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STORY STRUCTURES: BUILDING NARRATIVE TRAILS IN MUSEUMS

ABSTRACT

This chapter proposes extending the definition of a narrative learning environment into physical space, characterizing the narrative-producer as trailblazer. A digital learning trail is constructed from a museum visit using location tracking and mobile technologies, and this trail is narrated by the visitor to create, in turn, an audio tour for others. This adds a quantitative dimension to narrative, while emphasizing the constructive and creative aspects of storytelling. Technologies such as these are usually used for personalized or contextualized information delivery; here no such type of intelligence is built into the system, but remains for the visitor to construct. The theory behind this is detailed.

INTRODUCTION

Measuring what people learn from a museum visit is difficult, partly because everyone learns something different based on their prior knowledge and interests, and partly because museum learning tends to happen over long periods of time. Seeing a particular object in a museum may resonate with an individual, often provoking specific memories at the moment of encounter. But when visitors are approached at the end of a visit and asked about specific things they learned, they are often so mentally and physically exhausted that they cannot easily remember or articulate any. It is only months or years later that some other object, event or story will bring back the memory of the object encountered in the museum. (Falk and Dierking 2000)

What may help visitors recall and reflect on a visit is to make explicit the trail they have followed as a narrative path, allowing them to later revisit, reflect upon, reorder, and share it. Technology can help by automatically capturing a digital trail of a physical path, by visualizing it, by enabling the learner to easily change and add to it, and by making it easily accessible to others who can then edit and add to it as well. This collaborative approach to narrative construction could lead to communities of learners linked to particular museums, subject areas, or artifacts.

Based upon research in anthropology, education and museum studies, as well as my own experience working in museums for the past decade, I describe here the means to create digital narrative trails from museum visits. The technology for constructing digital trails by tracking users' movements in the real world is just emerging, and its development and application are rapidly accelerating. However, I propose a simpler- and arguably richer - means of trail construction, using only audio narration.

STORIES IN SPACES

From an anthropological perspective, learning is perhaps the very essence of human evolution - an adaptation to make sense of our physical and socio-cultural context. Considered in this way, learning predates humans. "Learning evolved as a mechanism to ensure the long-term safety of the organism.... In this view, learning is the product of hundreds of millions of years of survival-oriented evolution, a continually refining capacity for humans and other animals to intelligently navigate an ever changing social, cultural, and physical world." (ibid., p.60-61).

It may seem counterintuitive to start from this evolutionary perspective to talk about learning in the most unnatural of settings – human-created buildings, particularly museums, which artificially juxtapose many different animals, cultures, or artists under one roof. Yet Falk and Dierking's contextual model of learning, though rooted in biological evolution, is formulated to apply specifically to museums. I believe that it is applicable to other types of learning. In their model, all learning is situated – dependent upon, not immersed in, context (ibid, p.58). Learning is conceived as the integration, over time, of personal, socio-cultural, and physical contexts. The physical setting where learning takes place mediates the personal and socio-cultural.

At the same time, we know that narrative, too, is deeply embedded in human learning, providing an organizing structure for new experiences and knowledge (Mandler 1984). The act of remembering is itself a form of narrative construction. And universally, across cultures and over time, people can mentally organize information better when it is recounted in the form of a story (Falk and Dierking 2000, p.48-9; Sugiyama 2001).

Therefore it seems to make sense, from a theoretical perspective, to extend the definition of narrative learning environments (NLEs) into physical space. Mott et al (1999) regarded NLEs as computer systems with artificial intelligence which "could revolve around virtual worlds, believable characters, thought provoking themes, and rich stories." (p.78)

Valinho and Correia (in this volume) have created an immersive physical NLE which adheres closely to this definition. My intention is to broaden the definition of NLE further, harnessing new technologies to help already informationally-rich environments such as museums become sites for narrative creation. The emphasis is more on narrative creation than on narrative experiencing.

MUSEUMS AS NARRATIVE LEARNING ENVIRONMENTS

Museums, with roped-off paintings and glass-encased artifacts, may seem an unlikely place for learners to actively construct things. Yet unlike schools, museums are sites of intrinsically-motivated, self-directed, free-choice learning. People visit museums with the expectation of learning something, and seek out artifacts and experiences which resonate with their own prior knowledge. It is obvious that both history and art museums contain many rich narrative strands already. According to Doering and Pekakirk (1996), visitors too bring their own "entrance narratives" which constitute an internal storyline, guiding and informing their visit.

