

The Wisdom of the Crowd: Developing Crowd-sourced Interpretations of Landscape

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This paper discusses a crowd-sourced interpretative methodology for landscape study. First it introduces crowd-sourcing, giving a brief description of crowd-sourced interpretation. Next it details the theoretical background which led to its development before discussing the method in more detail, including ways in which it can be refined and the potential pitfalls for using it in archaeological research.

Crowd-sourcing is a method of obtaining funding or labour for a project from members of the public. Each individual will usually make a small contribution of money or time, amassing amounts which exceed what may be available through traditional means. When contributing time, this may be carrying out simple manufacturing tasks that need to be performed many times over, or it may be more complex intellectual tasks which require the sort of analysis and pattern recognition which humans excel at, but which are difficult for computers to achieve. A prime example of the latter is the Galaxy Zoo project in which members of the public classified over 300 thousand galaxies from telescope images via a website (www.galaxyzoo.org).

Current approaches have made use of people's labour, whether physical or mental, to undertake repetitive tasks which could be done by anyone and any number of participants, so long as a sufficient amount of work is completed. Crowd-sourced interpretation is slightly different however; it makes use of an individual's perceptual and mental abilities, and importantly, their differences. The benefit of using the crowd here is not a large homogenised workforce, but having access to a large number of unique individuals, each with their own influences and ideas.

This method makes use of what is known as the 'wisdom of the crowd'. It has been found that the aggregate of individual's responses to a problem are better than the majority of individual solutions, even those from experts (Yi *et al* 2012). This means that taking interpretations of visuo-spatial relations such as orientation, proximity and placement from a large number of people, may result in a better interpretation than that given by any lone researcher. Making use of many members of the public also serves to reduce the effect of bias; no individual's idiosyncrasies will have a large effect, and the self-reinforcing bias inherent in academic disciplines (i.e. new archaeologists are taught by archaeologists and read work by other archaeologists) will not be present to so large a degree. This sort of approach would therefore be the best way to meet research goals such as Objective 1 of the Stonehenge Research Framework, which notes that a wide range of perspectives are required to understand the site (Darvill 2005, 126). This goes considerably further than the framework's recommendation of bringing together lone researchers in workshops (*ibid.*).

The genesis of crowd-sourced interpretation lies in these ideas of bias in archaeological research and an attempt to find ways to better understand it. Landscape archaeology is full of visuo-spatial approaches which rely on the visual identification, interrogation and presentation of spatial patterning in landscapes, whether this is through formal methods such as GIS analyses or less defined ones

such as phenomenology. Measured survey and prospection are certainly important, but approaches which constitute a search for visual and spatial structure in the landscape have arguably been the primary method of research since landscape archaeology's inception (Johnson 2007; Williamson 1998). These methods were once viewed as empirical and atheoretical, and whilst this disregard for theory is no longer common, the data they gather is still used to form theories about many different topics for which direct evidence is not available (see for example Aston 2001; Barrett 2005; 2006; Bowden 1999; Cummings and Whittle 2004; Johnson 2007; Tilley 1993; 1994; 2004; and Rippon 2004). In addition, as both Hamilton (2011, 266) and Hodder (2000a, 5) have noted, the very collection of data is an act of interpretation; one must decide what and how to record.

Much work in this field makes the assumption, often implicitly or unknowingly, that past people perceived in the same way as modern people but this has been called into question, both through cross-cultural perceptual studies (Deregowski 1980; Segall *et al* 1966) and by some archaeologists themselves (Bender 1993; Hirsch 1995; Smith and Blundell 2004; Thomas 1996). Quite simply, the question is whether culture affects perception and so whether past people, enmeshed in a different culture, perceived the landscape in the same way as modern archaeologists. Often, even if the issue is raised, it is simply dismissed as unsolvable, unproblematic or incorrect, and whilst both Johnson (2007, 61) and Kytmanow (2008, 33) have questioned whether these investigations tell us anything about past landscapes and the cultures that inhabited them, attempts to properly quantify this potential perceptual gap, and thus assess the validity of such landscape research, have not been forthcoming.

The author's PhD research is an attempt to do just this, and one of the central elements is a perceptual experiment which is the source of the crowd-sourced interpretation methodology. This experiment faces the same problematic temporal gap that all archaeological research must deal with, but also that there is no direct evidence of past people's perceptual processes. It therefore makes use of a large number of modern participants from a range of demographics to assess whether perception of the landscape is culturally constituted. This paper is not the place to go into the full details but a principal I have dubbed Perceptual Uniformitarianism is used to justify this substitution of modern people for past ones. This is based on the fundamental archaeological principle Uniformitarianism, which states that processes occurred the same way in the past as in the present. I argue that if people from different cultures today see the landscape in the same way then it is probable that they perceive it in the same way as people did in the past, whilst if there are differences in perception between cultures, then differences between past and modern people are likely to be at least as large. The perceptual experiment thus aims to quantify the perceptual gap between different cultures and in turn between archaeologists and the peoples they study. It is important to note that the less confidence we have in archaeologists' ability to successfully interpret landscapes, the more useful the crowdsourced technique becomes for demonstrating the possibilities of what can be attended to in the landscape.

