

Authenticity and integrity in archaeological sites

P. Smars¹

¹ Department and Graduate School of Cultural Heritage Conservation, National Yunlin University of Science & Technology,
123 University Road, Section 3, DòuLiù 640, Taiwan

ABSTRACT

Materials, techniques and structural concepts of the remains in archeological sites are precious historical evidences: they are records of the technical endeavours of past constructors. These features, often hidden behind the surface, are worth of respect and protection. They contribute to the authenticity of the site. Structural interventions designed to reconstruct or reinforce the remains may unintentionally endanger authenticity. A balance has to be found between desire of integrity and respect of the fabric. Structural and geotechnical engineers, well versed in safety issues should also recognise, help to identify, document and plead for a protection of the work of their predecessors.

Keywords: archaeological sites; structural intervention, cultural value, mitigation of risks

1 INTRODUCTION

Our appreciation of an object is first and foremost the result of what is seen of it: its surface, its skin (Figs 1, 2). Cultural heritage is no exception. Of course -and luckily enough- this is only part of the story. Engineers are for instance well aware that appreciation would not be possible without the flesh and bones, hidden behind the skin and the substructures carrying the construction. The present paper advocates to technicians working on materials and structures (on what will be designated below as the "fabric") that these often invisible features (Figs. 3, 8), objects of their trade, also have a cultural value and, as such, should be elements of appreciation, respect and protection.



Fig. 1: Detail of the entablature of the Arco degli Argentari, 204 CE, Roma (Italy). Photo: P. Smars, 2017.

Contractually, the job of engineers and other professionals is to help finding solutions to technical problems. But professionals are also citizens of the society for the benefice of which cultural heritage is protected. They are stakeholders and, as such and because of their specific skills and experience, they should contribute (for ethical and/or contractual reasons)

to the definition of all the values of the built heritage and of the threats endangering it. It is in their interest, and possibly also their duty, to explain and lobby for the specific value of the fabric to the stakeholders, laymen and professionals, and to the deciders.



Fig. 2: Temple of Bacchus (2d c. CE), Baalbek (Lebanon). Photo: P. Smars, 2016.

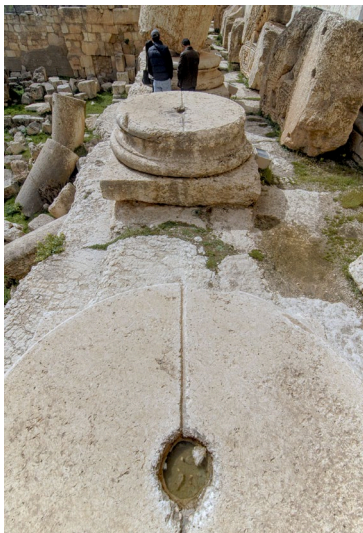
2 VALUES

The appreciation which leads society to designate certain buildings or sites as part of its "cultural heritage" is the direct result of the values assigned to these places. To be inscribed on the World Heritage List, properties must for instance demonstrate to possess an "Outstanding Universal Value" (UNESCO 2017).

This section analyse how technical interventions affect values and why and how technicians may contribute to their preservation.

2.1 In the context of built heritage

The preamble of the Venice Charter (ICOMOS 1964) states that "it is our duty to hand them on [historic monuments] in the full richness of their authenticity". This statement seems unambiguous and reasonable enough. But the text, born in a predominately European context and drawn by representatives of a professional group more homogeneous 50 years ago than today, bears traces of its biases.



**Fig. 3: South facade of Bacchus Temple, Baalbek (Lebanon).
Socket holes for dowels in the base of the fallen columns.
Photo: P. Smars, 2010.**

As the interest for cultural heritage spread, it was soon realised that many concepts were not understood in the same manner by all. Ideas were often seen as eurocentric with pretences of universalism. The concept of "authenticity" became a particular object of scrutiny.

Since then the debate is active, fuelled by the growing geographical and sociological diversity of stakeholders and by the diversity of objects liable to become "cultural heritage". Even translation was a problem (Ito in Larsen 1995). ICOMOS organised meetings to discuss "authenticity" in Naples, Bergen and finally Nara (Larsen 1995, ICOMOS 1994).

