analytical and microbiological study of two 19th century ambrotypes

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ABSTRACT: The study here presented aimed to characterize two ambrotypes from the 19th century and some of their degradation patterns using an in-situ analytical approach, minimally invasive, composed by technical photography and optical microscopy under different illumination, scanning electron microscopy with energy dispersive spectroscopy coupled (SEM-EDS) and micro-Fourier transform infrared spectroscopy (μ-FT-IR). Microbiological colonization was evaluated, and the enzymatic activity of isolated fungal strains was tested. One ambrotype was produced on a ruby glass containing manganese while bitumen was used for the background on the other. Retouching of jewellery with a gold-based ink was investigated. Both ambrotypes presented several patterns of physical and chemical degradation probably due to inappropriate handling and storage.

1. INTRODUCTION

The invention of the wet collodion process in the mid-1850s by F. Scott Archer enabled the development of the ambrotype, a modification of the original process, which became extremely popular for portraiture (Maurice, 1993). Taking its name from the Greek word *ambrotos*, meaning imperishable, an ambrotype is a unique image which can neither be printed nor duplicated (Matè *et al*. 2008). It is an underexposed collodion glass negative placed against a dark surface which causes the negative to appear as a positive image (Duncan, 2009). Collodion was obtained by dissolving nitrocellulose in a mixture of alcohol and ether. Small amounts of bromide and/or iodide salts were then added to the collodion, resulting in a syrupy solution that could be easily deposited onto clean glass plates. The plate was sensitized by bathing it in a solution of silver nitrate to produce light-sensitive silver bromide or silver iodide salts and then exposed in a camera. An invisible latent image was originated and then physically made visible with a solution containing a reducing agent (developer) and free silver ions (in general, a silver nitrate solution) (Valverde, 2005). One of the first developers was a solution of pyrogallic and acetic acids. The image was then fixed with sodium thiosulfate and finally washed and dried. At last, the image was frequently varnished and then cased to valorise and protecting it. Casing an ambrotype comprised the use of a brass mat, placed on top of the image, a protective glass positioned as the top layer, and a thin preserver wrapped around them, all the items placed inside the case (Cycleback, 2011). Ambrotypes are prone to undergo degradation processes of the photographic image itself, the glass plate and the background used to back the image. Degradation can be physical, chemical and biological in nature (Valverde, 2005). Physical degradation involves structural and mechanical damage and is frequently caused by careless handling and inadequate storage or display. Chemical degradation is due to extrinsic factors that include variation in relative humidity and temperature or light or airborne pollutants exposure (Noris, 1983). A negative interaction between the materials used to produce the photograph can also occur. Collodion is also prone to biological attack; its organic constituents are potential nutrient sources for microorganisms (Matè *et al*. 2008). Microbial deterioration is related to the growth of mould spores and bacteria that can develop and disseminate on the image as well as on the support layers (Borrego *et al.*, 2010). Chromatic alterations, stains and production of enzymes and organic acids are some examples of the action of microorganisms (Lourenço & Sampaio, 2007).

Two ambrotypes from the 19th century, belonging to a private collection and purchased on eBay® from a seller based in the United States, were selected for the study. A set of minimally invasive analytical techniques was established for the characterization of

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the items and some of their degradation patterns. The methodology included evaluation by photographic imaging under different illumination, observations using optical microscopy (OM), morphological and chemical evaluation by variable pressure scanning electron microscopy coupled with energy dispersive X-ray spectroscopy (VP-SEM/EDS), and chemical evaluation by attenuated total reflection micro-Fourier-transform infrared spectroscopy (μ-FT-IR). Microbiological studies were also carried out through the isolation and identification of bacteria and fungi colonizing the items and for the latter an enzymatic study was developed.

2. EXPERIMENTAL

The ambrotypes (named A1 and A2) were probably manufactured in the United States but their specific origin or date are unknown due to the lack of documentation. Ambrotype A2 was backed with a black varnish, applied on the opposite side of the glass support while ambrotype A1 was made on a reddish coloured glass, named ruby glass, avoiding the use of an additional background. Both ambrotypes were carefully cased, including the picture itself, a brass mat, a protective glass and a preserver that hold the components together. General documentation and evaluation of the surface morphology was done by technical photography under reflected, transmitted and raking light using a Nikon D3200 camera with a micro-Nikkor 40 mm f/2.8DX lens fixed on a column stand. Optical microscopy complemented the evaluation and allowed assessing morphological features and degraded areas. A Leica M205C stereomicroscope and a Leica DM2500M darkfield microscope were used, both coupled with a Leica DFC 290 HD digital camera. VP-SEM/EDS analyses were carried out in a HITACHI S-3700 N variable pressure scanning electron microscope coupled with a BRÜKER Xflash 5010 energy dispersive X-ray spectrometer. The resolution of the EDS detector is 123 eV at the Mn Kα line energy. In order to collect X-ray emissions from heavier elements like Pb, an acceleration of 20 kV was used for EDS analyses while SEM imaging was done on backscattering mode, operating with an accelerating voltage of 15 kV. This technique supplied information on the chemical composition of photographic materials and degradation products either by point analysis or elemental mapping. The molecular characterization by μ-FT-IR-ATR was performed with an infrared spectrometer BRÜKER Hyperion 3000 equipped with a single point MCT detector cooled with liquid nitrogen and an x20 ATR objective lens (Germanium crystal with 80 μm of diameter). The spectra were acquired in the range of 4000-650 $cm^{-1,}$ with 4 cm^{-1} spectral resolution and 64 scans. For microbiological assays, samples were collected under aseptic conditions with sterile swabs placed in a suspension of transport MRD medium (Maximum Recovery Diluent, Merck), until used. The following step was the isolation of the microorganisms and their characterization. Samples were inoculated (100 μL), under aseptic conditions, in NA (Nutrient Agar) and TSA (Tryptic Soy Agar) for bacteria isolation, in MEA (Malt Extract Agar) and CRB (Cook Rose Bengal) for filamentous fungi isolation, and in YPD (Yeast Extract Peptone Dextrose Agar) for yeast growth. Cultures were incubated at 30 °C for 24–48 h and at 28 °C for 4–5 days to allow bacterial and fungal growth, respectively. After this period, the plates stayed in incubation for 20 days at the same temperature to detect slow microbial development. Fungi identification was based on macroscopic features of the colonies and in micro-morphology of the reproductive structures, observed with an optical microscope Leica DM 2500P. The enzymatic assay was performed in liquid cultures for each strain. Cultures were incubated at 30 °C and 150 rpm during 240 h in a Basal medium (100 mL of salts solution, 10 mL of CSL (Corn Steep Liquor: 5 g of xylan, 2 mL of tween 80, 0.3 g of urea) supplemented with CMC (Carboxymethylcellulose). To determine the cellulolytic activity, samples were taken from the culture at 24, 48, 72, 96, 168 and 240 h. The amount of reducing sugars released was quantified by DNS (Dinitrosalicylic Acid) technique (Miller, 1959). The enzymatic activity was expressed in specific cellulolytic activity - total protein content present in the enzymatic extract (U/mg protein). Fungus *Trichoderma harzianum* CCMI 783 was used as the positive control.

3. RESULTS

3.1 Technical photography

Photographic images under reflected, transmitted, and raking light are presented in Figure 1.

Figure 1. Photographic imaging under different types of illumination.

Both ambrotypes display abrasion of the emulsion on the edges and surface tarnishing (more evidenced on A2). The use of raking light allowed observing surface accretions, impurities and stains related to colour changes. Furthermore, transmitted light showed that the black varnish used as the background on ambrotype A2 presents reticulation, exposing the negative image above it.

3.2 Optical microscopy

Observation with stereo microscope supplied deeper information on damages and production aspects. Surface accretions, colour change and abraded areas, already noticed by technical photography, were observed in detail on both ambrotypes (Fig. 2a, 2d and 2f). OM also showed damages on the edges that are probably due to the contact with the brass mat, positioned directly over the image. Collodion reticulation is also found, particularly on ambrotype A1 (Fig. 2c). As to silver mirroring, a common pathology affecting photographic items, it can be found close to the edges on both ambrotypes, although a frame-like-structure is observed on A2, showing a more noticeable degradation pattern (Fig. 2d). Photographic retouching to enhance jewellery, a common practice at that time, can also be found on A2 (Fig. 2e), where a gold tinting was used. Microorganisms were observed generally spread on the plates with well identified colonized areas (Fig. 2b).

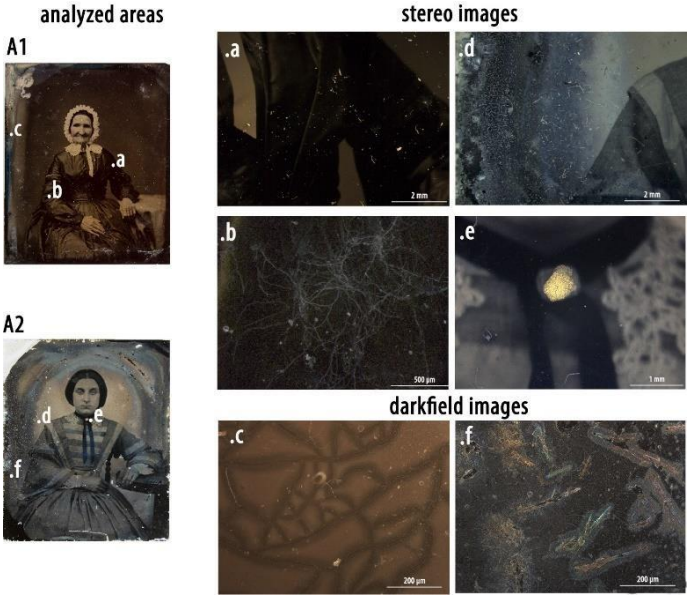

Figure 2. Detailed optical microscopic images of some degraded areas and production aspects.

3.3 VP-SEM/EDS

Some of the features found on degraded areas of both ambrotypes are presented in Figure 3. Ambrotype A1 shows scratches and gaps in the collodion layer, exposing the support (Fig. 3a and b, respectively). These areas were in contact with the brass mat which probably damaged the image causing physical disruption. On ambrotype A2, besides from gaps and risks on the collodion layer, crystalline deposits were also found in the left margin (Fig. 3d). The ruby glass used as the support for ambrotype A1 was analysed by EDS to evaluate the glass composition (Fig. 4). The matrix is a soda–lime–silica glass containing manganese (Mn), which was used as colorant, already described in otherstudies (Costa *et al.* 2018, Duncan, 2009).

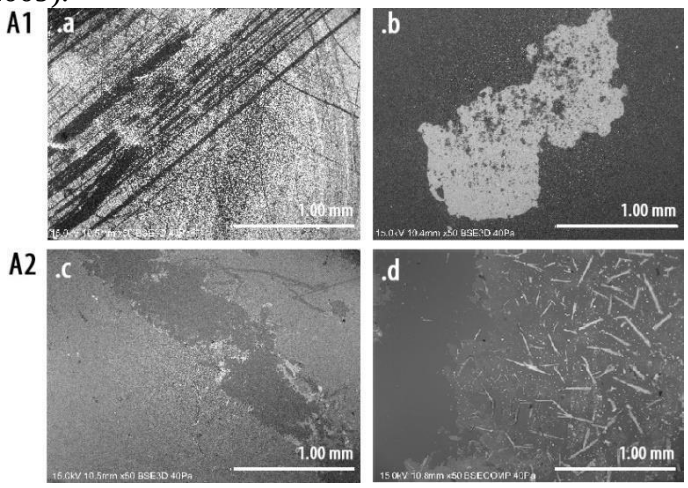

Figure 3. SEM imaging with backscattered electrons.