Space is strongly linked to affect (O'Keefe and Nadel 1987), and museums score

highly in affect. This connection is complex. It is in part because museums blur the line between education and entertainment, and in part because of their physical and cultural presence. Museums were created in the last two centuries to collect and display artifacts which are either central to the dominant culture, or came from colonies or "exotic" cultures. The artifacts themselves evoke emotions in people, and the often imposing architecture of museums implicitly conveys power, authority, and the dominant values of a culture (Foucault 1970). The physical and cultural presence of museums encourages and discourages certain behaviours in visitors.

Seeing a museum through a sociocultural lens, Stainton (2002) considers museum visitors as "people who are in conversation, literally and figuratively, with the artwork on display and with the curatorial intent." (p. 214) Visitors bring their own personal histories, and engage in implicit dialogue with the museum, the curators, the objects. According to Falk and Dierking (2000), "Learning is a dialogue between the individual and his or her environment through time." (p. 136) Paris and Mercer (2002) conceptualize "transactions" between visitors and objects in which visitors search for features of their personal lives (whether real or imagined) to confirm or elaborate their own identities. Meaning is made, they say, through the personal narratives thusly created. Therefore objects do not merely hold static meanings but act as stimuli for visitors to create their own; they can confirm, disconfirm, or expand on a visitor's existing stories. Bal (1985) similarly conceives "narrativity" as a relation between an object and the internal representation it provokes. Kazazis and Makri (in this volume) discuss how pictures both contain and evoke stories.

This phenomenon can be directly observed in art museums, and is related to visitors' level of expertise in a given domain, according to Fienberg and Leinhardt (2002). We are drawn to paintings or objects which resonate with our own knowledge, but the less we know about the object, artist, creator or domain, the more likely we are to relate it to an existing personal narrative, they say.

Most people do not visit museums alone, and visitors build on each other's knowledge in conversations, as narratives are developed and implicit dialogues become explicit. Vygotsky (1978) views conversation as a methodology for building knowledge, and discourse as a semantic link between people and objects. "Conversation," Falk (1993) says, "is a primary activity of knowledge construction." It is both process and outcome, changing and reflecting visitors' identity, knowledge and engagement. The system I propose would capture visitors' conversations as part of digital learning trails with a simple means of audio recording during their shared visit.

THE OPEN-SOURCE MUSEUM

Museums are already powerful narrative learning environments; technology can enable visitors to assimilate the narratives in museum artifacts and exhibits with their own personal knowledge and perspectives. During the workshop on which this book is based, a "technology-enhanced learning environment" was defined as "the use of digital technology, in any form, for learning." The goal of any such environment which uses narrative, it was agreed, should be the development of personal understanding of a learning task or learning content. In particular, it should help learners link new knowledge with their prior knowledge. In dialogue –

either a shared dialogue with someone else, or implicit dialogue with museum content – this can happen during the museum visit, in the moments of encounter or resonance, to use Carola Conle's terms (this volume).

Museums already employ many technologies, including some directly suited to linear narrative, such as videos and audio tours. In the last two decades museums have introduced computer-based interactive exhibits, mostly as screen-based programs which are usually physically or conceptually separate from other exhibits. They are usually linear and only marginally interactive; in most cases, a visitor presses a button which triggers a story of some form to be seen or heard.

A few recent projects illustrate how new digital technologies can make for richer narrative creation and sharing. StoryCorps (<http://storycorps.net/>) employs a series of fixed and mobile booths where people can record stories, either alone or in the form of interviews, as digital audio. Recorded stories are shared on the web, broadcast on national public radio, and added to the U.S. Library of Congress as part of American oral history. The first booth was installed in New York's Grand Central Station in 2003 and another opened in 2005 at the World Trade Center site; mobile booths began touring the U.S. in May 2005.

Urban Tapestries (<http://www.urbantapestries.net>) allowed people to link stories to places using mobile devices. When users created a story, using text, audio and/or still images, it was automatically tied to the place it was recorded using location tracking technology. As a user moved around central London, his or her individual paths formed threads, and the resulting overlapping threads of many people combined to create a social "tapestry" which could be explored and expanded.

In both of the above cases, there are no explicit learning goals and no incentive to create stories of any type or topic. The use of mobile technologies in museums, in contrast, has been focused around clear didactic aims, but while they have made ample use of curatorial narratives, they have only rarely allowed museum visitors to participate in narrative creation or sharing. Projects such as CAERUS (http://www.mobile.bham.ac.uk/projects_briefs.aspx) and the Tate Modern multimedia tours (Proctor and Tellis 2003) use location tracking for personalized or contextualized content delivery.