Inevitably, these discussions also bear traces of their historical context, postmodernism. But, as a result of the questioning, it is now well accepted that "authenticity" had and has different meaning in different periods and cultures (Di Stefano in Larsen 1995). In particular, it may refer to the "creator", "material", "function", "concept", "history", "ensemble", "context", "experience", "style" (Cleere in Larsen 1995, Howard 2003: quoting Ashworth). All these forms of "authenticity" then contribute to the formation of value.

The Operational Guidelines (UNESCO 2017), following the Nara Document (ICOMOS 1994) offer an interesting interpretation of the term. "Authenticity" is measured as the "credibility" or "truthfulness" of what is perceived as values. It anchors care of heritage in the

realm of ethics, something that John Ruskin (1849) already advocated: deceiving harms authenticity!

Returning to the question of values, there is no consensus about what to do practically with their diversity, relative importance, and about their level of universality or particularity.

The plurality and relativity of the values assigned to "monuments" was actually already recognised by Alois Riegl (1903). In his small and dense booklet, he defined and listed values, discussed how they are affected by interventions on the construction and how they are specifically perceived by the stakeholders. But besides these lists and definitions, his main point is arguably to recognise that requirements are often incompatible and that it is impossible to satisfy everyone.

For Howard (2003), heritage is always in dispute: between countries, religions, stakeholders. Each interested group has a specific agenda. Most often, "heritage" is a mean to reach another end. UNESCO for instance "seeks to build peace through international cooperation in education, the sciences and culture."

In this context of disparate interests, decisions are nevertheless taken and do affect the values, for better or worse. Before discussing the process of "decision making" in section 3, the "values" are further investigated in the specific context of archaeology and structural engineering.

2.1 In the context of archaeological site management

Nowadays, opinions about meaning, values and how to manage archaeological sites are not shared by all.

Giovannoni (1931), like Lassus and Viollet-le-Duc (1843) before him, was making a distinction between *living* and *dead* monuments. He argued that the later, monuments of Antiquity in particular, require greater restraint (in a line first illustrated by the work of Raffaello Stern on the Colosseum in Rome). Today, nobody sees archaeological sites as dead. They have visitors, they are managed and have an active role to play. The specificity of archeology and the urge to exerce restraint can nevertheless still be found in more recent documents. "The archaeological heritage is a fragile and non-renewable resource." (ICOMOS 1990), "The historic and scientific value of an archaeological site resides completely in the ability to investigate original material in original: this set archaeological sites apart from all other heritage sites." (ICOMOS 2017), interventions should "not compromise or destroy the physical evidence of what transpired in the past." (ICOMOS 2017), "to provide future generations with the wealth of information that they hold." Ioannidou (2006). "Conservation measures should not be invasive and be as fully reversible as possible" (Pedeli 2013). Some also argue that minimal interpretation is often good enough (Howard 2003), as any interpretation changes in time, only addresses specific groups, and creates distance.



Fig. 4: Bustan el-Khan, Baalbek (Lebanon). Post-tensioning intervention of Kalayan. See Miller (1971) for technical details and comments: "Structural tricks of cantilevered architraves and arches can defy gravity in deference to aesthetic judgement". Photo: P. Smars, 2015

This conception is more and more challenged by a very different vision, or program, giving more weight to what can be designated as the *use value*, and consequently less weight to the *historical value* (as defined by Riegl 1903). This is a natural effect, resulting from the greater consideration given to stakeholders the opinion of which is/was often disregarded: the tourists and the local population (see also Giovannoni 1931).

Holtorf (in Layton 2001) is presenting an extreme example of this vision: "Yet it can empirically be shown that visitors to archaeological sites or museum experience authenticity and aura in front of ancient original to exactly the same extent as they do in front of fakes or copies – as long as they do not believe them to be fakes or copies." If some evidence disappears, it is not a big deal because there are many archaeological sites and "it may even simulate research and interpretation if the amount of data available are limited rather than overwhelming." Further down, he states that whatever course of action is followed, archaeologists will continue to exercise their job. He then continues: "I argue that archaeological heritage management should be concerned with actively and responsibly renewing the past in our time."