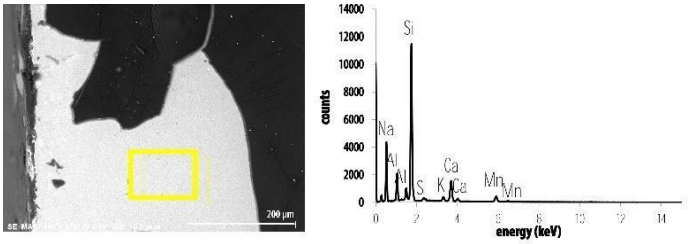

Figure 4. EDS analysis of the glass support on ambrotype A1.

One of the studied degraded areas on A2 is presented in Figure 5.

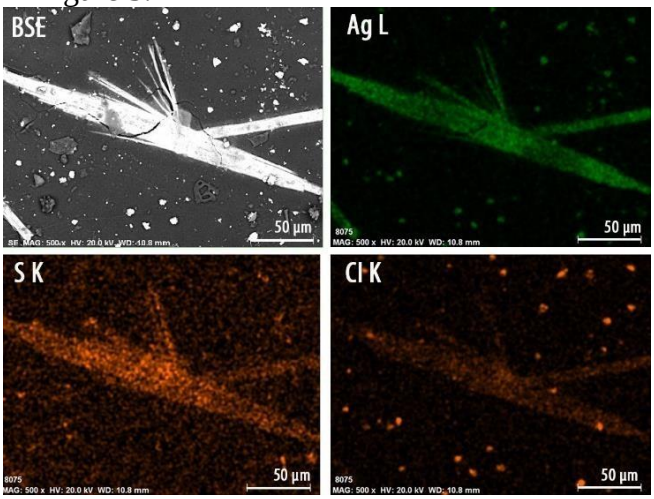

Figure 5. EDS elemental maps (Ag, S and Cl) of recrystallized silver crystals.

The EDS elemental map (Fig. 5) and the point analysis (not shown) of the larger crystals observed in the image suggested that they are a form of recrystallized silver. Sulphur overlaps partially with

silver, suggesting the presence of a silver sulphide compound. Smaller silver particles are spread around the central crystals and on these, overlap of Cl and Ag can be observed. Silver sulphide and silver chloride are common forms of silver degradation which can appear as silver tarnishing (Duncan, 2009).
The ink used in the retouching of the jewellery in ambrotype A2 was also studied. SEM/EDS analyses (Fig. 6) of necklace area confirmed the presence of gold particles on the surface of the ambrotype.

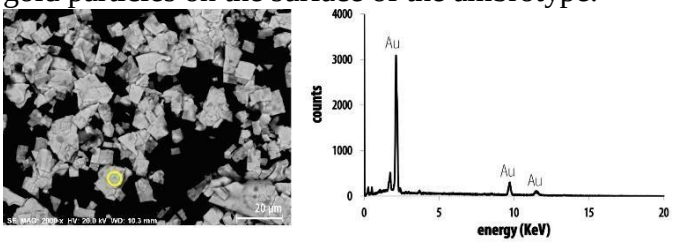

Figure 6. EDS analysis on the retouched necklace on A2.

3.4 µ-FT-IR spectroscopy

The ambrotypes were analysed in-situ with µ-FT-IR-ATR to confirm that collodion was in fact used and to search for other binders or varnishes (Fig. 7).

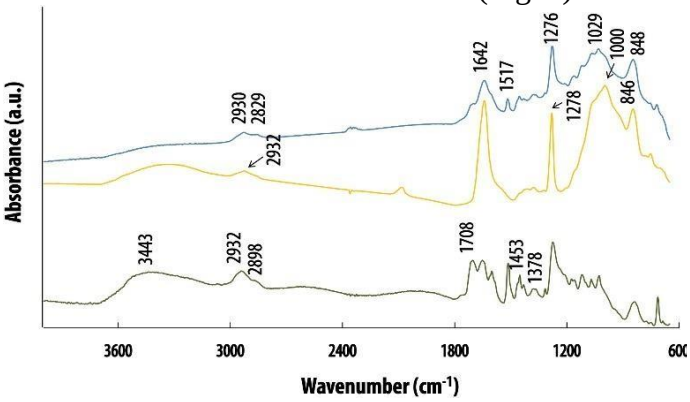

Figure 7. General µ-FT-IR spectra of ambrotypes A1 (a) and A2 (b) confirming the use of collodion as the binder. (c) refers to analyses done on the edges of A1 showing the presence of a resin.

The use of collodion (Fig. 7, a and b) was confirmed by the absorption bands at 1646-1642 cm^{-1} ($\nu_{assim}NO_2$), 1278-1276 cm^{-1} ($\nu_{sim}NO_2$), 1029-1000 cm^{-1} (νC-O) and 848-846 cm^{-1} (νNO) in accordance with the literature (Berthumeyrie *et al.* 2014). Analyses carried out on the edges of A1 (Fig. 8c) showed that an organic compound with absorption bands at 3443 cm^{-1}, 2932 cm^{-1} and 2898 cm^{-1} (ν_{sim}OH and ν CH), 1708 cm^{-1} (ν C=O), 1453 and 1378 cm^{-1} (CH_2) that can be attributed to a triterpenic resin was probably used to glue the brass mat to the ambrotype. The black varnish in the back of ambrotype A2 was analysed and the spectrum obtained (data not shown) matches the bitumen spectra in the literature (Price & Pretzel, 2009). The presence of microorganisms in A2 was also evaluated by comparing an area presenting colonization with other free of it (data not shown). A spectrum presenting characteristic absorption bands of amides I, II and III at 1648, 1546 and 1455 cm^{-1}, respectively, and attributed to the presence of microorganisms in the literature was obtained in the colonized area (Barth, A. 2007).

3.5 Microbiological study

Seven fungal strains and three bacterial strains were isolated from ambrotype A1 and three fungal strains and three bacterial strains from A2. *Penicillium* sp. was the most frequent isolated strain but *Ulocladium* sp. and a sterile mycelium (not identified) were also identified. All the isolated fungal cultures from A1 presented cellulolytic activity, with values ranging from 0.31 to 0.63 U/mg. This result showed that these fungal strains were able to produce cellulase, being able to develop in a cellulose matrix with biodeteriogenic action.

4. CONCLUSIONS

This work comprises the characterization and evaluation of different pathologies and production aspects of two ambrotypes from the 19th century. Common damages found included those related to mechanical action, as scratches and gaps, and with chemical action as recrystallization of silver particles and formation of silver compounds. Ambrotype A1 is a ruby glass where Mn was used as colorant. None of the ambrotypes were varnished although a resin was used on the edges of ambrotype A1, probably to glue the brass mat to it. A gold-based ink was applied to enhance jewellery on A2. This ambrotype was the only one backed. Bitumen was used for that and avoided that an additional background was necessary to reach the positive image of the ambrotype. The microbiological approach used showed that bacteria strains and fungal strains colonized both ambrotypes, being *Penicillium* sp. the most commonly found.

5. REFERENCES

Barth, A. Infrared spectroscopy of proteins. *Biochimica et Biophysica Acta (BBA) - Bioenergetics*, 1767(9): 1073-1101.

Berthumeyrie, S., Colin, S., Bussiere, P. O. & Therias, S. 2014. Photooxidation of cellulose nitrate: New insights into degradation mechanisms. *Journal of Hazardous Materials*, 272(2): 137-147.

Borrego, S., Guianet, P., Gómez de Saravia, S., Batistini, P., Garcia, M., Lavin, P. & Perdomo, I. 2010. The quality of air at archieves and the biodeterioration of photographs. *International Biodeterioration & Biodegradation* 64: 139-145.

Costa, L., Nunes, M., Costa, S., Trindade, M., Miguel, C., Ferreira, T. 2018. Unveiling the ambrotype: characterization of two 19th century photographs. *Microscopy and Microanalysis*. 1-11.

Cycleback, D. 2011. Judging the authenticity of photographs, In Cycleback (ed). 90-100. <http://www.cycleback.com/photoguide> Accessed November 2018.
Duncan, L. M. 2009. A Technical study of five ruby ambrotypes, Art Conservation, University of Delaware.
<https:// http://webcache.googleusercontent.com/>. Accessed November 2018.
Lourenço, M. & Sampaio, J. 2007. Microbial Deterioration of Gelatin Emulsion Photographs: A case study. *American Institute for Conservation of Historic & Artistic Works,* 12: 19-34.
Marucci, G., Monno, A., Van der Werf, I. 2014. Non invasive micro-Raman spectroscopy for investigation of historical silver salt gelatin photographs. *Microchemical Journal*. 117: 220.
Matè, D., Pasquariello, G., Sclocchi, M. 2008. Biodeterioration of cultural heritage, In Caneva, Nugari & Salvadori (eds.), *Photographic Materials*: 161-165. Los Angeles: United States of America.
Maurice, P. 1993. Ambrotypes: positively capturing the past, *Material History Review*, 38: 50-64.
Miller, G. L. 1959. Use of dinitrosalicylic acid reagent for determination of reducing sugar. *Analytical Chemistry*, 31(3):426-428.
Noris, D. 1983. The Proper Storage and Display of a Photographic Collection, In *The Book & Paper Group Annual*, 2.
Price B. & Pretzel B. 2009. Infrared and Raman users group spectral database. < http://www.irug.org.gc.ca/symposium/2011> Accessed October 2018.
Valverde, M. F. 2005. Photographic negatives: nature and evolution of processes. Rochester, USA: George Eastman House/Image Permanence Institute, Rochester Institute of Technology.

Damages caused by pressure sensitive tapes on paper artwork from the early 20th century

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ABSTRACT: The use of pressure sensitive tapes (PST) on paper documents and artworks represents one of the most complex issues for the conservation and restoration fields. This paper presents and discusses some examples of damages caused by the PST presence on a 20th century drawing collection from Fábrica Constância, nowadays belonging to the National Museum of Azulejo (MNAz). This work constitutes a first step towards a systematic identification and classification of damage caused by PST use on Fábrica Constância drawing's collection.

1. INTRODUCTION

Pressure sensitive tapes (PST) appeared by the end of the 19th century and their potential use in a multitude of applications soon turn them into a convenience for conservators. Unfortunately, for that reason, PST were too often employed on artworks as a primary solution for fixation of loose parts, tear mends and picture framing, among others. Despite their ephemeral nature, only by the end of the 20th century PST lack of long-term stability started to raise conservation concerns on their removability and long-term negative effects, especially on cultural heritage items (O'Loughlin 2001).

PST consist, in general, of an adhesive layer of natural or synthetic rubber or an acrylic polymer, and a carrier. This last element can include a variety of materials, namely foil crepe paper, cellophane, cellulose acetate and plasticized polyvinyl chloride. Apart from polymers, the plastic backings may also contain softeners, antioxidants, plasticizers and curing agents (Smith, et al. 1984, Blaxland 1994).

1.1. PST and Cultural Heritage

Despite the wide range and variety of damage caused by PST on cultural heritage, graphic documents, and particularly books and paper materials, are among those more prone to physical and chemical alterations by PST's aging due to their fragile nature. Several factors, intrinsic to the materials themselves, can contribute to this damage. The nature and quality of paper supports, which widely vary from excellent, on early hand-made papers, made solely from rags of worn linen and cotton clothing or rope and nets, to highly unstable groundwood papers, on modern times, are one of them. Moreover, other components added to improve their mechanical and aesthetic properties, like sizing, which decreases the absorbency of paper, coatings and fillers to increase strength and pliability, or even dyestuff, to alter the aesthetic appearance, worsen the situation by adding complexity to the interaction of paper supports with PST (O'Loughlin 2001, Gorassini, et al. 2016).

The practice of climate control is a relatively recent issue in museums, libraries and archives; being so, PST used in paper supports have aged naturally under unknown, and surely not controlled conditions. The damage patterns observed nowadays include colour alteration to darker and yellowish hues, shrinkage and tension creases. Moreover, when PST loses adhesion and the carrier comes loose, disfiguring dark stains can frequently be observed.

