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Use of digital guides in museum galleries: Determinants of information selection

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ABSTRACT

Mobile guides play an increasingly important role in informal learning settings such as museums and exhibitions, supplementing traditional museum tours offered by human interpreters. In order to identify visitors' strategies of assessing information provided by a digital guide, two studies were conducted in a large exhibition on modern German literature. By unobtrusively observing visitors' behavior in the exhibition, Study 1 demonstrated that users of the digital guide spent about 60% more time in the exhibition and also scrutinized individual exhibits more extensively. In Study 2, we analyzed a large set of more than 100,000 accesses to information on a digital guide provided in the exhibition. Based on these data, we identified a set of factors that shaped the visitors' selection of exhibit information from the mobile guide. In particular, an exhibit's position in the gallery (showcase number, vertical position), its visible features (size, authenticity), and its popularity (hits on Google, being labeled as highlights on an introductory sheet) predicted visitors' tendency to access additional information about an exhibit, whereas an exhibit's color and legibility, as well as whether the exhibit contained writings had no predictive value.

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1. Introduction

Today, mobile media play an increasingly important role as ubiquitously available sources of information in informal learning settings. This includes a growing number of mobile visitor guides available at historical sites, botanical gardens, zoos or museums (Schwan, Grajal, & Lewalter, 2014). Some of these visitor guides come in form of predefined tours, typically offering walks focusing on various different topics. Alternatively, mobile digital guides may focus on individual exhibits, allowing visitors to individually select the information that they are interested in. While in the former case, digital media lead visitors to the selection of exhibits according to the logic of the tour, in the latter case exhibits have precedence over the guide, providing the visitors with information on the exhibits that they have selected on an individual basis. In the present study, we investigated the influence of a digital guide on general visiting behavior in a large exhibition on modern German literature. Furthermore, we analyzed a large set of more than

100,000 accesses to information on a digital guide provided in a large exhibition on modern German literature. Based on these data, we identified a set of factors that shaped the visitors' selection of exhibit information: the position of the exhibit in the gallery, its visual salience, its authenticity, and its popularity. From these findings several implications for the design of multimedia guides in museums and exhibitions can be drawn.

1.1. Mobile guides in museums and exhibitions

In the last two decades, various types of digital media have gradually supplemented museum tours offered by museum staff and human interpreters. Such digital guides come in many forms, ranging from traditional audioguides providing explanations in purely spoken form to multimedia presentations on smartphones or tablets that include both spoken and written text, pictures, and videos (Proctor, 2011; Tallon & Walker, 2008). From the perspective of the visitor, mobile museum guides offer several desirable features. Most importantly, they allow customization of information and explanation according to the individual needs of the visitor. This includes selection of language, mode of presentation for people with seeing or hearing disabilities, providing maps for

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orientation and navigation help, a display of relevant additional material for scrutinizing and in-depth exploration, as well as providing games and simulations to increase interest and motivation (Proctor, 2011; Tallon & Walker, 2008).

Accordingly, several studies and evaluations have demonstrated that the use of mobile guides substantially prolonged visitors' stay in the exhibition by increasing exhibits' attraction power (i.e. more visitors paying attention to the exhibits covered by the mobile guide) and holding power (i.e. visitors spending more time in front of exhibits covered by the mobile guide) (Kuflik et al., 2011; Lanir, Kuflik, Dim, Wecker, & Stock, 2013). Also, visitors using mobile guides not only frequently reported higher satisfaction with the exhibition, but also indicated noticing more relevant details and developing a better understanding of the exhibits (Bellotti, Berta, De Gloria, & Margarone, 2002; Helal, Maxson, & Ancelet, 2013; Kuflik et al., 2011; Mann & Tung, 2015; Webb & Mann, 2014). Taken together, these findings show that mobile guides may substantially foster visitors' knowledge acquisition and learning.

Museum exhibitions often present a large number of exhibits that cannot be examined completely in a reasonable amount of time but instead require visitors to decide which of the exhibits they would like to turn their attention to (Rounds, 2004). Hence, visitor behavior has been characterized as “free-choice” (Falk & Dierking, 2002; Kirchberg & Tröndle, 2012), and accordingly, most visitors do not “work through” an exhibition in a comprehensive manner but instead focus on a small subset of exhibits. By observing visitors in a British Science and Industry Museum, Morris Hargreaves McIntyre (2004) identified different types of visitor behaviors which differed both in completeness and elaborateness of the visit. Going through an exhibition in a systematic way and paying attention to nearly all of the exhibits presented was only observed for less than 10% of the visitors, whereas the vast majority showed a much more selective behavior. Similar results have also been reported by Serrell (1997). In several observation studies in museums and galleries, she found that only a minority of visitors are “diligent visitors” who stop at more than half of the available exhibits. Instead, museum visitors showed a highly selective pattern of attention, stopping at only a fraction of all exhibits and closely inspecting an even smaller number of them (Serrell, 1997).

