

That's Entertainment! Designing Streaming, Multimedia Web Experiences

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This article investigates the use of streaming multimedia narratives in Web entertainment. Based on experience gained during the user-centered design of a Web site for art and culture, evidence is provided that users want and like "less clicking, more watching" Web experiences where the point of view of experts, artists, or celebrities is presented in a narrative form. A study was conducted where users evaluated 2 prototypes of cultural tours that stream continuously for several minutes unless the user chooses to exercise control over the flow or to explore hotlinks that lead to extra information. Those tours were positively evaluated as both entertaining and engaging. By analyzing mouse activity, it was determined that users who interacted more tended to report less entertainment and engagement. It was also found that such "watchable" experiences are not necessarily a solitary experience and can be enjoyed by groups of people. Finally, users see the Web experiences as a highly enriching and accessible way to augment the cultural experiences and performances they enjoy in brick-and-mortar cultural institutions around the world, rather than as a substitute for them.

1. INTRODUCTION

People use the Web to procure information about entertainment, travel, and hobbies, and have fun by Web surfing and chatting (Cole, 2000). However, there is really no Web experience similar to the most common entertainment activity, namely, watching TV (see Vogel, 1998). In this article, we present our experience in developing an entertainment Web site for arts and culture where the user-centered design (UCD) process led us

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to the design of TV-like, streaming, Web-delivered multimedia experiences quite similar to TV documentaries but enriched by hotlinks to extra content. This approach of “less clicking, more watching,” suggested by an initial user testing, was further confirmed by laboratory experiments involving two prototypes of these “watchable” Web experiences. Based on these results, we question the common belief that entertainment on the Web must be highly interactive and participatory, following the model of video games and chat rooms. In contrast, we have identified a strong desire for storytelling experiences, similar to short documentaries commonly broadcast on TV today. Although almost one half (47.5%) of Internet users spend some time with other members of their household every week (Cole, 2000), currently there are few online entertainment opportunities appropriate for such group experiences. We explored this possibility by testing our design with pairs of users. Our results indicate that such watchable Web experiences can, in fact, be enjoyed simultaneously by a group of people.

This article begins by discussing the concept of entertainment and its embodiment on the Web. We follow by describing the context of our research, the e-culture project for a Web site on arts and culture. The UCD process of the Web site development is then examined, including the design concept that emerged from the initial discovery process. We follow by describing the evaluation process of the prototypes and the lessons and conclusions that can be drawn from this research.

2. THAT'S ENTERTAINMENT!

Defining *entertainment* is by no means an easy task. Although the term is often used in everyday language, it is actually difficult to define it (for a discussion about the issue, see Dyer, 1992). For example, Langer (1953) described entertainment as being “any activity without direct physical aim, anything people attend to simply because it interests them” (p. 404). Similarly, Whitehead (as cited in Langer, 1953, p. 404) defined entertainment as “what people do with their freedom.” For the purposes of this article, we can say that people are entertained when they are voluntarily undergoing an experience that interests them and gives them some amount of pleasure or release.

Therefore, entertainment encompasses activities such as talking and gossiping; reading newspapers and books; listening to music and radio; watching movies and television; practicing sports; attending live performances of sports and arts; playing games; gambling; shopping; cooking, gardening, fishing, and other hobbies; eating, drinking, and flirting; and traveling, visiting museums, and going to amusement parks. However, when used in the context of the entertainment industry, we tend to narrow this definition to activities where audiences are entertained by the knowledge, thoughts, images, and sound created by professional entertainers who are beyond their circle of family and friends. In particular, we focus this article on the most common of such entertainment activities, the one that takes 30 hr per week of the average American's time, or 46% of his or her total leisure time: watching television at home (according to Vogel, 1998).

3. ENTERTAINMENT ON THE WEB

Many of the entertainment activities listed earlier have their counterparts on the Web. Talking and gossiping have a forum in electronic chat rooms; reading news on

the Web is becoming increasingly popular; the previously solitary video game experience has found new meaning in the networked game era; shopping has gigantic proportions on the Web, newly augmented by the thrills of online auction; and the growth of the gambling and pornography industries on the Web may only be curbed by legislation.

As stated previously, our research examines the possible Web counterparts for the TV experience (i.e., Web-based watchable entertainment experiences provided on the screen of a desktop computer). Currently, few Web sites have experienced success in this arena, and those that have are of limited scope (A Survey of E-Entertainment, 2000). The best examples are sites featuring animated cartoons, often based on parody, such as Joe Cartoon (www.joecartoon.com); sites that show short films, previews, and commercials such as Atom Films (www.atomfilms.com); and the "Web cam" phenomenon.