Bletchley Park Text (Mulholland et al 2005) went a step further by allowing museum visitors to construct meta-narratives by combining existing curatorial stories (in the form of interviews with historical figures). By sending text messages via mobile phone from specific exhibits in the museum, visitors create a personalized web page which links their chosen topics in narrative threads, which could be further explored and rearranged.

Other new technologies allow computing power to be seamlessly embedded into objects and spaces, with input and output devices in different parts of a room or building, and processing and networking infrastructure hidden. Valinho and Correia (this volume) demonstrate some narrative applications of this "ubiquitous computing" paradigm (Weiser 1991). As mobile projects like Urban Tapestries show that an invisible, wireless network infrastructure blurs the notion of place, ubiquitous computing enables places to come to life as active co-creators. Museums, though rooted in Enlightenment-era colonial imperialism, can be seen as malleable, changed by people and technology. Bletchley Park Text demonstrates that they can be merely starting points for long-term learning trails, with exhibits and objects as building blocks for narrative creation.

Thus technology enables a sort of open-source museum. "Open source," according to Wikipedia (itself an open source encyclopedia - www.wikipedia.org) is "regarded by some as a philosophy and by others a pragmatic methodology, relates to practices in the production of products which promote access to their sources." In computer software this is manifested in freely available source code which anyone can compile and use, with communities of users mutually supporting each other. Bletchley Park Text reflects a broader trend of museums opening up their collections, but few provide the means for visitors to engage in co-construction with the museum, or to personalize museum content to their own lives. The very term "visitor" reflects the conceptualization of temporary museum users who come to see what is presented by curators and are then forgotten. Museum audio tours are generally narrated by curators or domain experts; this is beginning to change however (see Kennedy 2005). The essence of my proposed system is that museum visitors would create audio tours for other visitors, while at the museum.

Mott et al (1999) say that "by enabling learners to be co-constructors of narratives, narrative-centered learning environments can promote the deep, connection building, meaning-making activities that define constructivist learning." (p.80). My focus on building, however, is more tied to constructionism, not constructivism, I believe. Educational perspectives as well as museum studies generally regard learners as actively makers of meaning, not passive receivers of transmitted knowledge. This idea comes from the cognitive theory of constructivism first proposed by Piaget (1929). However, few applications in either education or museums actually have learners actively creating something. Constructionism, as practiced by Papert (1980) and others, accepts that learners are active (Papert was in fact a student of Piaget's), but extends the theory into a practical methodology, taking the view that actually creating something in the world (or on the screen) in turn creates mental structures in a learner's head. In other words, creating something – particularly something for someone else – enables the kind of self-reflection that makes for powerful learning. On this basis, I propose that the conscious creation of a museum audio tour for someone else to use would act as a powerful learning mechanism for its creator.

LEARNING TRAILS

The idea of learning trails was originally proposed by Peterson and Levene (2003), inspired by Vannevar Bush's (1945) idea of the "memex," a mechanical recording device which predates digital technology. In an online learning system, according to Peterson and Levene, making a trail record of the "learning objects" a learner has visited enables a degree of personalization. They hypothesized that in a physical space such as a museum, a digital trail could be automatically generated if a learner had some sort of "experience recorder," like Bush's memex, tracking the exhibits/objects that they visited. This is now possible with location tracking and personal recording technologies.

Peterson and Levene did not consider the narrative implications of such learning trails. But narrative is, after all, "a unique sequence of events, mental states, happenings involving human beings as characters or actors." (Bruner 1990, p.43) It is inherently linear; even in hypertext or hypermedia narrative environments, the path that a learner follows is ultimately linear in time. Trail recording, then, can

add a quantitative aspect to narrative by linking it to a time series of specific, discrete digital data points which can then be edited and processed on a computer. Such a trail automatically generated from a museum visit is, in a simple sense, a story of that visit. Making it visible and available to the learner for reflection and editing could aid learning, since information organized in a narrative form is more easily memorized and recalled (Mandler 1984). Placing events in a linear sequence makes the connections between them visible (deVries, this volume).

A trail of this sort acts as a coherent schema or conceptual framework which helps learners to organize information. Cognitive psychology research from Miller (1956) onward has shown the value of "chunking" complex information into manageable bits. Indeed, the amount of information is not as important as the conceptual framework, and Ham (1999) has shown that in museums, such frameworks not only facilitate information integration but constitute most of what is remembered. However, models or schema can easily be regarded as static; the dynamic addition of time must be incorporated, as for example in the form of processes, sets of instructions, or trails.

