Touch | Don't Touch
Exploring the role of interactive displays in natural history museums to help visitors appreciate objects behind glass

Michael Horn, Jessica Roberts, Amartya Banerjee, Steven McGee
Northwestern University, michael-horn@northwestern.edu
Matt Matcuk, The Field Museum, mmatcuk@fieldmuseum.org

Abstract: How can we use interactive displays in museums to help visitors appreciate authentic objects and artifacts that they can't otherwise touch or interact with? This poster shares ongoing design-based research on the use of interactive displays to help visitors learn about themes and artifacts in a cultural exhibit on Chinese history and culture.

Keywords: Interactive displays, museums, collaborative learning

A persistent question facing modern natural history museums is how to understand the role of interactive digital technology in the visitor experience. Can interactive technology be used to foster visitor curiosity and engagement around the authentic artifacts that make up museum collections? Or does it lead to a digital disconnect in which visitors focus more on screens than the objects in front of them? Can technology help enrich conversation and social interaction? Or does it lead to situations in which people are isolated from one another in galleries? Coming to grips with these questions will be critical to the continued relevance of collections-based informal science institutions.

This poster will share work from a design-based research project involving a team of university-based learning scientists and computer scientists collaborating with curators and exhibit developers from a large natural history museum. In June 2015, the museum opened a 7,500 sq/ft exhibit showcasing 350 artifacts from prehistoric times to present-day China. The exhibit is divided into five themed galleries and represents a significant addition to the museum's coverage of the world cultures. The exhibit also offers a unique opportunity for computer supported collaborative learning research as it includes over 45 interactive touchscreen displays spread throughout the exhibit (see Figure 1 for a screenshot from one of these displays). The central design tension with these displays is to harness the power and engagement of interactive digital media in a way that enhances (rather than detract from) visitor appreciation and understanding of the authentic artifacts on display.

Figure 1. An existing interactive display sharing information about artifacts highlighting Bronze Age innovations.

Recent research suggests that digital technology can create engaging opportunities for learning in museums (e.g. Block et al., 2015; Louw & Crowley, 2013; Roberts et al., 2014). In particular, large interactive displays have become increasingly popular in museums and other public spaces. These devices can combine engaging multimedia content, sophisticated forms of interaction, and new means of audience participation. However, almost all of the extant research on interactive displays in museums has focused on the displays themselves—the display *is* the exhibit. But, this misses out on an increasingly common use case for museums—the display is a way to help visitors appreciate the exhibit, often an authentic object or artifact that they cannot otherwise touch or interact with directly.

To help address this shortcoming, we are observing and analyzing visitor interaction and conversation at focal display cases. Our research treats the depth of visitor conversation about the objects and themes of the gallery as the primary indicator of learning (see Leinhardt, Crowley, & Knutson, 2002). To capture visitor conversations, we have set up a camera and microphone at one of the most interesting but least frequently visited display case

addressing the theme of Bronze Age innovations. A sign posted near the display case informs visitors that they are being audio and video recorded for research purposes. Our discourse analysis identifies conversational features such as directing joint attention, naming or describing objects, asking questions, making inferences, and reading display labels out loud. We are also building on Loewenstein's (1994) concept of curiosity as a powerful motivator for engagement and learning. This theory suggests that by highlighting unknown but knowable ideas, we can cultivate curiosity and learner desire to seek out new information. Within this theoretical and analytic framework, we are using design-based research to explore the impact of design variations on the depth of visitor conversation.

Figure 2. Our first redesign highlights "big questions" as a way to stimulate visitor curiosity.

Our first round of designs focused on inducing curiosity by prominently highlighting *big questions* related to the themes of the gallery and the display case. Our reasoning was that posing questions would stimulate visitor curiosity and prompt deeper exploration of content. Figure 2 shows a screenshot from this iteration. Our analysis found that this while this redesign increased engagement along simplistic measures like holding time and capture rate, visitor conversation remained infrequent, brief, and shallow. We noticed, however, that the richest conversations tended to occur as visitors explored media content buried in sub-screens in the initial designs.

This led to our next design iteration in which we brought this media content to the foreground and made it more interactive (Figure 3). The idea is to engage visitors with interactive content *first* and then give the opportunity to read and learn more if they are interested. This follows research on instruction design (preparation for future learning) that demonstrates the importance of letting learners explore on their own before giving them formal instruction on a topic (Schwartz et al, 2004). This poster shares findings comparing these three designs.

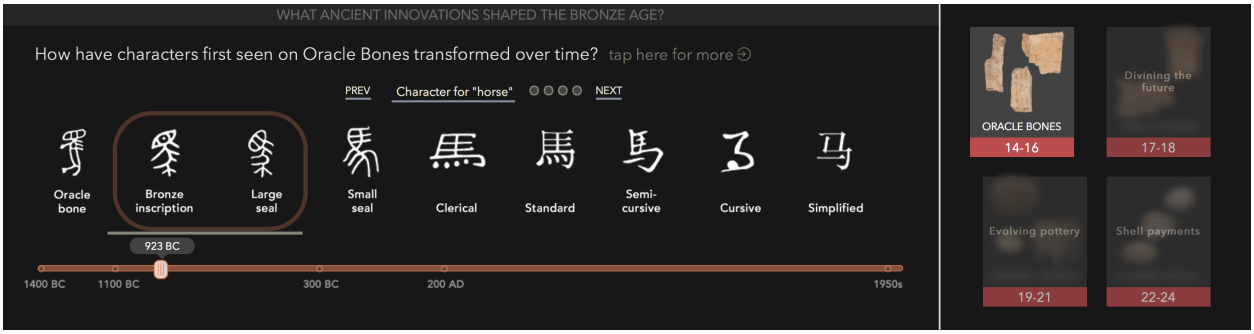

Figure 3. Our second redesign highlights interactive content first.

References

Block, F., Hammerman, J., Horn, M., Spiegel, A., Christiansen, J., Phillips, B., ... & Shen, C. (2015, April). Fluid grouping: Quantifying group engagement around interactive tabletop exhibits in the wild. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (pp. 867-876). ACM.

Leinhardt, G., Crowley, K., & Knutson, K. (2002). Learning conversations in museums (1st ed.). Mahwah, N.J.: Lawrence Erlbaum.

Louw, M., & Crowley, K. (2013). New ways of looking and learning in natural history museums: The use of gigapixel imaging to bring science and publics together. Curator: The Museum Journal, 56(1), 87-104.

Loewenstein, G. (1994). The Psychology of Curiosity: A Review and Reinterpretation. Psych. Bulletin 116(1): 75-98.

Roberts, J., Lyons, L., Cafaro, F., & Eydt, R. (2014). Interpreting Data from Within: Supporting Human- Data Interaction in Museum Exhibits Through Perspective Taking. In Proc. Interaction Design and Children (IDC'14).

Schwartz, D. L., & Martin, T. (2004). Inventing to prepare for future learning: The hidden efficiency of encouraging original student production in statistics instruction. Cognition and Instruction, 22(2), 129-184.