The three most common explanations for this shortage of options are the lack of bandwidth for video, the inadequacy of the desktop sitting position, and the need of interactivity in Web entertainment (A Survey of E-Entertainment, 2000). However, networked video games have shown that the first two problems are not enough to deter entertainment: pre-downloading and local computer graphics rendering can deal with bandwidth problems, and people seem to sit forever in front of video games.

Therefore, if interactivity is the defining component of Web experiences, then the concept of a watchable TV-like Web experience is a contradiction in terms. In fact, throughout the development of the project described in this article, Web designers repeatedly told us that people are entertained by computers only when actively interacting with the content (see Murray, 1997). This belief is strengthened by the repetitive failures of the traditional entertainment industry to create Web entertainment. The first cycle, fueled by the success of the "The Spot" (www.spot.com) and by the MIT Media Lab advocating interactive TV, failed spectacularly in 1997 both for Microsoft and AOL (see Gierland & Sonesh-Kedar, 1999). The dot.com phenomenon of 1999 and 2000 spurred a new wave of projects that also ended mostly in failure, particularly in the case of Steven Spielberg's www.pop.com, the Digital Entertainment Network, and Pseudo (www.pseudo.com; A Survey of E-Entertainment, 2000; The Sorry State of Digital Hollywood, 2000). The opposite model, making TV into a Web device, has also mostly failed, notably in the case of WebTV (A Survey of E-Entertainment, 2000).

Does that mean "... the Internet will not be the main vehicle for electronic entertainment ..." (A Survey of E-Entertainment, 2000, p. 32)? Although we do not have a definitive answer to this question, our work in the e-culture project, described in the remainder of this article, suggests not only that people want and like to watch TV-like Web experiences, but also that those experiences may be significantly different from both traditional TV viewing and Web surfing.

4. PROJECT GOALS

The research described in this article originated from studies related to the creation of a Web site for art and culture. The goal of this Web site was to bring entertaining

cultural content to users around the world. The Web site's goal was not to be a database of cultural artifacts or knowledge, but instead to attract users by enabling entertaining experiences similar to those provided by a visit to a museum, the attendance of a performance, or the watching of a cultural TV program. Success of the Web site was to be measured by its popularity and, specifically, by the proportion of repeated visits by users.

5. UCD APPROACH

What kind of entertainment do people want from a Web site on art and culture? To answer this question, we conducted a variety of UCD activities including interviews with curators and cultural programmers, focus groups sessions in different cities in the United States, data collection from visitors to two different museums in New York City, data collection from Web surveys on three museum Web sites, and usability walkthroughs of existing Web sites and our own prototypes. The detailed description of these UCD activities and results is beyond the scope of this article. Here we discuss the research and results related to the focus groups, usability walkthroughs, and the prototype design and evaluation that informed our design process that follows. Please see another published article (Vergo et al., 2001) for details on the curator interviews, visitor surveys, and Web surveys.

5.1. Target User Population

Based on existing research about Internet users, information from the cultural institutions with which we were partnering, and from IBM, we defined our typical user as a person at least 9 years old who spends an average of 10 hr or more per week on a computer, and of that time, 5 hr or more are spent on the Internet. Our target users attended some type of cultural event in the last 12 months.

5.2. Focus Groups

Our first project activity was to run a series of six focus group sessions. These sessions were conducted on the east coast (New Jersey), in the midwest (Michigan) and on the west coast (California). Each group consisted of eight individuals and was gender balanced. Two focus group sessions were conducted for each of the age groups: 21 to 35, 35 to 50, and 50 to 70. An independent, objective third party moderated the sessions.

Some of the initial ideas that were explored during the focus group session were

- Giving users the ability to create their own exhibit.
- Live virtual tours where artists or curators are available online, in real time, to conduct a tour.
- A cultural community center with the ability for users to meet, talk, and exchange ideas on a wide range of cultural topics.

- A site that could be personalized to an individual's cultural interests, so that any time an individual visits the site, they see cultural content in which they are more likely to have a personal interest.

During the focus group sessions, participants were presented with verbal descriptions and simple visual representations of the new design ideas, and were asked a wide range of questions with the following objectives:

- Gain a better understanding of the target audiences' use of cultural resources.
- Uncover consumers' experiences with existing cultural Web sites.
- Understand current Web site usage and behavior.
- Assess reactions to the proposed Web site features and activities.
- Brainstorm potential features for inclusion on the Web site.
- Determine relevance of and interest in the Web site concept.
- Understand the receptivity to various payment methods (i.e., advertising, sponsorship, subscriptions and memberships, etc.).

Overall, the newly proposed Web site features sparked favorable reactions from consumers. "Live" tours were overwhelmingly considered one of the most compelling and unique ideas proposed. They particularly liked the opportunity to interact with artists, experts, celebrities, and tour guides.