The basic methodology of this perceptual experiment can be used not just as a tool for answering this theoretical question but also for testing hypotheses and forming new interpretations. Hodder has attempted to overcome the problem of data collection with a reflexive methodology that incorporates the views of other stakeholders, but practices such as sharing only the evidence which is of interest to groups that have predetermined ideas and agendas (see Bartu 2000, 104) only serves to further bias any interpretation. They also still used data recorded by archaeologists, thus not truly surmounting the interpretive problem of data collection. By administering landscape based questionnaires to people from many different backgrounds we can crowdsource the interpretive act of data collection, avoiding these pitfalls and the bias inherent in research carried out by an individual within a modern western culture and the archaeological discipline. Collating all of the data also serves to mitigate the biases of any one individual or demographic within the group, thus the wisdom of the crowd prevails.

What then is the methodology of this crowdsourced interpretation? Given that it requires participation from a large number and broad range of people it needs to be as simple as possible. At its most basic landscape archaeology involves little more than walking around a landscape taking note of your observations, and whilst this is perhaps a bit too free form to produce useful results in this situation, it offers a starting point from which we can build a recording method. A questionnaire which participants can complete at their own pace whilst exploring a landscape serves as a happy medium between accessibility and obtaining useful results. It also allows a certain amount of guidance to target areas or issues of particular interest. In this way existing hypotheses can be tested for feasibility. To an extent the questionnaire must be tailored to the landscape under consideration, though there are some topics which may be relevant across many landscapes. It is also important to allow participants free expression when using this method, opening up the possibility of discovering new interpretations. It may even be feasible with certain landscapes and questionnaires to score responses based on to what degree they agree with different interpretations. This would offer a quantitative way of assessing and comparing those interpretations.

It is vital to get the form of this questionnaire correct to avoid biasing responses or unnecessarily bringing things to participant's attention that they may otherwise not have considered important, all whilst still obtaining useful data. This is certainly a fine line to walk and any design needs to be properly researched from the large body of questionnaire and psychological experiment design literature. It also needs to be pilot tested to ensure that it performs as intended. As with the perceptual experiment it would be important to track demographic data to ensure that responses have been collected from a broad range of people and not distinct demographic clusters, as this could limit the method's usefulness.

Whilst this crowd-sourced methodology offers a new way to test and form interpretations which is not beholden to the biases mentioned earlier, it also raises the bar for public engagement in archaeology, directly involving members of the public in the interpretive and hypothesis forming process, right from the very start. This is distinct from what often happens in community engagement, where the public aids data collection under the direction of archaeologists, who do most of the recording and

interpretation of the site, and then disseminate a fleshed out archaeological narrative back to the community. It seems that it is often assumed that the public is interested in the grand theories and the material record of archaeology, but not the stage in between. The Stonehenge Research Framework disagreed, stating that visitors to Stonehenge have a distinct interest in how the leap is made from one to the other (Darvill 2005, 119). A crowdsourced methodology offers some insight into this process and allows the public to get directly involved, ensuring that they have agency within archaeological practice. It could also increase people's interest in archaeology and expand their thoughts about it beyond the basic what and when questions which they are often concerned with.

Given the nature of the archaeological record there are problems with implementing this methodology beyond those inherent in any questionnaire research. Roberts (1987) has described archaeological landscapes as icebergs, since only a small proportion of the available data lies above the surface. Conclusions which can be drawn from the visible landscape must always be tempered by the knowledge that they may be '*wholly conditioned*' by unknown features. Landscapes which have been too dramatically altered since the period of study will have limited feasibility for crowdsourcing. Landscapes which have seen less change, or for which we can build up detailed evidence will allow us a considerably more accurate look at past peoples relation to the landscape.

In limiting the use of this methodology in this way the issue then becomes how to present information to participants without biasing their interpretations. Of course it is important that as much as possible this data is presented in a neutral and holistic way; we are after all seeking to circumvent archaeologists' interpretations. Some might argue that it is the training of the archaeologist which allows them to overcome these interpretive barriers, that their accumulated experience and knowledge lets them piece the evidence together into a coherent picture. Whilst there is evidently value in archaeological training, many would feel uncomfortable giving archaeologists an exclusive right to the past, and as indicated above this only serves to validate any preconceived or received notions.

Whilst limiting the context of use, and the question of how to present information, may seem highly problematic, it is really little different from current archaeological research. Archaeologists must find ways to present and understand non-visible or separate data to allow them to integrate it into their process of interpretation, and landscapes for which less reliable data is available are naturally harder to research. These methods may include any combination; virtual reconstruction, mapping, using imagination, and marking out features in the landscape. With proper implementation then, it may be possible to use this methodology effectively even in more difficult landscapes.