In my understanding, notwithstanding the elements of truth contained in these statements, it is a modern version of *Panem et circenses* (bread and games). It also clashes with the idea of "authenticity", "credibility" and "truthfulness" of the operational guidelines.

Another proponent of decreasing the weight of historical value, Petzet ("In the full richness of their authenticity", Larsen 1995) expresses his opinion in a less cynical way: "It was certainly a necessary process for us to take heed not only of beautiful outer surfaces or of the appearance of a monument, but rather than to become concerned with material and structure, with the inner fabric that perhaps only the scientist or the civil engineer can explain to us (...). However, we should still be interested in the front as well, although certain exercises in our modern preservation cult seem to have forgotten this."

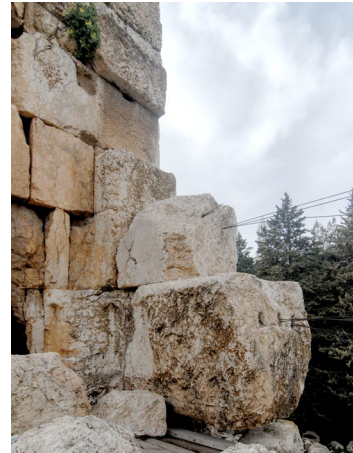


Fig. 5: Northern peripheral wall, Baalbek (Lebanon). Post-tensioning intervention of Kalayan (1960s). Photo: P. Smars, 2010.

These two opposite visions have direct implication about the way structural consolidation are perceived.

If *use value* and offering a current interpretation to visitors is given more weight, the extend and intrusiveness of structural interventions is less a problem.

If *historical value* is given more weight, structural interventions should be minimised and interfere as little as possible with the original fabric.

It has to be acknowledged that the actual condition of most archaeological sites is a living illustration of opposing programs. They all contain *authentic* as well as *deceiving* elements". This is inherent to the way they come to light. "Both excavation and restoration are destructive operations" (Wijesuraya in Layton 2001). The fact that archaeologists and conservators (to which we may add architects and engineers) approach archaeological sites from a very different perspective (Whalen, Stanley-Price and Pedeli in Pedeli 2013) may also lead to conflicts of value.

2.2 In the context of structural interventions

Structural and geo-technical engineers often have a key role in the definition of interventions on cultural heritage. The question of safety is clearly of paramount importance. This aspect related to the mitigation of the structural risk is discussed in section 4 (and more in detail in Smars 2012).

The present section is concerned with the technical dimension of the cultural value of the fabric.

Among the 10 criteria used by UNESCO to assess whether a property has an Outstanding Universal Value, criteria 1 to 4 may benefit from contributions related to technique, construction and engineering. In the Operational guidelines (point 82, UNESCO 2017), the *authenticity*, necessary to achieve an Outstanding Universal Value depends among other criteria of the *truthfulness* and *credibility* of "material and substance", and "traditions, techniques and management systems". This is related to "authenticity" as discussed above.

Fig. 6: Temple of Hera I ("Basilica") (~550 BCE), Paestum (Italy). 19th c. reinforcement of the architrave of the central columns of the naos. Photo: P. Smars, 2017.

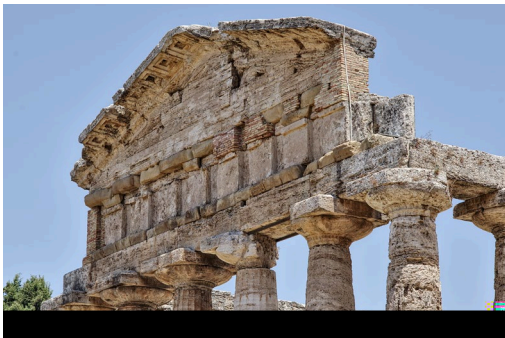


Fig. 7: Pediment of the Western facade of the Temple of Athena (also called "temple of Ceres", ~500 BCE), Paestum (Italy). Interventions of Bonucci in 1828 (brick masonry) and Maiuri in 1926 (metallic bars under the architraves) (Cipriani et al. 1991). Photo: P. Smars, 2017.