Respondents were adamant that they should not be charged a fee to use the features offered on the Web site. Advertising banners and third-party sponsorships were deemed the most acceptable means of funding the site. However, it must be noted that the use of advertising banners was a forced choice response. In the subsequent usability walkthroughs, people were clear in their disdain for advertising banners.

Most respondents viewed the newly proposed Web site as a supplemental source of information, that it was an enhancement to the actual live cultural activity or event, or both. Although east coast participants usually use ticketing and venue Web sites to gather logistical information regarding a cultural activity, midwest and west coast respondents also venture to cultural "home sites" for background information relating to the activity or event. Most respondents conduct some form of preparatory research before attending a cultural activity or event. Time, geographic constraints, and financial constraints are the primary factors that hinder respondents from attending cultural events as often as they would like.

5.3. The Usability Walkthroughs

The usability walkthroughs were run in 12 sessions with a total of 70 participants ranging from 9 to 72 years in age who were screened for cultural interest and experience with the Web. Participants were first shown "best of breed" excerpts of existing Web sites related to culture, and then they were presented mockups of new design ideas. The mockups of design ideas shown in the second part of the usability walkthroughs encompassed five different design approaches for exploring cultural content:

1. A filtering system based on direct manipulation of large databases with visual feedback (such as in Alberg & Shneiderman, 1994).
2. A set of lenses (tools) to manipulate the way content could be viewed (such as in Stone, Fishkin, & Bier, 1994).
3. A chat system where people could talk about a particular art work (such as Viegas & Donath, 1999).
4. A notebook system where the user collects and comments on artistic content, and later publishes the notebook for public and private viewing.
5. A multimedia system where the user watches guided multimedia tours, interacting whenever interested in related information.

A major finding of the usability walkthroughs was that most of the participants did not express interest in Web sites that involved active interaction with the content or other Web site visitors unknown to them, such as when using a filtering system, creating a notebook, or chatting. The guided tour format was clearly the best received among the design ideas. Among the existing Web sites, there was a preference for sites where the user was guided through an experience or discovery process; and even in these cases, participants strongly suggested the replacement of text by audio. We summarized these findings by hypothesizing that in this domain of entertaining Web experiences, users wanted less clicking, more watching. Users seem to be very comfortable with the idea of a streaming Web experience that leads them through artistic and cultural artifacts where, unlike television, the stream can be paused, replayed, or interrupted for further exploration. In fact, we found a strong desire for availability of related information through hypermedia links and in-depth analysis of the works of art. It is interesting to note that some of the participants viewed the more interactive design concepts and existing Web sites as work-like experiences, not entertainment. This seemed to reflect an association between interactive tools that were presented in these designs and typical work-related applications from their real world experiences.

The usability walkthroughs also pointed out that users wanted a human voice behind the multimedia experience, that is, a personal viewpoint in the exposition of the content. In many ways, the participants in our research seemed to lean toward defining an entertaining Web experience as something closer to traditional TV, but enriched by the opportunity to explore and find related information. However, our Web surveys also indicated that to access the majority of our targeted audience at that time, such Web experiences must be available to users who have modems of at least 56Kbps for their computers.

5.4. Web Site Design

Based on the results of the discovery phase, we developed a design concept for the cultural Web site based on the idea of providing users multimedia tours guided by experts, artists, or celebrities. In our design, a tour presents information to the user continuously, from beginning to end, unless the user chooses to explore related material or to exercise control. To cope with the requirement of minimum 56Kbps bandwidth, we decided to explore multimedia experiences primarily based on still

pictures and sound with minimal use of video. At 56Kbps, a continuous video stream is of insufficient quality, but at that speed it is possible to download combined audio and images that have reasonable quality. The primary use of still photographs also reduced production costs, because shooting video is more expensive than using still pictures accompanied by recorded audio. As a note, because of copyright issues, the Web site is for IBM internal use only at this point in time, and is not accessible via the World Wide Web.

5.5. The Design of the Tours

In our design, the main multimedia experience, or main tour, is composed of multiple scenes connected linearly that play continuously to tell a story from the tour guide's perspective. The tours resemble a short TV documentary and play within a Web browser window. The main tour is enriched by the addition of user controls such as pause and resume, a navigation map to enable scene changes, and by the inclusion of hot spots for two different kinds of related content that we labeled *side tours* and *branches*. A side tour is a self-contained multimedia segment focusing in depth on some aspect of the tour. A branch is a static Web page with text, pictures, and links to related information on a specific subject. Because side tours were more costly to produce than branches, we produced side tours only for highly desirable related information.