Because visitors typically only attend to a small subset of exhibits, the question arises which of the exhibits will be selected and scrutinized more deeply by the visitors, for example by accessing corresponding information on an accompanying mobile guide. The interplay of exhibit selection and usage of a digital guide may take different forms, depending on the characteristics of both the exhibition and the mobile device (Ardissono, Kuflik, & Petrelli, 2012; Emmanouilidis, Koutsiamanis, & Tasidou, 2013). One common practice is to offer one or more “guided tours” through the exhibition via a mobile device. Typically, guided tours allow the visitor to take a look at a predefined subset of exhibition “highlights” in a reasonable amount of time (usually from 15 to 90 min). Hence, visitors' selection processes are reduced to choosing a specific tour and then following its path through the gallery without further need for selection. Instead of providing visitors with a small set of digital tours off-the-shelf, more advanced systems take visitor's prior selection behavior into account, thereby identifying exhibits that may be of particular interest to the individual visitor. Usually, such context-aware recommender systems offer visitors a small set of plausible choice options during his or her visit, again reducing the necessity to choose to a manageable amount (Ardissono et al., 2012; Emmanouilidis et al., 2013; Stock et al., 2007).

Alternatively, mobile guides may also not provide any tours or recommendations but instead might offer access to information about a more or less comprehensive set of exhibits, leaving it up to

the visitor to decide which ones to attend to. If the set of exhibits covered by the mobile guide is relatively small, marked by icons or numbers, then coverage may indicate importance and thus again determine visitors' selection of which exhibits to look at. If, on the other hand, a mobile guide provides information and explanations for most or even all of the exhibits, its function as a filter of relevance is lost. Instead, visitors have to base their selection of exhibits on different criteria, particularly on characteristics of the collection of exhibits itself. Given that mobile media may substantially foster learning processes in museums and exhibitions (Bellotti et al., 2002; Kuflik et al., 2011), knowledge of the kind of attributes of exhibits that may trigger visitors to access accompanying digital information constitutes an important consideration for designing mobile guides. During the last decades, visitor research has identified a number of factors that shape visitors' behavior in museum galleries which may serve as a starting point for empirical investigation of the present topic at hand (Bitgood, 2013). We will summarize relevant findings from visitor research in the following section.

1.2. Attending to exhibits in museums

Paying attention to an exhibit and accessing accompanying digital information is certainly not an all-or-nothing process but comprises several steps including noticing, approaching, stopping, scrutinizing the exhibit, and accessing additional information. Accordingly, visitor research has introduced a distinction between the attracting power of an exhibit, defined as the number of visitors who notice it, approach it, and stop in front of it, and its holding power, defined as the mean time spent in front of the respective exhibit (Boisvert & Slez, 1995; Serrell, 1998). Accordingly, it is assumed that a longer holding power indicates a more elaborate processing of the exhibit. While holding power allows for a crude estimate of elaboration, some observation schemes make finer differentiations with regard to visitors' behavior in front of a particular exhibit (Boisvert & Slez, 1995; van Schijndel, Franske, & Raijmakers, 2010). For example, in the context of science museums, Boisvert and Slez (1995) distinguish between (i) involved time when the visitor stands in front of an exhibit but does not read directions or interact with it, (ii) positive interaction when the user reads labels or uses an exhibit in a way it is intended to be used, and (iii) instructional time when a visitor has an exhibit explained or discusses the meaning of an exhibit. Thus, according to Boisvert and Slez (1995), looking at an exhibit involves several steps of increasing cognitive elaboration, with prior steps being necessary conditions for the following ones, and with the possibility of stopping at every point during the process. Hence, it is only on the third level of Boisvert and Slez's taxonomy that a visitor may decide to access additional information via digital guide.

Particularly the initial phase of inspecting an exhibit is marked by the transition from noticing it to approaching and scrutinizing it. In the course of this step, visitors have to choose a particular exhibit from a larger number of alternatives. However, this does not necessarily imply that they engage in elaborate decision processes. Instead, visitors usually do not spend much effort in selecting exhibits since choosing the “wrong” exhibit does not have high costs, does not have any serious consequences, and can be easily reversed by simply choosing another one. Hence, according to Rounds (2004; see Bitgood, 2006; for the similar “general value principle”), visitors' behavior is guided by simple heuristics by which they try to optimize their intrinsic rewards from an exhibition at low mental and physical costs. Inspired by work on information foraging theory, Rounds argues that visitors do not tend to plan their behavior in a systematic way but instead decide heuristically in a minute-by-minute manner which exhibit they will turn their

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