The ISCARSAH charter of 2003 (ICOMOS 2003) emphasises that "the value of architectural heritage is not only in its appearance, but also in the integrity of all its components as a unique product of the specific building technology of its time", that "the distinguishing qualities of the structure and its environment, in their original or earlier states, should not be destroyed" and that "each intervention should, as far as possible, respect the concept, techniques and historical value of the original or earlier states of the structure and leaves evidence that can be recognised in the future" (Fig. 4-9). The charter uses the term distinguishing qualities, another document, the annex on Heritage Structures of ISO 13822:2010 uses character-defining elements. The recent restoration interventions on the Parthenon invoke these principles: "respect for the original structural system of the monuments", "preservation of the original structural function of the architectural members" Ioannidou (2006).

Engineers may not be trained to look at these aspects. As far as I am aware, geotechnical engineers in particular do not seem yet to be very much interested in the history of their trade (other than the history of the theory). In the last International Conference on Construction History (Wouters 2018), only two papers were related to substructures (on a total of about 180).

This is a shame as many problems of historic buildings are foundation related. Studies on historical foundations are rare and papers discussing the respect of their authenticity are exceptional (Iwasaki 2013, Iwasaki 2013b).



Fig. 8: Borobudur (9th c. CE), Indonesia. Dovetail socket, assembly marks and indented joints. Photo: P. Smars, 2014.

The evolution of the engineering profession, confronted with an uncertain natural environment, lead to the development of materials, structural elements and concepts of design meant to better control the outcome. The education, mindset and solution proposed by engineers are naturally following the same path.

But, in history, the context changed and, experience showed that, what is good today may not be compatible with what was built in the past. Archaeological sites paid a heavy price to the confidence given to concrete and steel (Fig. 9, 10). The interventions of N. Balanos on the Parthenon between the end of the 19th c. and the beginning of the 20th c. are possibly the most famous example of over-confidence in new technology.



Fig. 9: Propylaea (3d c. CE), Baalbek (Lebanon). Intervention of Kalayan (1960s). Photo: P. Smars, 2010

The growing incitation to respect the original fabric has both a cultural and a technical origin. One consequence is the multiplication of de-restoration interventions, at the Parthenon and elsewhere. In Agrigento (Sicily), for instance, the Greek archaic fountain showed structural problems since its discovery. In the 1980s, the block masonry structure was sewn by a net of metallic bars. But this measure was ineffective as it did not address the hydrogeologic and geotechnical origin of the problem. A de-restoration was decided and in 2002, 142 cores were drilled in the stone ashlar to

remove the metallic bars from the structure (Santoro 2014). The operation lead to some losses, an unfortunate and unavoidable consequence of having to deal with a restoration neglectful of reversibility (or retreatability, Van Balen et al. 1999).

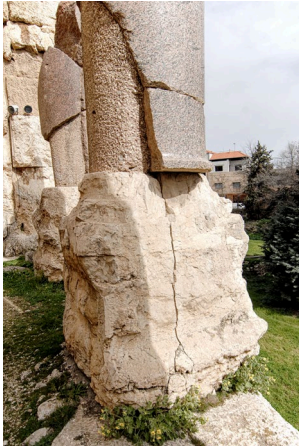


Fig. 10: Detail of a column of the Propylaea, Baalbek (Lebanon). Photo: P. Smars. 2010.

3 DECISION PROCESS

Evaluations are necessary: resources are limited and conservation is fundamentally about choices of what is going to be preserved, based on significance (ICOMOS 1990), and how to proceed.

Henry Cleere (Larsen 1995) concludes his paper on "the evaluation of authenticity in the context of the world heritage convention" by stating "ICOMOS recognizes that it would be unrealistic to believe that this evaluation could be reduced to a mechanistic point-scoring system that would inevitably be arbitrarily values."

This is a common view and, at first sight, a reasonable assumption. The same could be said about the evaluation of values. In another context, how can the relative importance of healthcare and education be weighted? This is obviously impossible! Nevertheless this is made by every government in every country. This is their responsibility, power and burden. They allocate money, time, personnel, means to accomplish tasks, all specified in numbers. This may not be consciously a "point-scoring system" but it is a "value system", hopefully tempered by competence, legitimacy and accountability. In this process, every factor is measured (with various level of objectivity and integrity). The fact that some decisions may be taken by committees does not alter the analysis.