Figure 1 shows a snapshot of a tour. The majority of the screen area is filled with tour content (pictures, text, occasionally very short segments of video). On the bottom left-hand side, a pictorial navigation map gives the user an idea of their position in the tour, the duration of different scenes in the tour, and the proportion of the tour remaining. Rolling the mouse over the map presents textual information about each scene, whereas clicking on the picture of a scene interrupts the current scene and immediately starts the scene corresponding to the clicked image. As the tour progresses, hot spots indicating the availability of side tours and branches appear on the

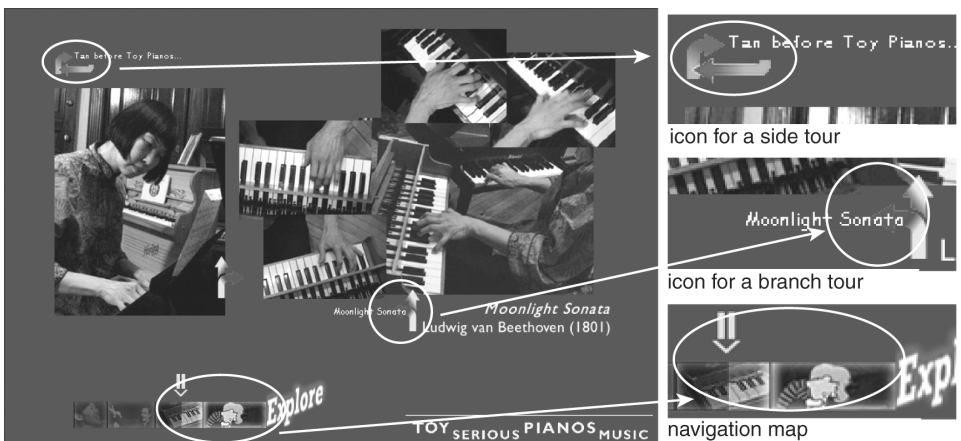


FIGURE 1 Typical scene of a tour with its navigation map, links to a side tour, and two branches.

screen. These hot spots remain for a minimum duration of 10 sec and then fade away. The hot spots appear when the content relates to them and fade away after the related part of the tour has finished. When a side tour is selected, the main tour is interrupted and the side tour is played. When a side tour finishes, the main tour resumes from the point where it was left. A click on a branch pauses the tour and opens a new window on the browser, displaying the Web page associated with the branch. To resume the main tour, the user must click on the pause and resume icon above the map.

All the tour content including the scenes from the main tour, side tours, and branches is available from the “explore page” at the end of the tour. Figure 2 depicts the explore page for the tour shown in Figure 1. Clicking on the tour map restarts the tour from the beginning of the scene that is clicked. Similarly, clicking on side tours and branches immediately starts them. The user can access the explore page at any time during a tour by clicking on the corresponding hot spot on the right of the map.

5.6. Evaluating the Two Tours

The design concepts described previously informed the design and development of two pilot tours that were the focus of the research described in this article. The first tour featured the work of a toy pianist, Margaret Leng Tan. In the tour, the pianist talks about her involvement with toy pianos, how music is arranged for a toy piano, and her connections to Schröder, the famous cartoon character created by Charles Schulz. Two side tours describe the history and mechanics of toy pianos and the work of Margaret Leng Tan before becoming a toy pianist. The main tour

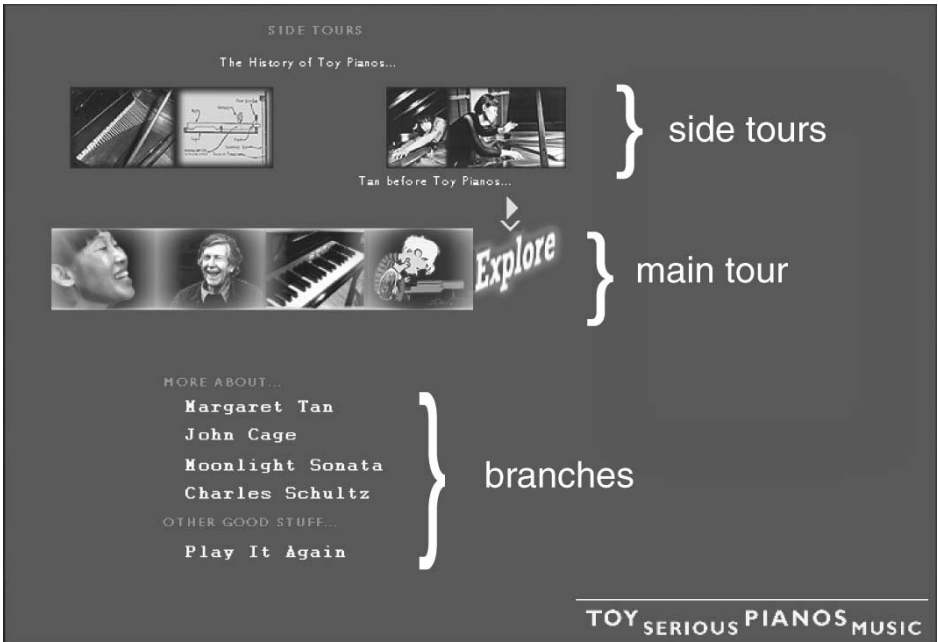


FIGURE 2 Exploration page that allows access to the main tour, side tours, and branches.

lasts 4 min 15 sec and the side tours take 1 min 18 sec and 50 sec, respectively. The tour also includes five branches.

