Digital Place, Cognitive Space

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To what extent does our use of digital devices to capture and process archaeological data affect our perceptions of what was there? Mark Altaweel (2018) has recently asked a similar question in relation to GPS technologies – how do these affect our understanding and experience of place? He suggests that they diminish our sense of place and experiences that we might otherwise have as we navigate according to their recommendations. Certainly, satnavs are notorious for taking our navigational cognitive load upon themselves and consequently leading drivers who are insufficiently aware of their surroundings into undesirable, even dangerous situations. We might think that the human cognitive load that is thereby freed up by such devices ought to be capable of being diverted into more useful, more extensive, areas – we literally have the space to think about bigger and deeper things as a consequence of their application. This kind of argument frequently arises in relation to the value of automation, for instance, and can be seen in the kinds of discussions surrounding the use of structure-from-motion photogrammetric recording on archaeological excavations, for example. But is this supposed release of cognitive space an unalloyed good? Or is this a case of the technologies distancing us from the physicality of the archaeological material and space in front of us?

For example, James Taylor *et al.* (2018) discuss how the use of tablets on an archaeological site removes the physicality of graphical recording and in the process facilitates a detachment from the physical remains, describing it as a 'digital wedge' inserted into the interpretative process. Likewise, Colleen Morgan and Holly Wright (2018) have examined the impact of digital drawing on archaeological practice: they observe that there has been little examination of the cognitive work involved (2018, 146) and in its absence suggest architecture as a proxy. They conclude that digital tools do not easily replicate traditional methods and hence "a complete abdication to digital recording should be a matter of intense consideration" (2018, 147).

Can work surrounding GPS technologies similarly act as a proxy to consider the effect of digital technology on archaeological spatial cognition? Mark Altaweel points to research that shows there are brain changes associated with the use of GPS (and augmented reality) which might affect perception, and suggests that

> … we might be changing our cognitive abilities by over dependence on technologies such as GPS and AR in ways that could be have a long-term impact on us, although the extent of that impact is currently unclear.

So examining the effects of GPS use might shed light on both spatial archaeological knowledge in general as well as the archaeological use of virtual/augmented realities.

A range of studies look at how we offload our thinking to technologies: for example, Barr *et al.* (2015) show how what they call effortful analytic thinking can be replaced by a reliance on fast and easy intuition as a consequence of technological use. Users resort to their smartphones in the face of uncertainty rather than engage in more analytical thought in what is called 'cognitive miserliness' (Barr *et al.* 2015, 474), where comparatively effortless intuition is equated to higher smartphone use in preference to costly analytic thought. More specifically related to GPS navigation is the question of cognitive mapping, where evidence suggests that the quality of a cognitive map is greater when using traditional methods (hand-written notes, sketches, paper maps etc.) than using navigation systems, where fewer scenes were remembered, recall of landmarks is limited, and consequently simpler maps were drawn from memory (Burnett and Lee 2006, 415). Typically, GPS users display poorer topological understanding, with worse appreciation of layout and routes and poorer estimation of orientation and distance (Ishikawa *et al.* 2008, 80). Consequently, using such technological devices

> supports only a reduced, disembodied understanding of landscape, hinders the development of cognitive maps, and results in poor reconstruction and memory of the environment (Leshed *et al.* 2008, 1675).

What seems to be significant is that the need for human spatial processing is reduced by automated navigation which inevitably leads to poorer spatial knowledge, in contrast to the active learning entailed in traditional methods which result in better spatial survey knowledge (Münzer *et al.* 2006, 306). This certainly correlates with my experience teaching students surveying: for example, a total station can be used by rote, but unless there is understanding of the underlying principles, recognising when errors occur and knowing how to correct them can be problematic amidst what can easily become an automatic detached process. It is the active engagement of the user in the navigational process which positively impacts on spatial knowledge acquisition (Parush *et al.* 2007, 250-1), whereas technological solutions allow the user to disengage and consequently acquire a partial knowledge of their surroundings at best:

> When a participant is actively engaged in the environment, they are stimulated or motivated to learn and gain knowledge about the space in which they are moving. A mobile map with

> automated position information (i.e., self-localisation) essentially enables and possibly even encourages someone using it to switch off and to become the passive receiver of information, and as such does not support learning in a constructive manner. (Willis *et al.* 2009, 108).

An outcome of this is the development of cognitive discrepancies between real and represented data giving rise to differences in perception, accuracy, attentiveness, and engagement.

This is not to offer a blanket argument against the use of such devices: after all, various studies of GPS navigational use have somewhat ambiguous results, and – as several note – whether traditional or automated methods are used, both ultimately result in successful achievement of the goal of getting from A to B, which allows some to see the use of GPS devices as offering freedom and new opportunities for engagement (e.g. Leshed *et al.* 2008, 1675) rather than creating distance from their surroundings. Nevertheless, the evidence does point to a cognitive shortfall in the perception and appreciation of spatial settings when using digital GPS devices such as satnavs, and this needs to be considered in the context of digital recording and spatial interpretation, as well as in relation to experience of virtual environments. Furthermore, if these digital devices do indeed release opportunities for additional archaeological analytical and interpretative engagement, then we need to be sure to embrace them, rather than see the time and energies so released simply used to gain economic benefit. So, to echo Colleen Morgan and Holly Wright (2018, 147), the use of these digital devices in spatial data recording should be a matter of intense consideration.

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