PST removal is considered one of the most demanding processes in conservation work. It can be complex or eventually precluded when the application of PST occurred over media such as ballpoint pen or typewriter inks, which can become solvated by the tackifiers and/or the plasticizer present in the tapes; or over pastel or graphite media,

composed of small particles that can be absorbed by tapes prone to cold flow (O'Loughlin 2001). Therefore, to determine the most suitable tape and stain removal methodologies, or to improve the existing ones, the first step should always consist on an accurate identification of the aged PST through a systematic assessment of the object and PST condition and their morphologic characteristics. This can be achieved by visual examination, along with photographic registration under different types of illumination schemes.

1.2. The Preparatory Drawings

According to Kurlansky (2016), drawing only achieved the status of a standard art form when paper became easily available. This happened during the Renaissance period, when the European population became increasingly interested in paper. Parchment was previously used for drawing, but in a scarce and non-systematic way because it was too expensive and too difficult to erase. At first, paper was also too expensive to be used to dash off a quick sketch but, simultaneously, it had a too low standing for serious art. By the late 15th century, a strong increase was felt in the cultivation of flax and hemp, used to produce linen and ropes, and consequently more rags were available for papermaking. The widespread availability of paper allowed the artists to freely sketch and play with the ideas before the final production of the artistic object. The use of preparatory drawings and studies as a structural factor for the final work is one of the main methodologies followed since the classical period and consequently, for the past six centuries, studying art has meant to work on paper and to learn how to draw (Kurlansky 2016, Arruda 2005).

A countless number of drawings of a wide variety of categories can nowadays be found in the collections housed in museums and other cultural institutions. Despite some relevant works of art from a specific author or epoch, the majority are preparatory drawings and sketches, frequently unfinished, and not always appreciated on their artistic value or considered as heritage. This is probably one of the reasons why it is recurrent to find them in poorly preserved state, damaged or rudimentary restored, and presenting PST to fix the support, especially when oversized.

2. EXPERIMENTAL

Six technical drawings (sample 5, 13, 14, 15, S4 and S5) from the early 20th century, belonging to Fábrica Constância and nowadays in the National Museum of Azulejo (MNAz) collection, were selected for this study. These drawings were made in different paper supports and media. Sample 5 is a fragmented corner of a pencil drawing, made from a white, machine–made, vellum paper; samples 13 and 14 are small sized preparatory drawings, drawn with graphite pencil and blue and red inks on white, machine-made, tracing papers; sample 15 is a piece from a black ink drawing on a very thin, white, machine-made paper; sample S4 is part of an oversized preparatory painted drawing, on a brown, rough, textured, machine-made Kraft paper; sample S5 is a piece from a graphite drawing, drawn in two, lighter brown, thinner and smooth textured Kraft paper leaves, attached by PST to a second support of white, thick, machine-made paper.

From this initial group of six samples, two (14 and S4) were selected for exemplifying the most frequent damages caused by PST's use while the other four underwent a more complete characterization scheme.

Visual examination of the samples was first conducted by the naked eye under normal daylight conditions to establish the physical description of the items and their pathologies. A detailed inspection with macro-photographic imaging, using a Nikon D3100 digital camera SWM ED IF Aspherical Micro 1:1 Ø 62 was carried out. Detailed inspection of the items was also carried out with optical microscopy (OM), with the help of a portable digital microscope Dino-Lite®, model AM413T-FVW, using visible light and UV radiation [four white and four UV (400 nm) light-emitting diode lights]. Colorimetric studies (L*, a* and, b* - CIE Lab space defined by *Commission International de l'Éclairage* in 1976) were performed on both the unstained paper supports and stained areas with a *Datacolor International Mercury* portable spectrophotometer. The spectrometer was equipped with a Xenon lamp and a photodiode sensitive to the 360 to 750 nm spectral range. Black and white standards were used for calibration. Illuminated CIE D65; 10º of observation angle and specular component excluded. Analyses were performed on three different points of each sample, with the average value used for data interpretation.

3. RESULTS

The main types of PST's damages observed in this collection are presented in Figure 1. They include darkening of PST's carriers with consequent visual in-terference with the drawing (a - d); tension creases, due to PST's physical shrinking of the carriers (b, d); loose carriers, that lead to drawing detachment from the second support or passe-partout (c); and a solvated effect on the drawing/writing mediums (b, d) due to PST adhesive and its components, such as plasticizers, stabilizers etc.

In cases such as that exemplified on sample S4 (Fig.1a), where PST with a good grasp was placed over a layer of gouache pigments, the attempt to remove the PST would most certainly result in further damage to the drawing, since it will lead to medium loss and superficial abrasion of the paper support.

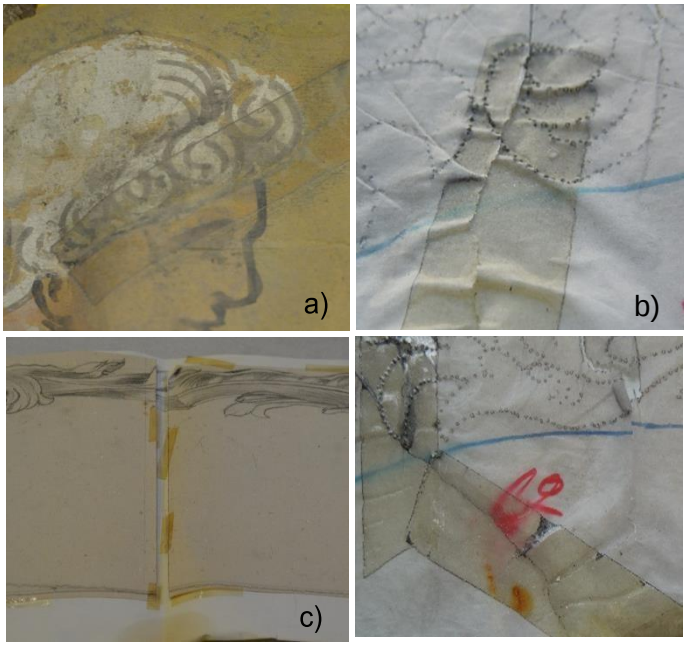


Figure 1. Examples of PST damages on paper drawings: a) sample S4 - tape disfigurement b) sample 14 - tension creases c) sample S5 - aged tapes, with loose carriers and dark obstructing stains d) sample 13 - tape yellowing and medium solvated.

Macro-photographic images under racking and transmitted light, and digital imaging under visible and UV radiation at ×48 are presented in Table 1 and Table 2, respectively. Reflected light imaging showed a heavy layer of PST adhesive's residue on the surface of samples 5, 15 and S5 and dirt adhered to the limits of those areas. Comparing to the imaging with transmitted light, the main physical alteration was an accentuated variation on papers translucency. As expected for the cellulose supports, in most of the cases, the PST stained areas presented a higher translucency, not always homogenous, but directly dependent on the amount of residue present (sample 15 and the stained area on the secondary, white paper of sample S5). In contrast, the adhesive stains on thicker, mechanical-made, heavier sized, vellum papers, showed a decrease of the paper's translucency (represented on sample 5 and on the first support of sample S5).

Digital imaging with reflected light showed the smoothness of the surface texture of the stained area and despite the apparent loss of tackiness, it was still possible to observe some spots with a glowing aspect on both papers supports on sample S5.

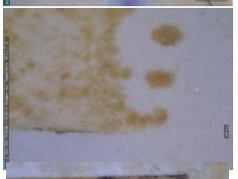
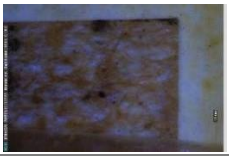
Fluorescence under UV radiation (Table 2) allowed visualizing differentiation between the stained and unstained areas. The bright yellowish colour observed on the stains can be associated to an organic origin, probably a gum, while the unstained paper supports present no fluorescence and reflect the blue hues.

Fluorescence was brighter on sample 5 and 15. The PST adhesive stains presented a brighter yellow tone on the first, while fluorescence appeared darker yellow on the latter. This can be explained due to a heavier amount of adhesive residue layer of a different origin. In sample S5 the same adhesive residue is present on both supports. On the upper support, a brown, thicker vellum paper, the adhesive stained areas showed no fluorescence unlike the stained areas on the support beneath this one that showed a bright yellow fluorescence.

Table 1. Macro-photography under racking and transmitted light.

SAMPLES	Racking light	Transmitted light
5		
13		
15		
S5		

Table 2. Digital imaging with a Dino-Lite®, under visible reflected light and UV radiation.

SAMPLES	Visible light	UV radiation
5		
13		
15		
S5		

The colorimetric studies confirmed that in overall, independently of the type of support or amount of PST adhesive residue, the stained areas registered an accentuated loss of luminosity when compared with the unstained paper support (Fig. 2). These variations were particularly notorious on the vellum papers

where the darkening caused by the adhesive can be easily observed (Table 3).

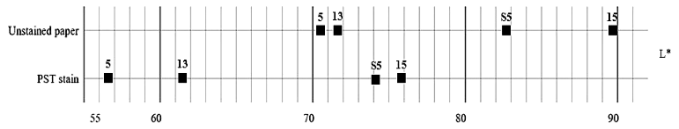


Figure 2. Schematic representation of L* parameter variation on the colorimetric study of unstained paper and PST stain areas of samples 5, 13, 15, S5.

Table 3. Colorimetrical value variation of parameter L*.

Samples	Unstained paper	PST stains	Δ L*
5	70,12	56,41	13,71
13	71,12	61,33	9,79
15	89,97	75,36	14,61
S5	82,73	74,33	8,4

4. CONCLUSIONS

Four samples of a group of six drawings from Fábrica Constância and nowadays belonging to the National Museum of Azulejo collection were studied. The aim was to evaluate the damage caused by PST use, based on morphological and colorimetric aspects.

PST stained areas presented a dark aspect, common to all the drawings studied. Other observed feature was the general increase of translucency on the stained areas. The exceptions were detected on thicker, mechanical-made, heaver sized, vellum paper supports, where translucency decreased, even when there was a high amount of adhesive residue.

Digital imaging under UV radiation allowed demarcating more consistently the adhesive stained areas due to fluorescence colour and hue degrees. Brighter colours were observed in those cases where the adhesive has not completely lost its tack properties.

5. REFERENCES

Arruda, L. 2005. Tipologia do Desenho, In Associação dos professores de desenho e geometria descritiva (eds.). *Boletim Aproged* 24; Escola Secundária Aurélia de Sousa, Setembro 2005: 11-18

Blaxland, C.L. 1994. Adhesives in an historic library – a conservator's view. Int. J. Adhesion and Adhesives 14 (2): 123-129

Gorassini, A., et al. 2016. ATR-FTIR characterization of old pressure sensitive adhesive tapes in historic papers. J. Cult. Herit. 21: 775-785

O'Loughlin, E. M., 2001. Pressure sensitive tapes and our cultural heritage. *Baltimore Proceedings*, *Pressure Sensitive Tape Council*: 225-231

Kurlansky, M. 2016. *Paper, paging through history*. London: W. W. Norton & Company Ltd.: 118 – 122

Smith, A. M., et al. 1984. Pressure-sensitive tape and techniques for its removal from paper, The Book and Paper Group Annual, JAIC 23 (2, 3): 101-113 http://dx.doi.org/10.10.16/j.culher.2016.03.005

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FBAUL | Virtual Print Room

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ABSTRACT: This article introduces the FBAUL Virtual Print Room project - bilingual (Portuguese/English) website where the Study and Inventory of the Collection of Lithography of the Faculdade de Belas-Artes da Universidade de Lisboa (FBAUL) are presented. The lithographs dated between 1840 and 1911 were used for teaching purposes at the former Academia and Escola de Belas-Artes de Lisboa and comprise the academic method of learning Drawing. The website is divided into three main sections: 1) Catalogue - database with a search engine that gives access to the Inventory of the Collection; 2) Study Room - comparative approach to establish parallels with the originals of the lithographs; 3) Mapping - flags similar engravings in archives of institutions in Europe. This project is a contribution to make the Collection in the nearest future available for research and noted on the map of European University Art Collections.