The second tour focused on Ludwig van Beethoven and his Ninth Symphony. Three side tours are provided: one about Beethoven's deafness, and two side tours that enable the user to explore Beethoven's scores and his Heiligenstadt Testament. Beethoven's main tour lasts 10 min 10 sec, and the first side tour is 2 min. The other side tours, because they incorporate interactive elements, have no fixed duration, although their exploration typically took 1 min each. There are also five branches available for user exploration.

We carried out an evaluation of the two tours with target users to understand what worked and what did not in these Web experiences. The evaluation focused on answering the following questions:

1. Can a Web tour experience with less clicking, more watching be entertaining and engaging?
2. Are users satisfied with the level of interactivity designed in the Web tours?
3. Do users who report higher subject matter appeal interact more, spend more time on the tour, or both?
4. Do users look for related information during the streaming portion of the tour or from the explore page?
5. Does social context (singles or pairs) have an effect on reported levels of our subjective measures?

6. METHOD

There were two groups of participants who took part in the experiment. In the first group the participants experienced the Web sites alone (singles), whereas in the second group there were pairs of participants viewing the Web sites (pairs). The procedures were very similar for the two groups except for minor variations mentioned in the details that follow.

Participants in our study completed three Web experiences, based on our two pilot tours. For each of the two tour topics, we had constructed a low- and a high-interactivity version of the tour. Low-interactivity tours had limited play control (only pause and resume) and no side tours or branches. High-interactivity tours included all the elements described in the design section. Participants first experienced both the low- and high-interactivity versions of one tour and then experienced the high-interactivity version of the other tour. Order of the tour presentation (Beethoven or toy pianos first) and level of interactivity (low or high) was balanced within conditions.

The participants were recruited from the population of regular employees and student interns at the IBM TJ Watson Research Center in Hawthorne, NY. About one half of the participants in each of the two groups were students and one half were regular employees of various backgrounds. About one half of the participants were women and one half were men. The age range of the participants was from 21 to 55 years old. All participants were prescreened to have attended at least one cultural event in the last year and to have used the Internet at least 5 hr per week. Eight

participants were randomly assigned to the singles condition, and eight groups of 2 participants each were randomly assigned to the pairs condition. Participants in the pairs condition all knew each other before the experiment. The 24 participants in the experiment were each given \$25 merchandise certificates for their participation in the study.

As a note, the use of IBM employees for this phase of the research does limit the generalizability of the results to some degree. We did use the same cultural interest and Web experience screening criteria for the IBM participants as we did with the participants in the focus group and usability walkthrough research. This was exploratory research and we had no stated hypotheses about the effects of different variables. The design of the study and sample size provided adequate power for the investigation of the variables.

On arrival at the usability laboratory, participants were given a brief overview of the session structure and introduced to the usability studio setup by the experimenter. The authors of this article were the experimenters and ran the sessions. Participants sat facing a 17-in. personal computer monitor placed on a table with a keyboard (which was not used) and a mouse. The sites that the participants evaluated were presented in a full-screen Netscape 4.7 browser window. The experimenter told them that they would be videotaped and asked them to sign a release form. Each participant then filled out a pre-session questionnaire that collected demographic information. After participants had filled out the questionnaire, the experimenter then set the browser to the first site, briefly introduced it, and then left the room to observe the session from the control room. After each tour, participants filled out a post-session questionnaire (PosSQ) describing their experience. On finishing this questionnaire, the experimenter returned to the room to set the browser to the next tour and then left before the user began the tour. Participants were instructed to spend as much time on each tour as desired and to tell the experimenter when they were done. After all three tours were completed, the experimenter interviewed the participants using the debrief questionnaire (DQ).

Immediately before the first experience with a high-interactivity tour, the experimenter asked the participants to make sure that they took at least one branch and one side tour during the main tour, and also told them that they could explore as much of the information as they wanted on the explore page. For the participants in the pairs condition, the experimenter asked that they each take turns controlling the mouse and that they make sure that each of them take at least one side tour or branch selection. Before the final (high interactivity) experience, participants were told to interact with the tour as much or as little as they wanted.

The main part of the PosSQ was a set of four questions asking the users to rate the level of engagement, entertainment, satisfaction with the level of interactivity, and subject matter appeal of each of the tours they experienced, using a 7-point Lickert scale. We did not provide definitions of the terms. The actual questions were

1. How engaging was the multimedia experience for you?, 1 (*not engaging at all*) to 7 (*very engaging*).
2. How entertaining was the multimedia experience for you?, 1 (*not entertaining at all*) to 7 (*very entertaining*).