The way in which this information is presented is vitally important; as we are dealing with a matter of perception the content and medium of representation could have a considerable impact on resulting interpretations. One possible solution would be to use virtual reality; computer simulations would allow the presentation of a particular slice of time, removing modern features and archaeological features from after the period of study, recreating the landscape from environmental evidence and restoring earthworks and sites to a more complete condition. This removes the complications of working in a

modern landscape, but comes with a host of problems which render its use unsuitable. Every landscape under study would require costly and time consuming modelling and in order to create something representative a large amount of data must be collected in the field. This evidence can never be exhaustive and so the representation will not be an exact recreation of the past landscape, and yet the very act of representation may invoke confidence in the participants (James 1997, 26). We are also already presenting an interpreted landscape to the participants. Finally, virtual reconstructions cannot offer bodily engagement, yet this is vital for a valid assessment of real world perception (Gibson 1986); it has been demonstrated by Kroh and Gimblett (1992) for example that representations of landscapes offer different experiences to the landscapes themselves.

Another method of presenting information is the use of mapping, though this suffers from serious problems as well. Maps also involve an act of interpretation in their creation and whilst they would be used in the field, the information in them cannot be engaged with bodily. The aerial view offered by maps would create a perceptual division between the different sources of information and this division could lead to problems of integration, especially for those unfamiliar with using maps.

Verbal description also has its problems. Here language could be a barrier and the words used in the description could have a biasing effect. Most importantly using verbal or written presentations of the information requires the participants to imagine the landscape; this not only opens up the possibility of inaccurate conceptions, but also makes this a more mental than perceptual task, something which could have profound effects on the result.

The final option would be to mark out non extant features in some way, perhaps using canes and tape to show their location. This would allow an integrated perceptual experience within the landscape but there is a limit to the information that this could provide, and it would therefore have to be supplemented with written or verbal descriptions. Whilst this introduces some of the same problems, the main issue of non-perceptual experience is reduced. The information available with this technique is obviously more limited than in a virtual reconstruction, but it would at least allow for bodily engagement. Whilst not a perfect solution, it may be that this is the best option possible for landscapes in which significant features are no longer extant. Building on this concept, augmented reality technologies could be employed, bridging the gap between this approach and virtual reconstruction, though some of the problems of the latter would still be of concern. An offline approach has been tested in a non-archaeological context with some success (Ghadirian and Bishop 2008) and with the continuing advances in this technology an embodied, augmented experience is becoming an ever more realistic proposition.

Of course the best way to ensure that participants have all of the information available to them would be to use an entirely extant landscape. Unfortunately such a thing does not exist; even protected, seemingly whole landscapes are part of a continual process of change and are the product of modern policy which has aimed to preserve them in their current state. If for example we wished to use this methodology to look at the early stages of Stonehenge, its current form would not aid us.

The question of which of these techniques is best at presenting information to participants in a way which will not bias their interpretations, but will allow the use of all of the evidence available, requires a great deal of practical testing. This would involve using each of these approaches, and not using any, to see what effects each of these options had. Ideally it would be possible to compare more and less extant landscapes, although the differing landscapes would present difficulties in direct comparison.

A solution to this, although an admittedly costly one, might be to use a 'fake' archaeological landscape. A landscape with little extant archaeology could be used as a base for an initial experiment, with the various methods of information dissemination being tested in turn using a fictitious landscape model. The final stage would then be to construct this model in the landscape. The effect on interpretations of the different methods and of different pieces of information being withheld could then be tested. Such an experiment would serve to answer questions about the use of this methodology, but could also offer important insights into archaeological interpretation in general, and especially in areas such as our relation to the fragmentary record and how archaeologists can make use of non-material evidence. It could also elucidate the best way to disseminate archaeological information both to other archaeologists and to the public.

It is entirely possible that such an investigation would find that there is no completely satisfactory way to present information to participants in a crowdsourced interpretation methodology. However, it will likely prove evident that not giving them this extra information has a very significant effect on their interpretation of the relationships and the layout of the landscape.

There are then some issues that need resolving before such a crowdsourced interpretive methodology can be widely used, but these are much the same issues as those which are faced by archaeologists all of the time; they are simply brought to the fore by the practicalities and the theoretical background of the method.

Given the recent surge in interest in crowdsourcing adopting this sort of approach could get people who would otherwise not be engaged with archaeology interested in the process. It may even lead to new sources of funding, whether from bodies that support crowdsourced research or even from crowdsourcing itself. The most important consideration however, is that whilst it must tackle the same issues that all archaeological research is confronted with, by taking a broad based qualitative approach to landscape survey, this crowdsourced methodology offers real potential for new insights, increased public engagement and improvements in the theories we construct about the past and the people who lived in it.

This paper summarises the author's presentation at the Landscape Survey Group's conference in Sheffield, 2014. It does not necessarily express the views of the Landscape Survey Group.
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