1. INTRODUCTION

The FBAUL Virtual Print Room[1] is a project currently in progress as part of our Ph.D. Thesis in Ciências do Património at the Universidade de Lisboa, Faculdade de Belas-Artes (FBAUL), under the supervision of Prof. Luísa Arruda, Prof. Fernando António Baptista Pereira (Universidade de Lisboa) and Prof. João Brigola (Universidade de Évora). The project intends to present online the Inventory and Study of the FBAUL Collection of old Lithography, which is the scope of our Thesis.

The Faculdade de Belas-Artes de Lisboa is housed in the former Convent of São Francisco da Cidade, a thirteenth-century building, where in 1836 the Academia de Belas-Artes de Lisboa was established (Calado, 2000, 2018). The building of the Convent was also chosen to lodge several institutions and their collections, which later gave origin to important Museums in Lisbon (Alves et al., 2018)[2].

Direct heir of the former Academia and its heritage, the FBAUL encompasses collections which are mostly related to teaching models and academic exercises; an Historical Archive, books, and Legacies the of the Portuguese sculptor Lagoa Henriques (1923-2009), and the architect Miguel Ventura Terra (1866-1919) (Pereira, 2011).

The Collection of old Lithography of FBAUL is partially known, however, there have been efforts to study and disclose it well as underline its relation with the method of learning Drawing at the former Academia (Arruda, 2012, 2016).

The Collection comprises over five hundred lithographs, dated between 1840 and 1911. The works are related with some masterpieces of Italian Old Masters like Raffaello Sanzio (1483-1520) and Pompeo Batoni (1708 - 1787), drawn by artists, such as Vincenzo Camuccini (1771-1844); Drawing Courses of professors of the Academia, like Joaquim Rafael (1783-1864), and French artists: Auguste Allongé (1833-1898), Charles Bargue (1826/27–1883), Jean-Léon Gérôme (1824-1904), Jules Carot (1877-?) and Josephine Ducollet (1846-1876; active).

These lithographs played a major role in the apprenticeship of Drawing at the former Academia/Escola de Belas-Artes de Lisboa, which followed the example of its European counterparts (Arruda, 2012, 2016).

[1]Presented for the first time at the International Multidisciplinary Congress «Web of Knowledge. A look into the Past, Embracing the Future», Colégio do Espírito Santo, Évora, Universidade de Évora, Portugal, 17-19 May 2018, with the following title: "Knowledge on the web: the future of the collections of prints and drawings of the Faculty of Fine-Arts of Lisbon".

[2] In the framework of the project *FRANCIS – Visualizando a «Cidade de São Francisco» de Lisboa*, a literature review was done on bibliographical references related to the study of the collections of the Convent and FBAUL, presented under the following hyperlink: https://drive.google.com/open?id=1yaDJET_6KHqmws_OqXyyqdpsKny9oN70

2. WEBSITE: FBAUL | VIRTUAL PRINT ROOM

In Europe there are institutions that have their Print Rooms[3] online: The Herzog August Bibliothek (Germany)[4]; The College of Optometrists (England) [5]; Victoria & Albert (England)[6], Ashmolean Museum of Art and Archaeology of the University of Oxford (England)[7].

The initiative to present part of the collections of the FBAUL online started with the Virtual Museum of FBAUL in 2011, an idea outlined in the scope of our master's thesis (Faria, 2009). This Museum set online the complete inventory of the FBAUL old drawing collection (Arruda & Faria, 2011; Faria 2016). In 2014 an expanded version was outlined and later developed which is currently online[8], and includes besides the collection of old drawing, the collection of etching and a virtual tour to the building of the FBAUL (Cardeira, 2014, 2015).

The FBAUL Virtual Print Room is a bilingual (Portuguese/English) website (still under construction) that presents the Collection of old Lithography of FBAUL. Its main aim is to allow users to have access online to the Inventory and Study of the Collection. The website is divided into three main sections: 1) Catalogue; 2) Study Room; 3) Mapping.

2.1. Catalogue

The Catalogue tab refers to the section where the database of the Collection is presented, which enables the users to have access to the Inventory of the Collection. The database is a search engine with fixed criteria to allow users to find works that exist in the Collection. The search can be performed using one of the following fields: Author/Artist, Drawing, Lithographer or Subject.

After the search being validated, the results convey information of the lithograph(s) regarding the identification of the Inventory Number, Author/Artist of the drawing or lithograph, Subject, Title, Dimensions, Date, and a brief Description of the work. All records presented give access to the Inventory Record in PDF format.

2.2. Study Room

Study room is a section of the FBAUL Virtual Print Room, where the lithographs are analyzed following a comparative approach - Comparative Study. The users have access to a selective group of lithographs, organized according to the subject or artist.

The Lithographs are compared with examples taken out from art treatises, or originals that served as working references, but also drawings done after the lithographs, namely from the Collection of old drawings of FBAUL. This last approach signals the relation between the lithographs and the study of Drawing, especially with the Collection of old drawing of FBAUL (Arruda, 2010; Faria, 2009, 2011). All comparative studies are accompanied with a brief explanatory text and hyperlinks to selective bibliographical references, which contribute to understand the comparative analysis proposed.

2.3. Mapping

This section considers a geolocation view regarding the whereabouts of similar examples of the Collection in archives in Portugal and other parts of Europe.

The view presented in the Mapping section flags the locations and names of archives on the map of Europe, that hold similar works that exist in the Collection. When users perform a rollover action over the spot that is flagged, a pop-up window is enabled in which the lithographs of the Collection are presented side by side with the works that exist in other archives.

3. CONCLUSION

The FBAUL Virtual Print room is a specific website that presents online, the study and research of the Collection of old Lithography of FBAUL. This project intends to align itself with the FBAUL Virtual Museum http://museuvirtual.belasartes.ulisboa.pt/; heighten the Collection of Lithography on the map of University Art Collections and by this way relaunch the museological identity of the artistic heritage of the FBAUL. Finally, contribute to support the understanding of Portuguese academic drawing, namely the method and models which were followed in the nineteenth century and the first decade of the twentieth century.

[3] Print Room refers to a location in a museum or gallery, where works in paper, related to works of Old Masters, prints (engravings, lithographs), photographs and drawings are stored or displayed. Print Rooms appeared in the circle of private collectors in the second half of the eighteenth century in England and Ireland. For further understanding see: https://www.collegeoptometrists.org/the-college/museum/online-exhibitions/virtual-print-room-gallery/antique-prints-and-print rooms.html9; and https://www.tate.org.uk/visit/tate-britain/prints-and-drawings-room/holdings

[4] http://www.hab.de/en/home/research/projects/virtual-printroom-online.html

[5] https://www.college- optometrists.org/the-college/museum/online-exhibitions/virtual-print-room-gallery/antique-prints-and-print-rooms.html

[6] https://www.vam.ac.uk/info/study-rooms

[7] https://www.ashmolean.org/western-art-print-room

[8] http://museuvirtual.belasartes.ulisboa.pt/

4. REFERENCES

Alves, Alice Nogueira, Arruda, Luísa, Fragoso, Diana 2018. O Convento de São Francisco da Cidade de Lisboa – Uma casa de coleções. *Dinâmicas do Património Artístico. Circulação, transformações e diálogos*: 215-223. Lisboa: ARTIS, Instituto de História da Arte da Faculdade de Letras da Universidade de Lisboa.

Arruda, Luísa (coord.), Faria, Alberto 2010. *Desenho antigo: na colecção da Faculdade de Belas-Artes da Universidade de Lisboa*. Lisboa: Faculdade de Belas Artes da Universidade de Lisboa.

Arruda, Luísa & Faria, Alberto 2011. Museu Virtual da FBAUL. (Retrieved: http://hdl.handle.net/10451/4280)

Arruda, Luísa 2012. Imagens do corpo na Academia de Belas-Artes: método de aprender o desenho. In Tavares, Cristina Azevedo (org.), *Representações do corpo na ciência e na arte*: Lisboa: Fim de Século, pp. 139-151.

Arruda, Luísa D'Orey Capucho 2016. A colecção de Litografia da Academia das Belas-Artes de Lisboa e o ensino do desenho In Malta, Marise e Neto, Maria João (Coord.), *III Colóquio internacional - Coleções de arte em Portugal e Brasil nos séculos XIX e XX. As academias de belas-artes do Rio de Janeiro, de Lisboa e do Porto, 1816-1836: ensino, artistas, mecenas e coleções*, Caleidoscópio, Lisboa, pp. 345-353

Calado, Margarida 2000. *O Convento de S. Francisco da Cidade. Subsídios para uma monografia*. Biblioteca d'Artes, Lisboa: Faculdade de Belas Artes de Lisboa/ Universidade de Lisboa.

Calado, Margarida 2018. *O Convento de S. Francisco da Cidade= S. Francisco da Cidade Convent*. Faculdade de Belas Artes da Universidade de Lisboa, Lisboa.

Cardeira, Ana Mafalda 2014. Museu Virtual FBAUL: Work in progress para a Coleção de Pintura. In Semedo, Alice, Nascimento, Elisa Noronha, Centeno, Rui (coord), *Atas do Seminário Internacional «O Futuro dos Museus Universitários em Perspetiva»*: 101-106. Porto: Universidade do Porto.

Cardeira, Ana Mafalda 2016. New Virtual Museum of the Faculty of Fine Arts of Lisbon: Collections and Virtual Tour. In *Connecting Collections. XVII Universeum Network Meeting*. Amesterdam.

Faria, Alberto Cláudio Rodrigues 2009. *A Colecção de Desenho Antigo da Faculdade de Belas-Artes de Lisboa 1830-1935: tradição, formação e gosto*. 4 v. Lisboa: [s.n], Universidade de Lisboa, Faculdade de Belas-Artes.

Faria, Alberto 2011. *A Colecção de Desenho Antigo da Faculdade Belas- Artes de Lisboa 1830-1935: tradição, formação e gosto*. Lisboa: Fim de Século.

Faria, Alberto 2016. The Virtual Museum of Faculty of Fine Arts, University of Lisbon. In Wolfschmidt G. (ed.), *Enhancing university heritage-based research*. Hamburg: Tradition GmbH, pp. 223-227.

Pereira, Fernando António Baptista 2011. O património artístico da Faculdade de Belas-Artes: o edifício e as suas memórias, as colecções, o arquivo, os legados, um projeto de museu. in Lourenço, Marta, Neto, Maria João (coord.), *Património da Universidade de Lisboa: ciência e arte*, Lisboa: Tinta-da-China pp. 157-172.

Unveiling the simulacri corpus sanctae. The case study of Saint Aurelius Martyr (Oporto, Portugal)

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ABSTRACT: The post-Tridentine Church promoted the cult of the martyrs' relics exhumed from the Roman catacombs by exhibiting them to the veneration of the faithful in life-sized sumptuous reliquary-images (simulacri corpus sanctae). They functioned as powerful ways of dissemination of the Catholic faith and a mean of fighting Protestantism. During three centuries, the cult of the catacomb saints or holy bodies (corpi santi) spread throughout the Christian world. In recent years, a relatively large number of studies regarding the catacomb saints and their full body reliquaries (simulacra) have emerged on publications, oral presentations, and academic research. Despite being a promising topic receiving increasing attention, these reliquaries are still largely unknown in most countries, including Portugal. An overview of the first scientific approach performed on historic textiles, the skeletal remains, and the constructive system of the 18th century reliquary of Saint Aurelius Martyr from Oporto's cathedral is presented.

