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Archaeology and remote sensing technologies: (un)happy couple with prospects?

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INTRODUCTION

Remote sensing technology has penetrated into archaeology with increasing boldness and has gradually taken over archaeological thinking. One could ask why: Is it that these new methods and sophisticated technologies are seen as enhancing the study of the past?

The growing interest in noninvasive methods in archaeology is largely due to the Valetta Convention, which highlighted the destructive nature of excavations and underscored the need for protecting archaeological heritage *in situ*. The dilemma that archaeologists faced was whether to dig and collect empirical data for the purpose of learning about the past, but destroying (in a sense) the object of research in the process, or to desist from digging, shutting off any chance at developing knowledge about past societies. Noninvasive methods, already known at the time, offered a third opportunity: empirical data (of a different kind) could be obtained without destroying the heritage. Tying archaeology in with technology can be assumed to be the road to success, guaranteeing progress in the process of learning about the past.

This optimistic view is voiced frequently in analyses of modern trends in archaeology. Technology is present in archaeology not only at the stage of data collection in the field, but also in analytical pro-

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cedures (e.g., archaeological science) and at the level of data management (e.g., GIS). Jeremy Huggett (2015: 87) has encapsulated this thinking as follows:

"Archaeology sits on a cusp between the humanities, the social sciences, the 'hard' sciences, and the biological and material sciences, and this interdisciplinary character has fostered a wide-ranging set of methodologies and a highly critical approach to data collection and to methods of machine-based processing, manipulation and interpretation."

TOWARD A CONCEPTUALISATION OF REMOTE SENSING TECHNOLOGY IN THE SCIENTIFIC DISCOURSE

In my thinking, Huggett's optimism is unfounded considering the practice of remote sensing technology applications. Let me start with the question of what is technology (remote sensing technology in our case)? Referring to Martin Heidegger, one could assume that technology is directed at *discovery* using means offered by the nature sciences (Warzeszak 2002: 235). The discourse at once opposes naturalism and anti-naturalism in science methodology (Rączkowski 2011) and has far-reaching consequences for the nature of research questions and methods of solving cognitive issues. The naturalistic approach assumes for one that technology is neutral, value-free (e.g., Heidegger 1977; Huggett 2012). It offers data collection and analysis (perhaps even being restricted to a description, presentation of results), leaving the process of interpretation to the last stage of the research. Thus, remote sensing technology is commonly considered as a means of getting information about the world, the ancient world in this case. However, it can and should be treated also as a means of communicating scientific results, indeed a rhetorical form of the discourse about the past. This opens the way to a discussion of how the world is visualized, to semantic issues etc. (e.g., Barthes 1995a; 1995b). The question that arises, however, is: Are we telling the audience about the past that is 'behind' the visualization? Or do we leave the audience alone with the generated image?

The communication aspect of remote sensing technology gives the opportunity to consider its role in the modern world (the world of the archaeologists as well) from a tetrad-analysis perspective (McLuhan, McLuhan 1988; Sui, Goodchild 2003: 9). According to the four laws of McLuhan, modern technologies: 1) enhance/intensify selected aspects of actions taken by individuals or social groups within specific cultures; 2) make obsolete certain skills of individuals or social groups; 3) retrieve social activities that have already been pushed to the margins of social practice, and 4) reverse into an opposing form, when taken to the limit (Fig. 1). Here is not the place for a detailed discussion of all of the effects identified by McLuhan, but I would like to focus, even if in a restricted scope, on the first and second ones.

DATA AND THEIR VISUALIZATIONS AS 'ENHANCEMENT' OR 'OBSOLESCENCE'?

Remote sensing technology has broadened significantly our capacity to obtain specific forms of data, which can be interpreted through their connection with past human actions or formation processes. Data procurement and processing methods allow for various analyses (often spatial) and modeling. Moreover, the process of working with the data can liberate specific emotions and engage the researcher, reaching far beyond the pure application of sophisticated algorithms.