In a real-world space such as a museum, a learning trail is a mapping of conceptual space onto physical space; it gives a place a form of memory, and time is often an overlooked element from many technology trials as well. We have been testing location tracking technologies for trail recording (see Winters et al 2005), and have found that the notion of "learning objects," which is so clearly defined in e-learning, becomes a matter of granularity in a physical space such as a museum. A learning object can literally be a physical object or artifact, or it can be a set of objects, an exhibit, or other location. It is also important to consider interactions with other learners, so we broadened the notion to "learning events." This shifts focus from discrete objects to moments in time, or in Conle's words, moments of encounter. It emphasizes the active nature of learner interactions instead of the static nature of objects.

But an automatically-generated trail does not especially encourage active construction by a learner; in fact the phenomenon of interacting with a computer merely by walking around caused us to term it "non-interactive technology" (Walker and Winters 2005). What we believe it does, however, is encourage reflection by making the learner aware that they are creating something in this (physically active) way.

A more explicit form of construction in learning trails comes after the trail has been created, when the learner reflects and re-orders it for the purpose of sharing. Here, too, is opportunity for self-reflection, for this is when the trail becomes a story, as the trail is revisited, remembered, reordered, and expanded upon. A simple digital trail is not a story without the nuances that come from narration and dialogue. A narrative trail is not merely a linear path but "a chain of events organized into a coherent schema from a personal perspective (i.e. that of the narrator). And a narrator's perspective brings to light intentions, interpretations, and evaluations related to these events." (de Vries, this volume).

A solution, then, is to allow the learner to narrate the trail, either as it is being created or afterward. Narration could most easily be part of post-trail editing and annotation, and this should be included. However, the location tracking technology we have been testing includes the ability to transmit audio via wireless network, which makes possible narration during trail creation. Audio can not only be sent but received by the learner, so two-way dialogue is also possible. This

opens up other possibilities for live interaction with remote participants. A learner in a museum could, for example, speak with someone remotely located who had some knowledge of the object currently under study, or the trail being taken. This may not be practical however; it is akin to visitors talking on mobile phones in an exhibition, which is usually rejected by museums as well as other visitors.

Technology tends to influence theory, as Sharples' points out in his emerging theory of mobile learning(2005a). In the mobile age, he says, communication has a central role and learning is "conversation in context" (2005b). Cognition is seen as distributed, and this phenomenon, I believe, is in fact increasing with "smart" sensor technologies which effectively make a space into a computable system – one which can be programmed.

There is a further technical problem, however, with location tracking technology. It can be very precise in pinpointing a learner's physical location, but misses many other rich contextual cues. For example, if the learner is standing very close to an exhibit but is facing the other way, the location tracking can be meaningless. Nova et al (2005) report similar issues, and found that users who did not use location tracking but could communicate with other users with text could better pinpoint their partners' paths.

It is possible to continue adding sensors and other technologies to capture ever finer-grained contextual information, but I have begun testing a simpler solution – using audio narration only. Learners carrying a mobile digital device – most commonly the Apple iPod music player – with a microphone attached. At each exhibit of their choosing, they simply record an audio clip telling what they are looking at and how they interpret it. This can give an even richer source of location information, since it is not merely a set of location coordinates but the learner's own interpretation, which can include other contextual information and personal perspective.

Voice recorders, and the iPod in particular, create a time-ordered sequence of recordings which is, in effect, a linear, digital trail. This trail is easily edited, uploaded and shared with other people. As long as the location is clearly stated – and in museums this is easier than elsewhere since places, exhibits and objects are labeled – then this circumvents the problems of location tracking described above. It makes the narrator's voice explicit, but also allows the inclusion of other media later, in the trail editing stage. The use of audio contrasts with Nova et al's (2005) use of text communication and de Vries' (this volume) use of email. De Vries reported problems with writing and typing skills, and audio recording may address this – though of course it brings its own limitations.

Communication is asynchronous – not live, two-way communication, as with a mobile phone for example, and in fact visitors may be separated by months or years. The device is merely a simple means of recording, and in fact any audio recorder will work. Museums can be reluctant to give visitors devices, but in this case the visitors use their own (as in Mulholland et al 2005). Museums can be particularly reluctant to allow recording devices. But I believe that allowing visitors to use their own personal devices can enhance their sense of ownership, which Kolb (1984) among others has identified as important for learning.