1. A HISTORICAL CONTEXT

The initial period after the Lutheran and Calvinist Reformations, in the beginning of the 16th century, was marked by a certain degree of puzzlement in the Catholic world. The answer quickly arrived with the Council of Trent (1545-63), and a subsequent counter-attack, armed with the clarity and focus of its decrees (Ditchfield 2007). The fortuitous rediscovery of the entrance to an early Christian underground cemetery (*Coemeterium Iordanorum*) on a vineyard along Rome's Via Salaria Nuova, on May 31, 1578, contributed to the implementation of the cult of the martyrs' relics, stimulated by Rome (Boutry 1979, Bouza Álvarez 1990). The exploration of the Roman catacombs that followed supplied the Catholic territories with a much higher proportion of martyrs than the number listed in the official martyrologic (Ditchfield 2007). From the first moment, all those buried skeletons were considered martyrs of the primitive Church, killed during the period of intolerance and persecution that characterized the first centuries of Christianity. Therefore, the massive translation of the holy bodies (*corpi santi*) carried out from the Roman catacombs was the starting point to restore and strengthen the Roman faith and promote the exaltation of martyrdom in the next three centuries (Bouza Álvarez 1990). The exhumed holy bodies were widely distributed inside full body reliquaries (*simulacra*) to Europe and America as a message of purity, sacrifice and regeneration of the Church (Boutry 1979, Serafim 2001). In German-speaking European countries, these sacred relics functioned as powerful tools against Protestantism by replacing the relics destroyed during the Protestant Reformation (Johnson 1996).

Within the framework of the Council of Trent, the holy bodies sent from Rome were accompanied by official authentication documents (*autentica*) with detailed information on the circumstances of its exhumation. With the Constitution *Ex Commissae* by Clement X (1670-1676), dated from 1672, the official authentication documents could only be signed by the Pontifical Sacristan or the Cardinal Vicar (represented by the Custodian of the Relics and Cemeteries) to proof of the skeleton's authenticity as a genuine martyr. The entry to the catacombs would be forbidden to visitors, except for special authorization (Boutry 1979, Baciocchi *et al*. 2011, Ghilardi 2015).

In the absence of identifying elements, the anonymous saint was rebaptized (*saints baptisés*), which means that he or she was given a new name, unlike the saints with *nomine proprio* (Boutry 1979). This new name was selected under the influence of the popular saints (legitimized by the Catholic Church), a well-known ancient Christian or even a moral virtue, which led to the existence of several *corpi santi* with the same name across the four corners of Christendom (Boutry 1979, Bouza Álvarez 1990, Baciocchi *et al*. 2011).

1.1. Simulacri corpus sanctae

The holy bodies were positioned in the interior of a simulated body, representing the martyr, and made of silk, paper mache, parchment, wood or wax. In some cases, they could also expose part of the sacred remains. These full-bodies *simulacra* were ceremonially dressed in baroque clothes, as ancient Roman legionaries or virgins, and exhibited with the signs of their martyrdom as heroes of Christian life or moral models of triumph and victory over pain and death by faith. Among the iconographic representations of the catacomb saints, the body lying in eternal rest or *somno pacis* was the most efficient representation of the deserved dream of the righteous or *sueño del justo*, as described by Bouza Álvarez (1990), although the image of the martyr lying on his elbow facing the believers was also used. These *simulacra*, made with the finest materials and executed with minutiae by nuns, monks or artisans, could be assembled and decorated in Rome or at the final destination. However, regardless the place where the set was mounted, the relics were always recognized and inspected by the bishop and experts based on the authentication documents that came with the martyr's bones. This recognition was made before the public ceremony of transporting the sacred relics to the definitive place of worship. Therefore, only authenticated relics could be exposed for veneration (Bouza Álvarez 1990, Bazarte Martínez 2006). Later, the *simulacra* were displayed inside sumptuous glass shrines, especially commissioned for them, and exhibited for devotion in churches, convents and private chapels.

2. ROMAN RELIQUARIES IN PORTUGAL

In the last few years, a relatively large number of studies regarding the historical and ecclesiastical context, manufacture techniques and conservation issues of the catacomb saints and their reliquaries have emerged in publications, conference presentations, and other academic research (Pfeiffer 2005, Prader 2012, Dahan 2014, Palmeirão 2014, Kristóf *et al*. 2015, Alterauge *et al*. 2016, Reys *et al*. 2016, Ciappara 2017, Ghilardi 2017). Despite being an issue that received increasing attention in Europe and even in North America, the number of holy bodies that came from Rome to Portugal is still uncertain, as are those that survived until now. Due to the absence of the official authentication documents, the information regarding the exhumation, donation, and arrival of many *corpi santi* to Portugal is still unclear. Moreover, due to the Lisbon earthquake (1755), the French invasions (1807-1810) and the extinction of the religious orders (1834) and the mortmain prohibitions against perpetual ownership, many relics and reliquaries were destroyed, stolen or lost, or simply hidden for protection, and therefore banished from the cult. Others have been unnoticed and ignored for decades, despite their historic and outstanding artistic values.

Saint Fortunato, Saint Clement, Saint Justine and Saint Clare are some of the confirmed *corpi santi* that came from Rome to Portugal in the 18th century, assembled and decorated in natural sized figurative devotional reliquaries (*simulacra*). They are still exposed for public veneration in churches in Guimarães, Braga, Lisbon, and Oporto. Despite the lack of information regarding their mounting technique and materials, they are believed to be from Roman origin, unlike some well-known case studies in Central Europe (Pfeiffer 2005, Prader 2012, Koudounaris 2013).

2.1. Simulacri of Saint Aurelius Martyr

The *simulacri* of Saint Aurelius Martyr is one of the two 18th century remarkable examples (the other is Saint Pacific Martyr) belonging to the religious assets of Oporto's cathedral (Fig. 1). The reliquaries were exhibited on both sides of the main altar: Saint Pacific on the Gospel side and Saint Aurelius on the Epistle side (Costa 1789). They were later moved to other places inside the cathedral until the restoration works that took place in the temple in the first half of the 20th century, carried out by the General Direction of National Buildings and Monuments (DGEMN), when they were stored and forgotten for more than 80 years (Ferreira Alves 2002). On October 2012, both reliquaries arrived to the conservation and restoration centre of the Catholic University of Portugal (UCP), in Oporto, to undergo conservation works, requested by Arnaldo Pinho, Canon of the Cathedral chapter of the Diocese of Oporto.

In 2013-2015 the material, technical, and microbiological study, as well as the curative conservation intervention of the reliquary of St. Aurelius was carried out by Palmeirão (2014, 2015). Disposed in a carved, gilded wood shrine, with a glass front (Fig. 1), the full-body *simulacri* is lying on his right elbow towards the believers and is ceremonially dressed in baroque clothes with the *Chi Rho* Christogram on the chest. The holy martyr is accompanied by the attributes of his martyrdom: the blood vessel with the Christian monogram *VAS SANGUINIS*, the palm, the flower wreath, and the sword. On his left hand, in front of the palm, the inscription in capital letters: *S. AURELII M.*. The set (*simulacri* and attributes) rests on a rectangular wooden litter that allowed its displacement inside and outside of the cathedral (e.g. processional veneration). In the production of the *simulacri* a wide range of different materials – textiles, metal, paper, fabric, glass and wood – was used, making it a complex case-study from the material, technical, structural, and decorative points of view.

Figure 1. *Simulacri* of Saint Aurelius Martyr disposed in a carved gilded wood shrine.

3. SCIENTIFIC EXAMINATION

3.1. Methodology

Visual examination and morphologic evaluation were performed with a precision wire-account magnifier and an optical microscope (OM) in order to identify the textile fibres. Twenty samples of fibres were collected from the *simulacri* vests: warp and weft yarns from the fabrics, embroidery polychrome yarns and fixation yarns from the cloak and the lace from the litter. The fibres were handcrafted in small cork stoppers, which were cut by hand to obtain thin sections in the transverse direction to be observed with transmitted light. All samples were also observed in longitudinal section in order to complement the information gathered from the cross--section analysis. Conventional radiography was used to identify the presence of internal structures in the simulated body as also the location, positioning, number and condition of the bones inside it. The *simulacri* was removed from the shrine and the examination undertaken without removing its vests. A single exposure of the full body and two partial radiographs of the head and pelvis were performed.

3.2. Instrumentation

Magnification and counting were performed with a precision wire-account graduated 10x magnifier.

Optical microscopic images (OM) were obtained with a Meiji Techno binocular microscope with optical system KHW10x, Fn20, coupled with a ProgRes® CapturePro 2.7 digital camera (objective magnifier ranges from 100x to 200x).

Radiographic examination was performed with a portable X-ray ampoule YXLON®, model SMART® 160E/0,4. The X-ray tube was placed at a distance of 180 cm from the film KODAK ® AA400 (CEN C5) without additional filter Al. The parameters were as follows: 40 kV, 6 mA, 35 s.

3.3. Results

The *simulacri* vests, in baroque style, consist of 27 textile elements, predominantly in silk and flax fibres (fixation yarn from the cloak): 11 fabrics, 1 embroidery, 9 metallic laces, and 6 passementerie elements (Palmeirão 2014, 2015).

A radiographic image of the complete skeleton as it is in the *simulacri* is presented in Figure 2. This non-invasive technique allowed to confirm the existence of human bones and to assess their condition of preservation, as well as the assembly method of the bones and the internal characteristics of the reliquary. An internal metallic structure on which the remains and the vests were mounted was identified on the X-ray images. Besides the thin metallic structure of the set (red), as well as its metal reinforcements (black and blue) were detected (Fig. 3). The skeleton is incomplete and some bones were assembled in a non-anatomical position. The non-anatomical position of the skeleton was also observed on a radiological study performed by Kristóf *et al*. (2015) in Hungary. Some ante-mortem and post-mortem fractures were also observed. In the latter case, the fractures may have occurred due to improper handling, transportation and/or storage of the *simulacri*.

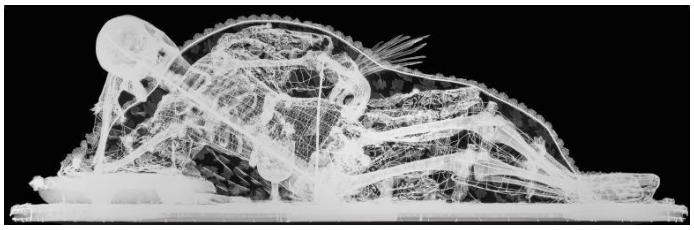

Figure 2. Radiography of the *simulacri* of Saint Aurelius Martyr.

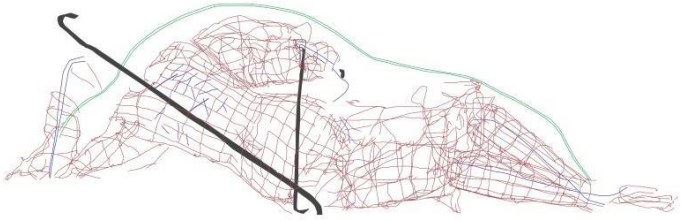

Figure 3. Internal metallic structure (incomplete) inside the *simulacri*.

4. CONCLUSIONS

After the rediscovery of the Roman catacombs in 1578, the post-Tridentine Church encouraged the cult of the martyrs' relics in life-sized sumptuous reliquaries, converted into powerful instruments of *religious propaganda*. Named catacomb saints, the thousands of holy bodies (*corpi santi*) found inside the catacombs were assembled and decorated in figurative reliquaries as soldiers or virgins (*simulacra*) and exhibited with the signs of martyrdom in glass, wooden shrines for veneration of the faithful in

churches, convents and oratories all over the Christian world. The reliquary of St. Aurelius Martyr is a remarkable example of the cult of martyr's relics in the 18th century in Portugal, as many others already inventoried. The assemblage of the *simulacri* in baroque clothes follows the common practice in Europe and it has a probable Roman origin. Indeed, the comparison of St. Aurelius with other European case studies from the 18th century pointed out the similarity of textile fibres and motifs. The radiographic study allowed to conclude the use of an incomplete skeleton in a non-anatomical position.