This condition is not the prerogative of politicians. Everyone, at each level of responsibility and power, bases his actions on factors ranging from very objective to purely subjective. Everyone is also somehow representing a group (people caring about the authenticity of the fabric for instance).

It has to be noted that measurements may have various flavours or levels (Stevens 1943). Looking at

values: at a first level, values are *identified*, at the second level they are *ordered*, at the third level, their relative importance is quantified and at the last level they are quantified in absolute term. Each step often involve greater uncertainty and more subjectivity. But, depending of how compatible values are, it will nevertheless be necessary for deciders to give numerical content to the measurements. This is done formally or, as it happens most often, informally (in a process engineers call "engineering judgement").

It seems legitimate for them to search for an optimum course of action. This optimum is related to the values assigned, and to their measurement, tainted by uncertainty and subjectivity (and possibly competition). The objective is to minimise the risk of loosing values in time (which will affect them whatever course of action is chosen). Space willing, a discussion of principles of ethics, good governance, game theory and bayesian decision theory may have been useful at this stage.

Looking now at the specific role of the engineer, the most likely situation for him is to be hired to work on a building or site already tagged as having cultural importance. His responsibility is to provide to the team and to the decider(s) elements of appreciations. The ICOMOS ISCARS AH charter (ICOMOS 2003) offers many helpful guidelines (best read in the original). As an illustration of the process of decision, five necessary tasks listed in the document are extracted: identify problems and their causes, evaluate safety, quantify the benefit and harm of proposed information, monitor the effect of the measures, explain the process in a report. These are measurements in the sense discussed above, all meant to facilitate processing by others: emphasising clarity, conciseness, and quantitative evaluation (of safety and benefit).

But, as explained in the introduction, besides these tasks, engineers have also to embrace their conditions as stakeholders. The identified values may not always be easy to defend, as they may be invisible or only apparent to the eye of the specialist, but if they are documented, publicised and defended, they are more likely to be protected.

4 RISK MITIGATION

It is assumed that the target of an intervention is to reduce the risk of loosing values. Values are vulnerable to hazards. Risk is related to uncertainty: the evaluation of hazard, vulnerability and values is contingent to randomness, lack of knowledge and divergence of opinions.

Hazard is often difficult to control but can be more accurately defined, taking into account the specific location, geological condition, monitoring of the water table, etc. This may not lead to lower risk estimates but it reduces uncertainty.

Having recognised the authenticity of the inners of

the fabric as a value, it is logical to try to avoid intrusive and deceitful interventions. This attitude is also consistent with the protection of historical value, also cared by archaeologists. Furthermore, it is a way to insure, that interpretation does not compromise data more than necessary.

A better estimation of the vulnerability of the structure may also lead to a reduction of uncertainty, possibly preceded and informed by a period of deformation monitoring.

Non-structural mitigation techniques are worth considering, especially in archeological sites. They may consist in limiting the number of visitors and the zones accessible, in improving documentation (knowledge is a value and documentation may facilitate reconstruction in case of disaster) or even in accepting a higher possibility of collapse, but being prepared for it.

The concepts of working life, ultimate and serviceability limit states at the centre of the work of structural engineers are worth revisiting when dealing with archaeological sites. *Working life* may be replaced by a deadline for a new evaluation (CSLP 2008). Limit states, meant to protect life and investments, are also possibly not perfectly suitable. Collapse for instance does not necessarily imply a loss of life. And serviceability is not an issue. In an archaeological context, displaced or collapsed structures often have actually experienced such fate in the past.

When structural mitigations measures are decided, they should be devised with the aim of not deceiving. If they alter the structural concept, they are better if they are external to the fabric. If they do not alter the structural concept, hiding them is less a concern.

Divergence of opinions are likely to concern values. Information is an important factor. The non-existence of risk-zero situations and the fact that all expectations cannot be met have to be explained. An early involvement of all the stakeholders may help.

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