SAMPLE TRAIL SCENARIO

The following scenario describes how such a system would work in practice.

John and Jane, a young professional couple in New York, are frequent museum visitors. One Saturday go to an exhibition of the abstract painter Piet Mondrian which has just opened at the Museum of Modern Art. Both have a rudimentary knowledge of Mondrian as a painter of minimal, rectilinear compositions. They bring along their iPod but are uncertain whether they will use it, or what to expect.

Once in the exhibition they are struck by the overwhelming presence of the artworks – seen in person they are not the mere graphical compositions John and Jane have seen in reproductions, but real paintings with rich colors and textures; some have been reworked several times and layers of paint can be seen to be built up in places. Jane goes ahead to get a general overview of the exhibition and John lingers in one particular part of it. He decides to record some annotations and talks into the iPod, noting areas where pencil lines can be seen, and where the artist has moved a line over in some cases just a few centimeters.

Since the exhibition has just opened it is crowded; at one point an elderly gentleman standing next to John asks if he is an art historian. He is not, but discovers that this man is, and has more in-depth knowledge about Mondrian. The man agrees to be "interviewed" by John, and tells him about some of the religious and utopian ideas behind Mondrian's compositions.

They part, and soon Jane returns. He tells her excitedly about his encounter with the art historian, and she tells him excitedly about the early landscapes of Mondrian's that she has seen elsewhere in the show. "You can see how he clearly progresses from landscapes to more and more abstract painting," she says, "but looking at the abstract ones now, I can see that they actually depict trees and rooftops and things." They then walk through the exhibition together, sometimes conducting mock interviews with each other, sometimes simply having a conversation with the iPod (still recording) tucked into John's shirt pocket. At each painting, they make sure to first say its name from the label so they can easily edit their trail later.

Back home that night, they download their audio and it is automatically depicted as a trail. They go through each stop, sometimes taking out extraneous parts, sometimes adding comments. Jane has purchased the exhibition catalog, and shares some of her new knowledge. They discover that they did not tour the exhibition from the beginning, and they re-order their trail to show a clear progression from Mondrian's realism to abstraction. Jane reads about the influence of jazz on Mondrian's work, and John finds some music he thinks Mondrian may have listened to while painting; he includes this in the trail also. They upload the trail for others to use and edit.

A few weeks later, the art historian who John met in the exhibition finds out about the trails web site, and comes across John's trail. He expands upon some of his and John's annotations and posts his own trail.

THE TRAIL AHEAD

Much research remains to be done on the recording and use of learning trails, and the sample scenario raises many technical and conceptual questions. The general

hypothesis to be tested is whether digital trails are useful and effective for learning. Is there value in following an audio trail created by someone other than a domain expert? My conjecture is that there is, if the learner knows that the trail is malleable – that it can be further personalized by them. In this way, even mere listening becomes an active process if the learner is aware that they can change the trail. Technology will continue to evolve; might real-time communication or annotation (such as "mobile blogging") prove more effective than asynchronous communication?

How trails are represented and described is very important – it is hypothesized that visitors will be interested in using alternative trails to those provided by a museum, but they must know something, a priori, about the content and characteristics of such trails to gauge their personal relevance.

The medium- and long-term usefulness of trails needs to be evaluated: Will people take the time to reflect upon and edit their trails after a museum visit? Will the trails be used and re-used over time, and will communities develop? Which types of learners, and which domains, are digital narrative trails best suited for? While trails will be evaluated in a directed way with school children, they seem particularly adapted to informal and lifelong learning in adults (see Sharples 2005a); frequent museum visitors tend to be well-educated young professionals in the upper levels of income and occupation (Gunther 1999) – which corresponds to the profile of active users of technologies such as the iPod, the computer and the Internet.

With regard to domain, I believe that trails may work particularly well in art museums, particularly with modern and post-modern art which is all about viewers' interpretations, and in which fruitful connections can be made between particular works and artists. However, if it proves effective, the trails concept may be more broadly applicable to tourism and other mobile, informal learning settings. It may also be useful in formal education, as the related area of "digital portfolios" seems to be.

Beginning as a personalized narrative about an artwork, object, exhibit or site, the story becomes itself a kind of artifact, taking on a presence which evolves every time it is shared. In turn, digital audio trails give museum objects and experiences a new dimension, in the oral tradition that has spanned all cultures in human history. A digital trail can travel further, faster; and it can evolve in ways that orally transmitted stories cannot. But like stories everywhere, it is always tied to a place, and always shaped by its narrator.

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