The research carried out on St. Aurelius reliquary focused on the material and technical history, conservation and valorisation of an 18th century Roman *simulacri* in Portugal. Accordingly, with the updated 2017 Vatican Instruction *Relics in the Church: Authenticity and Preservation* published by the Congregation for the Causes of Saints (Bartolucci 2017), it is of utmost relevance to ensure the *mise en valeur* and preservation of this religious heritage, almost unknown in our times.

5. REFERENCES

Alterauge, A. *et al*. 2016. Testing "Saintly" authenticity: Investigations on two catacomb saints. *RadioGraphics* 36 (2): 573-579.

Baciocchi, S. *et al*. 2011. La distribution des corps saints des catacombes à l'époque moderne: de Rome aux nations. In J. Zúñiga (ed.), *Pratiques du transnational. Terrains, preuves, limites*: 101-120. Paris: Centre de recherches historiques.

Bartolucci, M. 2017. *Congregation for the Causes of Saints. Instruction "Relics in the Church: Authenticity and Preservation". Rome 2017*. Available from: http://www.vatican.va/roman_curia/congregations/csaints/documents/rc_con_csaints_doc_20171208_istruzione-reliquie_en.html. [23 December 2017].

Bazarte Martínez, A. 2006. Veneración de reliquias y cuerpos de cera en los días de los fieles difuntos y todos santos. *Patrimonio Cultural y Turismo* (16): 57-68.

Boutry, P. 1979. Les saints des catacombes. Itinéraires français d'une piété ultramontaine (1800-1881). *Mélanges de l'Ecole française de Rome. Moyen-Age, Temps modernes* 91 (2): 875-930.

Bouza Álvarez, J.L. 1990. *Religiosidad contrarreformista y cultura simbólica del barroco*. Madrid: Consejo Superior de Investigaciones Científicas.

Ciappara, F. 2017. Translating "Holy Bodies" (Corpi Santi) in Malta, 1667-1795. *Historical Reflections/Réflexions Historiques* 43 (3): 1-17.

Costa, P.A.R. 1789. *Descripção topográfica e histórica da cidade do Porto*. Porto: Na Officina de António Alvarez Ribeiro.

Dahan, M. 2014. Imported Devotions: Roman Catacomb Saints in Ultramontane Montreal, MA thesis, McGill University.

Ditchfield, S. 2007. Tridentine worship and the cult of saints. In R. Po-chia Hsia (ed), *Cambridge History of Christianity: Reform and Expansion 1500-1660*: 201-224. vol. six. Cambridge: Cambridge University Press.

Ferreira-Alves, N. 2002. O tempo de Deus e o tempo dos Homens. A talha da Sé do Porto e o seu destino. In *Tempos e lugares de memória, Porto/Arouca, 5-8 Dezembro 1998*. Porto; Arouca: Centro de Estudos D. Domingos de Pinho Brandão; Universidade Católica - Centro Regional do Porto; Faculdade de Letras da Universidade do Porto - Departamento de Ciências e Técnicas do Património.

Ghilardi, M. 2015. Il Custode delle Reliquie e dei Cimiteri. *Studi Romani LXIII*: 175-210.

Ghilardi, M., pers. comm. 2016. Il martirio simulato. Fabbricazione, diffusione e devozione dei corpisanti in ceroplastica. *Le commerce des objets de dévotion chrétiens. Approches croisées (XVIe-XIXe siècles)*. Rome: École française de Rome.

Ghilardi, M. 2017. «L'artiste s'était surpassé». Medicina e reliquie in ceroplastica nella prima metà del XIX secolo. In I. F. Sermattei *et al.* (eds), *Antico, conservazione e restauro nell'età di Leone XII*: 193-210. Ancona: Quaderni del Consiglio Regionale delle Marche.

Johnson, T. 1996. Holy fabrications: The catacomb saints and the counter-reformation in Bavaria. *The Journal of Ecclesiastical History* 47 (02): 274-297.

Koudounaris, P. 2013. *Heavenly bodies. Cult treasures & spectacular saints from the catacombs.* London: Thames & Hudson.

Kristóf, L. *et al.* 2015. Condition assessment of two early Christian martyrs', St. Christine's and St. Augustine's relics with paleoradiological methods in Hungary. *Journal of Cultural Heritage* 16 (2): 249-253.

Palmeirão, J.C. *et al*. 2014. San Aurelio mártir - Estudio y conservación de los textiles de una imagen-relicario perteneciente a la catedral de Oporto, Portugal. In M. Vivancos Ramón *et al*. (eds), *Jornadas de Investigación Emergente en Conservación y Restauración de Patrimonio, Valencia, 22-24 Septiembre 2014*. Valencia: Instituto Universitario de Restauración del Patrimonio; Universitat Politècnica de València.

Palmeirão, J.C. 2015. Imagem-relicário de santo Aurélio mártir pertencente à Sé Catedral do Porto. Estudo e conservação integrada das relíquias, MA thesis, Universidade Católica Portuguesa.

Pfeiffer, A.C. 2005. Auferweckt in Herrlichkeit! Barocke Heilige Leiber in Oberschwaben. Materialien, fixierungstechniken, konservatorische aspekte, MA thesis, Fachhochschule Köln.

Prader, N. 2012. Reliquiengebeine Nur Überreste eines toten? Dekomposition, schadensursachen und konsolidierung am beispiel des katakombenheiligen Placide, Ph. D. thesis, Hochschule der Künste Bern.

Reyes, G.S. *et al*. 2016. La radiología digital para relicarios de ceroplástica: estudio interdisciplinar para identificar el sistema constructivo y la ubicación de los restos óseos. *Ge-conservación* 10: 54-65.

Serafim, J. 2001. Relíquias e propaganda religiosa no Portugal pós-tridentino. *Via Spiritus* 8: 157-184.

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Working in a global network. History and Digital Humanities seminaries between UCLM & CSIC (Spain)

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ABSTRACT: The academic training in digital skills of Spanish students in History and Humanities degrees has some shortcomings. In this context, we present the experience of a seminary organized in Ciudad Real (Spain) by the University of Castilla-La Mancha and the Spanish National Research Council. This congress has tried to fill that digital vacuum though different activities: an exhibition about the image of the History in videogames; a workshop related to online reference managers; and some conferences related to diverse applications and relationships that exist between the digital world and studying and researching in the historical field.

1. INTRODUCTION

Nowadays the use of Information and Communication Technology (ICT) by Humanities researchers and scholars implies facing methodological challenges in the development of projects and in the way of conveying the research findings. These ones must be directed towards the establishing of multidisciplinary networks among professionals of different knowledge areas. Traditional scientific standards (books, scientific papers, conference proceedings…) have been introduced in digital networks, and digital humanists (historians, in particular) need to be connected to their colleagues and the media.

2. MOTIVATIONS AND ORGANIZATION

The *History and Digital Humanities seminar* was organized by the University of Castilla-La Mancha (UCLM) and the Institute of History, with funding from the General Foundation of the Spanish National Research Council (CSIC) and was held in November 2017 at the Faculty of Arts of Ciudad Real (Spain). A few months later, in April 2018 it was celebrated other seminar complementary at the Autonomous University of Madrid (UAM).

For three days were gathered undergraduates, PhD students, professors, researchers and professionals of education and cultural management, interested in knowing the potential offered by the ICT tools applied to the Humanities.

The seminar responds to a constant concern of the organizers in the Digital Humanities, especially the application of computer tools to the research. In this sense, the seminar focusing on different approaches and functionalities that computer advances make available to students, researchers and professionals in the fields of History and Humanities in general.

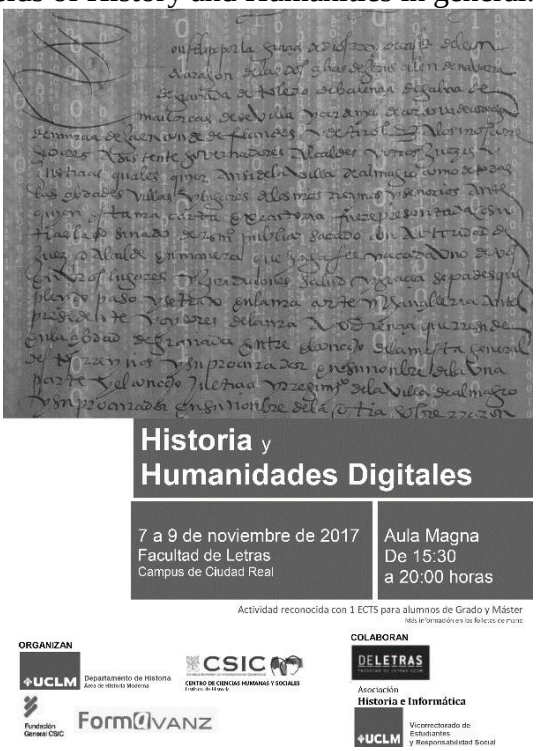

Figure 1. Seminar Poster

For a few years ago, Humanities and the digital world walk in parallel ways and today it is unthinkable the development of teaching and research tasks outside of Information and Communication Technologies (ICT). Currently, the relationship between ICT and

the humanistic dissemination is specially defined in areas such as Philology (text marking) or Geography (Geographic Information Systems, hereafter GIS). We try to add History beyond Archaeology, a discipline that came to the digital world a long time ago with the virtual reconstructions of monuments, for instance.

Also, it has been taken into account the labour reality of this time. Nowadays, the employers demanding of humanist a broad knowledge and correct use of digital tools are growing. The result of this situation is the emergence of professions such as manager and curator of digital contents (CMS) and digitizer of heritage (material and documentary). Moreover, other jobs such as expert advice in digital environments related to the world of entertainment, for cinema, television and videogame industries, are looking for products of a higher quality (Jiménez, Mugueta & Rodríguez, 2016). It is our responsibility as History teachers to reach that students get ready for the present and future, earning their living after the University.

Figure 2. The audience in a session of the seminar at Faculty of Arts (UCLM, Ciudad Real)

3. MAIN GOALS

The seminar aimed to achieve different objectives:

- To reflect on the role of historical research and dissemination in the general panorama of the Digital Humanities.
- To present some computing methodologies and to reflect on the approaches and experiences of the Digital Humanities in historical research and dissemination: databases, cartography (GIS), social networks in historical societies, as a selective approach to ICT in academic research.
- To inform undergraduate and postgraduate students about the job opportunities offered by the digital world: archaeological legacy management and dissemination, use of databases and digital repositories, digital cartography, digitization of documentary legacy, virtual reconstruction, historical counsel in the field of leisure and entertainment ...
- To introduce students into the use of search, capture and organization of digital information tools (databases, bibliographic/reference managers, catalogues, repositories...) focus on their academic works (TFG, TFM, PhD thesis).

4. THE SEMINAR: ITS DEVELOPMENT

4.1. Researching and Teaching

The theoretical part of the course included several lectures on different subjects: the *Digital History* concept; providing an example of integration of databases and GIS in an international research project; the application of social network techniques; videogames in historical settings; and the challenge and experience of teaching massive online open courses (MOOC's)

Anaclet Pons (UV) reflected on Digital History concept, its origins and evolution though history. In his opinion, the use of computer media is what defines the concept and makes necessary a new humanistic instruction and a new way of making, reflecting and disseminating History (Pons, 2013). He notices a handicap for the Digital History discourse to be accepted by the academic staff in its electronic version without the accompaniment of the traditional publication as books or journals papers.