3. How satisfied were you with the level of interactivity in the multimedia experience?, 1 (*not satisfied at all*) to 7 (*very satisfied*).
4. How appealing was the subject matter of the multimedia experience to you?, 1 (*not appealing at all*) to 7 (*very appealing*).

For each tour experience, we analyzed the videotapes and logged the user's mouse activity as follows. We counted the number of times the participants moved the mouse pointer so that it was located on an object that could be selected (roll-overs), and the number of times an object was actually selected. The objects could have been branches, side tours, or navigation map scenes including the explore page. We obtained counts for each of these types of selections. Also, we broke the interactions into two groups—those that occurred during the main tour presentation, and those that occurred after the participant had reached the end of the tour (i.e., from the explore page).

We also calculated a normalized “time in exploration” as the total time the participants spent on the tour, minus the base time of the main tour itself (if no branches, pauses, or side tours were taken):

$$\text{Time (normalized)} = \text{Time (total)} - \text{Time (base)},$$

where, time (total) is the total time a user spent on the tour, from the moment they started until they announced they were done. Total time included the time spent with the tour, pauses, plus the time spent on all branches and side tours.

7. RESULTS

The results in this section are gathered from the PostSQ, the DQ, and the analysis of user mouse activity. They reflect the data from the third, high-interactivity tour presented to each participant or pair of participants. For this third tour the users were provided a fully interactive tour and were free to interact with it however they desired. The first two tours were used as learning trials to give users experience with low- and high-interactivity tours before their final tour experience.

7.1. User Ratings of Tours

The means for user ratings of the four aspects of the tours (how engaging, entertaining, satisfied with the level of interactivity, and appealing the subject matter was) were all above neutral (4.0), ranging from 4.63 to 5.56 (see Table 1). There were no significant differences between the means for singles and pairs on any of the four subjective measures. In further analyses we found that the Beethoven tour was slightly more positively rated than the toy pianos tour on all four measures, however, there were no statistically significant differences.

Entertainment, engagement, satisfaction with interactivity, and subject matter appeal were all positively intercorrelated, with engagement and entertainment the

Table 1: Means for Singles, Pairs, and All Users on Engagement, Entertainment, Satisfaction with Interactivity, and Subject Matter Appeal

| <i>Variables</i> | <i>Singles</i> | <i>Pairs</i> | <i>Total</i> |
|---------------------------------|----------------|--------------|--------------|
| Engagement | 5.56 | 5.50 | 5.52 |
| Entertainment | 5.00 | 5.38 | 5.25 |
| Satisfaction with interactivity | 5.37 | 4.63 | 4.87 |
| Subject matter appeal | 5.12 | 5.19 | 5.17 |

most highly so. The range of the intercorrelations was 0.59 to 0.89. This suggests that entertainment and engagement were very similar concepts for our participants.

We explored the relation between normalized time spent on the tours and the user’s subjective ratings of the tours. Participants spent an average of 3 min 52 sec of normalized time on Beethoven and 6 min 12 sec on Tan ($p > .12$). There were no statistically significant differences on the amount of time spent on the tours by singles and pairs. Also, there were no significant correlations between the four subjective measures and the normalized time spent on the tours. Therefore, the amount of time participants spent in exploring related information was not a factor in their subjective ratings of the tours.

We analyzed the videotapes of user mouse activity, and the summary data are reported in Table 2. The results show that users interacted an average of 16.2 times during each of the tours. Given that the users spent an average total time of 10 min 30 sec to 14 min on the tours, this meant that a user was clicking about once per minute during the experience. The number of interactions before reaching the explore page was similar to the number of interactions after reaching the explore page, thus our assumption that users would interact both during and after the tour was supported. There were no statistically significant differences in the types of user activity.

We next analyzed the relation between user mouse activity and the user’s four subjective ratings of the tours. Results show that user mouse activity was negatively correlated with engagement and entertainment both before and after the explore page (see Table 3). Subject matter appeal was negatively correlated with mouse activity after the explore page. This means that users who watched the tours more, and interacted less, were more engaged and entertained and found the material more appealing. Conversely, those users who were less entertained and engaged were more likely to interact with the tour. From the DQ, results showed that 18 out of 24 participants said they would like to have the multimedia experiences similar to this again.