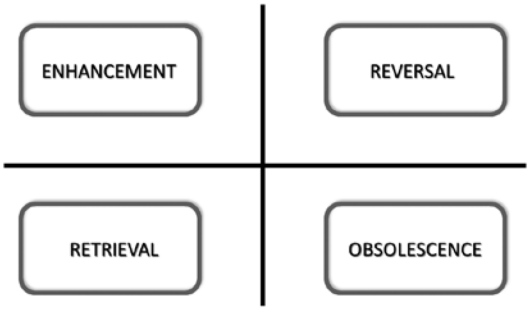

Fig. 1. Tetrad-analysis model according to McLuhan's laws

Data are not persuasive by nature, hence visualizations take on different form are as a rule the depending on the consequences of the processes applied to their analysis. They (visualizations) are the end effect of research procedures as a rule. They lead to the 'black box' effect (second law of McLuhan), eliminating many thought processes and concentrating on *doing the thing right* instead of *doing the right thing* (Sui, Goodchild 2003: 11). On the other hand, the persuasive side of data visualization leads to a fascination with remote sensing technology potential and has its part in fetishizing technology in archaeology (Huggett 2015). Snowballing new technologies, computer software, suggested visualizations (devoid of a deeper narration as a rule), which are the 'black box' effect, may be referred to as the 'locust of information' (Lem 1996). This creates a situation in which access to extended content (visualizations) is not tantamount to its assimilation owing to limited attention-focusing capacity (Szpunar 2013: 113). These aspects of remote sensing technology (and visualizations) are linked to Heidegger's view that the greatest threat of this technology is shaping attitudes whereupon technology is treated as providing the obvious solution and alternative solutions are no longer sought (Sui, Goodchild 2003: 13).

REMOTE SENSING TECHNOLOGIES AND ARCHAEOLOGY

Remote sensing technologies have been present in archaeology from the start (first use of aerial photographs at the turn of the 19th century). Their application depended on acknowledged theoretical ideas (Rączkowski 2002), but they owed their popularization to processual archaeology and the associated systems theory. Within this trend, remote sensing methods were supposed to provide a scientific explanation of phenomena from the past. The approach to data and methodology in processual archaeology, as well as in cultural–historical archaeology which preceded it, was indicative of a naturalistic approach, meaning that methods were value-free and so the data supplied were consistently neutral. Both trends also accepted a technological determinism (e.g., Huggett 2012) observed in a fascination with and dynamic development of 'archaeological science', GIS applications, etc. In practice, the application of remote sensing technologies reflected the conviction that questions about the past

and its reconstruction would be answered by a sheer application of data technology. Data description/visualization was frequently considered a sufficient result. To cite McLuhan again, cultural-historical archaeology theory and critical reflection made obsolete in the discourse on both the data and the past. In consequence, the popularization/cementing of the practice of using remote sensing technology in archaeology has effectively kept us conceptually in the 1930s. New and refined technologies do not change in essence the ways in which we think about archaeology and about the study of the past, because we have not ceased to use the same cognitive categories (see also Michalik 2014).

CONCLUSIONS

From my point of view, it is essential to part with a naturalistic approach to remote sensing technologies and to take critical measure of the data, their processing, the analytical processes and the interpretation. The challenge is to think beyond technology (tools). Critical approaches have appeared in many fields associated with computer technology and even remote sensing (e.g., GIS - Lock 2001; Digital Archaeology - Huggett 2015; aerial archaeology - Rączkowski 2002; Brophy, Cowley 2005; LiDAR - Opitz, Cowley 2013). The debate in these circles postulates a metaphoric application of archaeology to learning about what lies behind the facts/data (see also Banaszek 2014), deconstructing the 'black box' and observing the cultural embroilment of the researcher in the cognitive process. Cultural embroilment of the research process also calls for a broader range of questions. We should be asking not only about the nature of the data or the limitations of the method, but also what we are doing, how and why, how we present and communicate what we are doing and how others understand what we do.

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