Ana Crespo (CSIC) presented some results from the *ForSEAdiscovery project*, financed with European funds (forseadiscovery.wordpress.com). It is an interdisciplinary project, which combines underwater archaeology, dendrochronology and analysis of archive sources with databases and GIS. The aim is to identify the relationship between the political and natural behaviours in the shipbuilding process in the Iberian world and the origin of the wood used.

José María Imízcoz (UPV) talked about the methodological development of social networks in historical studies related to the Spanish 18th century. Without confusing with the current social media, he exposed the advantages or this type of research: understanding the connection of the different historical agents in the political, economic, social, religious and cultural spheres, as well as between them and the institutions (Imízcoz, 2017). Finally, he also alluded to digital projects and resources such as Fichoz, directed by J.P. Dedieu, very useful for the prosopographical and networking studies.

Juan Francisco Jiménez (UM) collaborated in the seminar with his conference and contributing the exhibition which will be presented in the third section of this point. His lecture rounded about the didactic use of videogames in the process of teaching History. Its main advantage is the educational immersion and meaningful learning trough the freedom to play and to experiment with the different sceneries of the games. The infinity number of chances turns out to be a motivation for the student, who acquires the

knowledge in an entertaining way (Jiménez, Mugueta & Rodríguez, 2016). In addition, Professor Jimenez opened and interesting job case for students related to the leisure industry and, in particular, with scientific advice in videogames companies such as IGN of Virtual War, which collaborate in his research projects. However, he recognized the disadvantages for its full implementation in the education system, especially the scarce budget of the students.

Digital resources had their place in the seminar under the guidance of Francisco Alía Miranda (UCLM). Foreground the current concern to digitalisation, the digital projects that are being developed around the world and showed a series of useful instruments for historical research, accessible in a remote way (Alía, 2016; Moreno & Martín, 2018). The lecturer differentiated three types of sources: firstly, bibliographic and reference databases, as Dialnet, WorldCat and ISOC; secondly, digital archives and libraries, as Europeana, American Memory or PARES; thirdly, virtual newspaper libraries and their old photos and films archives, as ABC (Spanish newspaper) or Fototeca del Patrimonio Histórico (Historical Heritage Photo Library)

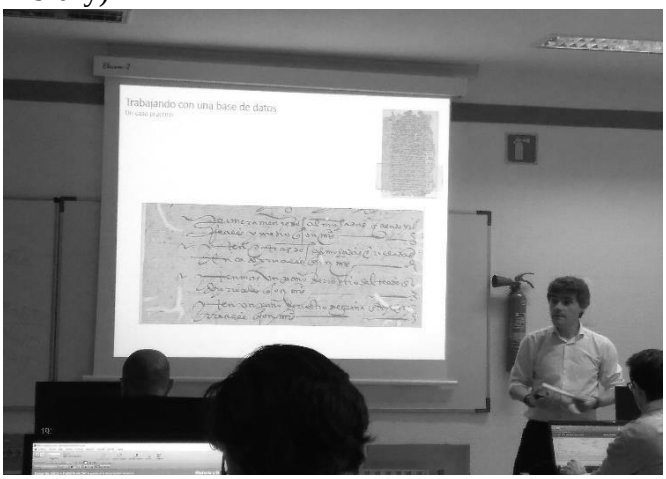

Figure 3. Lecture of prof. Moreno Díaz del Campo at UAM about the use of databases for the analysis of notarial documents.

The theoretical part of the course ended with the intervention of Antonio Rodríguez de las Heras (UC3M). The development of MOOC's and their difference with e-learning represents the educational media serving to the student. Regarding the results of the MOOC's, Rodríguez de las Heras uphold the importance of the knowledge over certifications and courses more effectives for this objective. In this way, he proposed the use of audios to resemble the interaction between teacher and student in a conversation to get better results than the current system based on readings and pre-recorded videos. In conclusion, a methodology in which didactic resources is similar to a prosthesis: something outside to the people, but ends up being part of them with the use and learning (Rodríguez, 2015).

As already mentioned, this seminar was complemented few months later in Madrid with another course at the Autonomous University of Madrid. There were practical workshops on databases application in historical research, the capture and management of information from bibliography and archive documents. There were introduced two massive databases: the prosopographic about the Portuguese Inquisition (*Sistema Prosopográfico de Análise de Relações e Eventos Sociais*) and the mentioned PARES. Also, two more presentations, the specific case of a successful MOOC dedicated to the Don Quixote age and a 3D virtual reconstruction elaborated with the analysis of historical documents, a field very developed nowadays.

4.2. Learning

The schedule included a practical workshop with immediate application. After an introduction to the academic, bibliographic and archival resources available on the Internet, we explain how to deal with them by the mean of a bibliographic management software (Zotero), for their use in academic works. This workshop is part of a series of courses organized by David Martín López and Francisco Fernández Izquierdo in Ciudad Real and Madrid every year since 2011: "ICT Application for Humanities and Social Sciences. Databases, Teaching and Researching" and "Humanities and Social Sciences Teaching and Researching with databases and bibliographic management software".

The workshop focused on the methods to locate and manage bibliography in an efficient way using Zotero, a free and open-source reference management software. It was explained the use of Zotero, different and popular citation formats (APA, ISO 690, Chicago…) and how to cite them automatically linking the manager to a word processor. The students learned a series of useful skills for their studies and their professional career: firstly, to get the learning skills that allow them to continue studying in an autonomous way; secondly, to know and use informatics media in the analysis, research and dissemination of humanistic knowledge; thirdly, to acquire a capacity to resolve problems in new or unknown environments within multidisciplinary contexts related to their area or study; fourthly, networking and suitable communication to specialists from other disciplines (Fernández, 2018).

In the same way that we explained in the previous section, in the seminar celebrated at the UAM the engineer Mª Lourdes Martín Forero (CSIC) taught a workshop on the use of GIS for the historians, as a extension of the presentation by Ana Crespo in Ciudad Real. The practical sessions introduced the students to the concept of GIS and how could be used the QGIS program (free software) for historical maps.

Figure 4. Exhibition panels at Faculty of Arts (UCLM, Ciudad Real)

4.3. Transmitting

In parallel, an exhibition dedicated to the world of videogames and Medieval History was organized. Its main goal was to show the visitor how the cultural industries, the Humanities and the teaching of History share spaces in today's society.

The exhibition was given by the research group of the mentioned Juan Francisco Jiménez. It was a very interesting complement to his lecture. It's a sample of the cultural revolution and the technological development that we have lived in the last decades, manifested in the audio-visual and leisure industries (cinema, television, videogames…)

Throughout eight panels, present the treatment of different historical topics (society, economy, culture, the war…) on videogames sagas as Civilization, Age of Empires, Assassin's Creed… The exhibition insists on the idea of the didactic efficiency of videogames though the first person participation of the student in the events of the past. More than a substitute, the videogame is presented as a complement to the traditional historical sources and teaching methodological to disseminate the knowledge of the past. The catalogue of the exhibition can be consulted on the website www.historiayvideojuegos.com

5. CONCLUSIONS

The different activities of the seminar have offered a global and interdisciplinary view of the use of digital media in the Humanities. ICT has revolutionized the learning process and has changed the teaching methodologies and content dissemination.

The evaluation surveys showed how convenient the course was. Students' previous knowledge in this matter was low or very low for half of them, being the group formed by 44 people. After the sessions, they felt the convenience of improving their training in the techniques mentioned above, even with the intention of expanding it, with preference for practical workshops and videogames. As part of the dissemination activities, the seminar itself has received mentions in journals specialized in Early Modern History and Digital Humanities.

6. REFERENCES

Alía Miranda, F. 2016. *Métodos de investigación histórica*. Madrid: Síntesis.

Fernández Izquierdo, F. 2018. Una aproximación a los instrumentos metodológicos digitales: los gestores bibliográficos. *Ayer* 110(2): 51-82.

Imízcoz Beunza, J.M. 2017. "Por una Historia Conectada. Aplicaciones del análisis relacional". *Magallánica: revista de historia moderna* 4-7: 1-9

Jiménez Alcázar, J.F. & Mugueta Moreno, I. & Rodríguez, G.F. (eds.) 2016. *Historia y videojuegos: el impacto de los nuevos medios de ocio sobre el conocimiento histórico*. Murcia: Universidad de Murcia, IGN, ed. Compobell.

Moreno Díaz del Campo, F.J: & Martín López, D. 2018. Herramientas digitales para modernistas noveles. El TFG y los recursos en línea del MECD. *Ensayos, Revista de la Facultad de Educación de Albacete* 33(1): 145-157.

Pons, A. 2013. *El desorden digital: guía para historiadores y humanistas*. Madrid: siglo XXI.

Rodríguez de las Heras, A. 2015. *Metáforas de la sociedad digital: el future de la tecnología en la educación*. Madrid: SM.

Teenagers Living Lab in Alvalade neighbourhood, Lisbon. A network for co-creating knowledge on spatial needs

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ABSTRACT: This contribution introduces the European Project C3Places – using ICT for Co-Creation of Inclusive Public Places and discusses the preliminary findings of a case study in Lisbon's neighbourhood Alvalade. C3Places addresses the question how digital technologies can be employed to engage different sectors of the community towards creating more attractive public open spaces. The Lisbon case study explores the relationship between urban fabric, lifestyles and teenagers' behaviour and needs on public spaces. In the neighbourhood Alvalade students of a secondary school are being engaged in Living Lab. The co-research approach includes interviews, field observations, study visits, design exercises and debates, and aims to empower teenagers to express their needs, ideas and values on public spaces. The Lisbon Living Lab will contribute to the creation of a network of knowledge where teenagers, the school community, the parish council and other stakeholders can gather together to co-create more inclusive and teens sensitive public spaces.

1. INTRODUCTION

1.1. C3Places and the Lisbon Living Lab

The European Project C3Places – using ICT for Co-Creation of Inclusive Public Places (H2020 JPI UrbanEurope, www.c3places.eu), addresses the question how digital technologies can be employed to engage diverse sectors of the community towards creating more attractive public open spaces. C3Places aims to explore the possibilities of ICT as a fuel to enhance the attractiveness, responsiveness and inclusiveness of public open spaces, boosting their transformation into places with a meaning for users. For this purpose, Living Labs in four European cities (Ghent, BE; Lisbon, PT; Milan, IT and Vilnius, LT) are exploring the interactions of different users' groups.

The Lisbon Living Lab is centred on teenagers, a group of users with unique interests and spatial needs. Backed up by co-creation and co-research principles the Living Lab is anchored on thematic workshops on urban planning. Several methods and tools are used to examine and explore teenagers' perceptions, behaviours and needs regarding public space use and appropriation. The urban planning workshops took place in the academic year 2017/2018 with 10th grade students of the secondary school Padre António Vieira in Alvalade neighbourhood. The collaboration with this school has a twofold purpose: 1) To interact with students under an institutional framework and to avoid the workshop sessions to become an additional workload for students; and 2) To ensure a higher participation levels as well as to minimise dropout rates, since taking part in the classes is mandatory. Fulfilling these requisites was possible since the school is taking part in a pedagogic pilot project of the Portuguese Ministry of Education "Flexible and Autonomous Curricula"[1], which gives the school greater flexibility in defining the curricular programmes for a certain number of hours.

Alvalade neighbourhood has been chosen since it constitutes a distinctive and paradigmatic exemplary of modernity and urbanity in the urban history of Lisbon. The Urban Development Plan of Alvalade was designed by the architect João Guilherme Faria da Costa in 1930-45 and aimed to control the urban expansion focussed on rent controlled housing. Alvalade is structured by large main roads and eight large concrete panels buildings developed around a central core - a school (ca. 500 meters away from those 8 buildings). Alvalade is considered an example of well-distributed functions and equipment, traffic hierarchisation and block interiors sometimes treated as common spaces (Coelho 2007; Tostões 2001; Costa 2002). Although, the only one extensive green space in the neighbourhood is the Alvalade Woods

[1] Despacho nº 5907/2017 de 5 de julho do Gabinete do Secretário de Estado da Educação. Diário da República: II série, Nº 128 (2017). Acedido a 14 Aug. 2017. Available at www.dre.pt.