Table 2: Summary of User Mouse Activity During the Final Tour

| <i>Type of User Mouse Activity</i> | <i>Mean Actions Before Explore Page</i> | <i>Mean Actions After Explore Page</i> |
|------------------------------------|---|--|
| Branches taken | 1.91 | 2.33 |
| Side tours taken | 0.83 | 1.58 |
| Scene changes made | 1.75 | 1.25 |
| Rollovers made | 3.79 | 2.75 |
| Total actions taken | 8.29 | 7.91 |

Table 3: Correlations of User Mouse Activity With Engagement, Entertainment, Satisfaction with Interactivity, and Subject Matter Appeal

| <i>User Mouse Activity</i> | <i>Engagement</i> | <i>Entertainment</i> | <i>Satisfaction with Interaction</i> | <i>Subject Matter Appeal</i> |
|--------------------------------|-------------------|----------------------|--------------------------------------|------------------------------|
| Total mouse activity | -.44* | -.48* | -.44* | -.45* |
| Mouse acts before explore page | -.41* | -.35 | -.29 | -.01 |
| Mouse acts after explore page | -.46* | -.44* | -.19 | -.43* |

* $p < .05$

7.2. A Comparison of Singles and Pairs

We analyzed our data for differences between single participants and pairs of participants. We found no differences between singles and pairs on the four subjective user ratings or on mouse activity of any type. In the DQ, 10 out of 16 pair participants reported that they thought the experience was more fun as a pair than it would have been had they experienced it alone. Of the 18 out of 24 participants who said they would return to the site, 12 said they would want to do it with family and friends rather than alone.

7.3. User Debrief Data

At the end of the sessions, all 24 users reflected on their experiences and answered a set of open-ended questions from the experimenter. The top responses are reported in the following. To the question, “What did you think of the experience?,” users replied that the Web experiences flowed well and were entertaining. They thought the navigation map worked as expected and was valuable. However, they said the navigation map would be better if continuous control over the flow of the experience were provided through rewind, fast forward, and jump capabilities to position the tour anywhere within a scene.

When asked about the side tours, users responded that the side tours were valuable and worked as expected. Users thought that the side tours would be better if they were more in depth and contained more content. They were adamant that the Web experiences should be just one level deep in terms of access to related information. They generally thought the branches were valuable and worked as expected. Branches would be better if users were provided with better information about where they were going and understood how the branches related to the tours.

When asked what they liked best about the multimedia experience, users said they liked the integration of the various forms of media with the presentation of the story and the user control and interactivity choices they had.

When asked what would make the tours better, users stated that they wanted finer control over the tours including fast forward, rewind, jump capabilities, and greater content depth in the related material available to explore as desired.

8. DISCUSSION

Is the Web an interactive medium? Most certainly yes, but not exclusively, as this research shows that users indicated satisfaction with watchable experiences. However, both the literature (Laurel, 1993; Murray, 1997) and our informal experience with Web designers during the project suggest a strong disbelief in TV-like experiences on the Web. For example, a researcher in the field replied to the verbal exposition of our results with the comment, "I hope you are wrong." A possible reason for this kind of reaction is a common misconception that equates interaction with choice among different story paths, following the hyperfiction tradition (Murray, 1997), which was born in a time that user interaction was restricted to mouse clicks and processing power was at a premium. It is interesting to note that choice-based hypertexts never took off as a popular genre, not even on the Web. Moreover, it is questionable whether choice is not intrinsically at odds with the concept of drama and comedy (see Pinhanez, 2000).

In the context of physically interactive spaces for entertainment, it has been observed that local responsiveness can be more important than narrative choice (Pinhanez, 2000). Similarly, most video gamers, notably the popular action-based games, seem to be more anchored in high levels of local responsiveness than in real story changes (except for the choice of playing poorly and ending the game).

This article in many ways poses similar questions to the traditional view of the Web where choice is the fundamental means of expression of the user. Although our work (and our participants' views) is heavily influenced by the pervasiveness of TV as the primary entertaining experience for people, we should not regard our conclusions as an endorsement of TV as the ultimate entertainment experience. Instead, the results indicate that a major factor in entertainment is who we are entertained by and not by the level of audience control over the entertainment experience. It is important to notice that our design was defined as much by the idea of human voice as by the less clicking, more watching paradigm. In other words, perhaps people have both a remarkable interest in the flow and experience of listening and watching stories, and they are engaged by a storyteller as a respected person with a point of view. In this light, TV can be considered a highly developed and engineered storytelling medium, whereas the Web is still trying to discover how to tell good stories.

Another point to keep in mind is that this research topic is a complex and multifaceted one. This study reports significant correlations between user behavior and self-reported entertainment and engagement in the range of .43 to .48. This means that through an examination of the variables in this study, we are able to explain about 20% of the variance in user behavior. This topic is likely one where a user's behavior is influenced by many factors. This is exploratory research and provides the groundwork for a series of research studies to more fully understand the variables and relations involved in user behavior and Web experiences.

9. CONCLUSION

In this research we designed and evaluated entertaining Web experiences with storylines that gave users the freedom to interact as much as they desired. The data

support the less clicking, more watching design approach identified in the discovery phase. Our results suggest that we achieved our goal of providing entertaining experiences. We think this is at least in part due to our focus in the tour design on telling a story from a tour guide's perspective and providing different types of opportunities for interaction (Pinhanez, 2000).

We found an interesting design dilemma. Users want to have continuous control over cultural Web experiences, however, those who report the highest satisfaction with the experiences use the controls the least. Users may ask for much more control functionality than they really use in practice in cultural entertainment experiences on the Web. For entertainment applications that are game like, user control is a critical factor; and games are a central part of the entertainment domain on the Web today. New types of entertainment on the Web are emerging and more will be created. This research shows that for some cultural entertainment experiences on the Web, a more passive experience results in higher perceived entertainment and engagement. A topic for future research is to examine related entertainment domains to understand the generalizability of these results.

The iterative design of the navigation controls and related information links was generally successful. Users responded positively to the presence of side tours and branches, both within the main tour and on the explore page. Users selected side tours and branches both during and at the end of the tours, leading us to conclude that offering the related information at both places is valuable. Users did offer concern about getting lost or losing focus that suggests to us that there should not be a more complicated scheme than is presented in these prototypes for cultural Web experiences.

Certainly, the tour content has an impact on how entertaining users perceive the tours to be. Both of our tours had musical themes and our users had different levels of interest in music. We expected that people who were more interested in a topic would spend more time on a tour by exploring more related information. The results did not support this idea. We found that subject matter appeal was not related to the duration of the experience, but was negatively correlated with the level of interactivity by the users. These surprising results warrant further investigation. Perhaps when users did not find the subject matter appealing, they decided to interact more with the tours.

The research showed that Web tours were experienced positively both in an individual viewing setting and in a social context. There were no significant differences on the subjective measures for singles as compared to pairs of users. The majority of both singles and pairs also reported that they would like to have similar experiences again in the future.

Since the publication of the initial results of this research, a number of different Web sites have adopted design approaches similar to ours to create user experiences on the Web. A couple of examples are "The Darkest Day" tour on msnbc that describes the events of September 11, 2001 (http://www.msnbc.com/modules/wtc_terror_experience/framework.swf) and also the king prawn episode on <http://www.8legged.com/>, which uses controls similar to those we designed.

In this research we employed a UCD methodology and utilized the results from the discovery phase in our implementation of the cultural prototypes. A primary result was that less clicking, more watching was a useful design guideline for enter-

taining cultural experiences on the Web. This work represents initial research on this topic. The Web enables a wide range of entertaining experiences for users. There is so much more to learn about the potential for entertainment on the Web. Future research can help to build the framework for understanding this topic through an in-depth investigation of the variables of duration, social context, and physical setting of the Web experience.

REFERENCES

- Alberg, C., & Shneiderman, B. (1994). Visual information seeking: Tight coupling of dynamic query filters with starfield displays. *Proceedings of CHI '94*, 1, 313–317.
- Cole, J. I. (2000). *Surveying the digital future*. Los Angeles, CA: UCLA Center for Communication Policy.
- Dyer, R. (1992). *Only entertainment*. London: Routledge.
- Gierland, J., & Sonesh-Kedar, E. (1999). *Digital Babylon: How the geeks, the suits, and the pony-tails tried to bring Hollywood to the Internet*. New York: Arcade.
- Langer, S. K. (1953). *Feeling and form*. New York: Scribner's.
- Laurel, B. (1993). *Computers as theatre*. Reading, MA: Addison-Wesley.
- Murray, J. H. (1997). *Hamlet on the holodeck: The future of narrative in cyberspace*. New York: Free Press.
- Pinhanez, C. (2000). Physically interactive story environments. *IBM Systems Journal*, 39, 3–4, 438–455.
- The Sorry State of Digital Hollywood. (2000, November 13). *Red Herring*, 85.
- Stone, M., Fishkin, K., & Bier, E. (1994). The movable filter as a user interface tool. *Proceedings of CHI '94*, 1, 306–312.
- A Survey of E-Entertainment. (2000, October 7). *The Economist*, 3, 1–36.
- Vergo, J., Karat, C., Karat, J., Pinhanez, C., Arora, R., Cofino, T., et al. (2001). "Less clicking, more watching": Results from the user-centered design of a multi-institutional Web site for art and culture. In D. Bearman & J. Trant (Eds.), *Museum and the Web 2001: Selected papers from an international conference* (pp. 23–32). Pittsburgh, PA: Archives & Museum Informatics.
- Viegas, A., & Donath, C. (1999). Chat circles. *Proceedings of CHI '99*, 1, 306–312.
- Vogel, H. L. (1998). *Entertainment industry economics* (4th ed.). Cambridge, England: Cambridge University Press.