(with 11 ha), there are several small yards and common/shared spaces in the different quarters. Also, large pedestrian lanes and squares, with large trees and benches are typical for Alvalade; they offer a usable and liveable public space between the large main roads and buildings.

1.2. Teenagers and Public Space

Teenagers (aged 13 to 17 years old) are amongst the more frequent public open space users. They provide the context where youngsters can gather together and interact away from to adult power and supervision, exploring the freedom to be themselves. Institutional and privatised activities favoured by contemporary parenting cultures are making this harder (Valentine 2004). Moreover, when conflicts emerging from space sharing between users of different ages are typically addressed in an adult-oriented manner, priority is often not given to children and young people. This adult hegemony on space occurs since some adults assume that attributing responsibilities to children may compromise their right to a childhood free of concerns or simply because they aren't yet able to exercise responsibilities, hence shouldn't be also granted with rights (Valentine 2004). This brings to discussion the United Nations Convention on the Rights of the Child (The United Nations 1989), that offers precisely a relevant conceptual framework to children's relationship to public space (Elsey 2004), by pushing forward concepts associated with children's participation, the promotion of their rights and raising capacity to contribute on decisions that impact their lives.

Nevertheless, reality has proven harder and public participation agenda is often imposed to rather than being initiated by young people. Engaging young people in co-creation, namely in the case of public spaces, is demanding and challenging path. On the one hand, professionals (from different areas and expertise) have little or no training in working with young people (Valentine 2004), and thus do not have a good enough understanding of how young people can fit into urban planning and placemaking. On the other hand, professionals consider that young people still lack responsibility, experience, interest, legitimacy and power (Laughlin & Johnson 2011). Despite these constraints, public spaces still play a key role on teenagers' skills, competences and lifestyles choices, public health and quality of life. Consequently, it is paramount to gain a deeper knowledge on their socio-spatial practices, needs and preferences. The Lisbon Living Lab, described in the next section, seeks to engage teenagers to build this knowledge, proving teens the context and the necessary tools to actively participate.

2. METHODOLOGY, GOALS & EXPECTED OUTCOMES

The Living Lab consisted of four workshops on urban planning that took place between February 19th and May 8th, 2018, with 49 students (aged 15 to 18) from two 10th grade classes. Each workshop comprised four sessions of 90 minutes each, amounted to 24 hours of contact. The workshops were conceived and implemented taking as reference co-research and co-creation principles and formal and non-formal education methods and tools. The workshops' tripartite aim was to enhance teenagers' spatial capacity building through: 1) exploring and discussing spatial knowledge and concerns; 2) presenting and discussing opportunities for civic participation; 3) co-production of knowledge on planning and designing public spaces. Through the co-created results, C3Places strives for gathering knowledge which may contribute and support the development of recommendations on more inclusive and teenagers' sensitive public spaces. The four themes which guided the workshops are: 1) A critical look at the city; 2) Building the city; 3) The digital era and the city, and 4) Designing a public space. The workshops are presented and discussed in detail in Almeida et al. (2018).

Both in the classroom context and out in public spaces in Alvalade, all sessions were conceived to promote interactive and stimulating activities, allowing the students to, as freely as possible, acquire enough ability to express suggestions and solutions to the activities. The activities encompassed, for example, studying, observing and recording spatial features of public spaces; structured debates; discus- sion with different stakeholders involved in building the city (local government, civil society movements and business representatives) about different opportunities for civic engagement and participation (participatory budget, grassroots movements and crowdsourcing). The workshop ended with students drawing a proposal to transform a public space in Alvalade according to their suggestions.

3. PRELIMINARY RESULTS

The process of analysing and exploring the data gained from the workshops is still ongoing. Nevertheless, some preliminary findings have been detected and are described below. As said previously, despite the advantages of organising the workshops in a school context, this also poses one limitation that needs to be taken into account in the evaluation process: The attendance at classes was mandatory, which means the participation is imposed by the school, restricting from the very beginning the teenagers' conscious act of engaging in the workshops.

It was noticeable throughout the sessions an apparent lack of knowledge regarding urban features and concepts, difficulties in spatial representations and on identifying and expressing their needs on public spaces. The students also manifest a lack of spatial/territorial references, reporting little use of public spaces, and stating a clear preference for private and indoor spaces, for example shopping malls. Therefore, they have difficulty of differentiating between public and private spaces.

It was expected to encourage students to reflect on public open spaces in Alvalade, but this goal was hard to be successfully achieved. One possible explanation may be related to the students' place of residence: 75% although studying in Alvalade live in other parish councils of Lisbon or even in the outskirts of the city. Other factors could be related to the fact that the school is located at the edge of the parish council, with few interesting places for teenagers, and the relatively recent reorganization of the parish councils in Lisbon combined with the territorial expansion of Alvalade.

Furthermore, the students also raise the question on the benefits of participation. They are aware of the temporal gap between being involved in community, civic consultations and movements and enjoying - still as teenagers - the benefits due to the long period between planning and implementation phases.

4. FINAL REFLECTIONS

Moving towards a deeper understanding of teenagers' spatial needs demands a critical look from different stakeholders' perspectives. Even though public spaces may be considered privileged arenas of debate and political struggle (Malone 2002), hence potentially participatory and inclusive, they are also sites of conflict between different users what can result in exclusion and segregation. Research has shown how teenagers are, in different contexts, deprived of using the (so called) public space, due to an age-based segregation (Lieberg 1995; Carmona et al 2003; Owens 2002; Massey 1998).

Public spaces are designed with a specific target group in mind, mostly working age adults. Consequently, it must be pondered to what extend other social groups can be taken into consideration. Power relations are prominent in interactions among distinct groups, and, from a hegemonic adult view on public spaces, where teenagers are considered qualitatively less important and dependent on adults' will and experience (Qvortrup 1994), opportunities to teenagers participate and therefore exercise influence on urban policies are restricted. Thus, when the process of placemaking is conducted leaning on participatory approaches, all stakeholders must be granted the right to contribute and be encouraged to deliver meaningful input into the decision-making process. Regarding teenagers, it is paramount to explore and understand their spatial practices to design spaces that better meet their needs and requirements and not only present solutions based on preconceived assumptions imposed by experts and professionals.

Teenagers' and children should be able to express their own requirements on urban spaces. These should be negotiated and designed with teenagers' participation in the decision-making process. It is important to bear in mind that despite the difficulties with participatory processes (who to include, required and available time and resources, motivation, permanent reconfiguration of needs, trends and behaviours) the advantages they may bring to develop sustainable spaces outweighs the limitations (Malone 2002). This makes the call to develop and try out methods and innovative procedures to engage teens in placemaking processes. C3Places is creating in Lisbon a platform where teenagers can express their views and ideas on public spaces. Yet, it seems that students involved in these workshops prefer private indoor spaces in detriment of public open ones. Sorkin (1992) discussed the phenomenon of homogenisation and domestication of public space and the substitution of those by private and commercial spaces. Also, the use of public spaces by teenagers is conditioned by the availability of suitable places in their surroundings. It is necessary to further reflect and explore to what extent these public spaces exist and are still (or not) relevant for teenagers in their daily lives, if they still constitute a privileged context for socialisation with peers and other groups. Public spaces are described by the literature as relevant for youngsters' social, cognitive and emotional development, as they offer the possibility for interactions between their internal reality/lived reality and the external stimuli surrounding them (Strecht 2011). This raises the question if these spaces of construction of social identity and of the lived experience are changing; and if they are being substituted by indoor and/or private spaces.

Another relevant dimension emerging from teenagers' discourse was the recognition of the temporal gap between their participation and the implementation of their ideas. This concern is highlighted by different authors, who stress the fact that participatory exercises usually focus on plans for the future instead of present changes (Caputo 1995). Holloway & Valentine (2003) refer precisely to policies' timescale, which can be very slow, creating a conflict with teenagers' tendency to focus on the present, hence making harder for them to recognise positive outcomes from their engagement.

This article addresses effective and innovative ways to overcome obstacles of involving young people in the participatory process of placemaking. It discusses the preliminary results of the Lisbon Living Lab. It is beyond discussion that creating more

attractive and sensitive public spaces is a key in the city making process, nevertheless this is a highly complex process, not only due to the uniqueness of adolescence, but also because the needs of other user groups must be considered, in order to avoid the development of segregated spaces.

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5. REFERENCES

Almeida I., Batista, J. S., Menezes, M. & Smaniotto Costa, C. 2018. *Adolescentes e Cocriação do Espaço Público. Oficinas Temáticas de Urbanismo 2017 - 2018. Relatório Preliminar sobre o Estudo de Caso de Lisboa*. Lisboa: Edições Universitárias Lusófonas.

Caputo, V. 1995. Anthropology's Silent 'Others': A consideration of some conceptual and methodological issues for the study of youth and children's cultures. In H. Wulff & V. Amit-Talal (eds). *Youth Cultures: A Cross-Cultural Perspective: 19-44*. London: Routledge.

Carmona, M., Heath, T., Tiesdell, S. & Oc, T. 2003. *Public Places, Urban Spaces: The Dimensions of Urban Design*. Michigan: Architectural Press.

Coelho, A. B. 2007. *Alvalade, de Faria da Costa. Uma cidade na cidade – O mistério de Alvalade I [online]*, Infohabitar. Retrieved from: http://infohabitar.blogspot.pt/2007/12/alvalade-de-faria-da-costa-uma-cidade.html. [Retrived 15 November 2017].

Costa, J. P. 2010. *Bairro de Alvalade: um paradigma no urbanismo português*. Lisboa: Livros Horizonte.

Elsey, S. 2004. Children's Experience of Public Space. *Children & Society*, 18: 155–164.

Holloway, S. & Valentine, G. 2003. *CyberKids: Children and the Information Age*. Falmer London, Routledge.

Laughlin, D. L. & Johnson, L. C. 2011. Defining and Exploring Public Space: Perspectives of Young People from Regent Park, Toronto. *Children's Geographies*, 9 (3–4): 439–56.

Lieberg, M. 1995. Teenagers and public space. *Communication Research*, 22(6): 729-744.

Malone, K. 2002. Street life: Youth, culture and competing uses of public space. *Environment and Urbanization*, 14(2): 157–168.

Massey, D. 1998. The spatial construction of youth cultures. In T. Skelton & G. Valentine (eds.). *Cool places: Geographies of Youth Culture: 120-129*. London & New York: Routledge.

Owens, P. 2002. *No Teens Allowed: The Exclusion of Adolescents from Public Spaces*. Landscape Journal, 21(1): 156–163.

Qvortrup, J. 1994. *Childhood matters: social theory, practice and politics*. Virginia: Avebury.

Sorkin, M. 1992. See You in Disneyland. In M. Sorkin (ed). *Variations on a Theme Park. The New American City and the End of Public Space: 204-232*. New York: Hill and Wang.

Strecht, P. 2011. *Uma Certa Harmonia. Notas sobre arquitectura, urbanismo e saúde mental infanto-juvenil*. Lisboa: Assírio & Alvim.

The United Nations 1989. Convention on the Rights of the Child. *Treaty Series*, 1577, 3.

Tostões, A. 2001. O Bairro de Alvalade no desenvolvimento urbano de Lisboa. In M. H. Barreiros (ed). *Lisboa: conhecer, pensar, fazer cidade: 64-71*. Lisboa: Câmara Municipal. Urbanismo. Direção Municipal de Planeamento e Gestão Urbanística. Departamento de Informação Urbana.

Valentine, G. 2004. *Public space and the culture of childhood*. London, Routledge.

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