

CHAPTER 17

FROM USABLE TO ENJOYABLE INFORMATION DISPLAYS

1. INTRODUCTION

When computer screens act as public information displays, they are usually designed to present information as efficiently as possible. This is appropriate considering the traditional view of usability, where you wish to achieve optimal readability. Think of timetables for buses and trains, lists of arrivals and departures at airports, parking meters, clocks, etc. They are all efficient in the sense that they successfully communicate the information they are supposed to, but they rarely feel exciting or aesthetically pleasing (see Figure 1). At the same time, in the same places, you will find all kinds of adornments, placed there with the sole intent to entertain and stimulate the people spending time in these places. In a similar way, we decorate our homes and offices with posters, paintings and other decorative objects to create an environment that appeals to our senses.



Figure 1. *Electronic timetables for public transportation are seldom attractive, designed to be usable rather than enjoyable.*

If people like to surround themselves with decorative objects like posters and paintings and at the same time there is a need for information presentation in the human environment, why not incorporate the enjoyment factor into the design of information displays?

This need for beautification is an issue that has been identified by other people, and attempts are sometimes made to make existing information displays more enjoyable. For example, at the central train station in Göteborg, Sweden, a little wooden tower holds a computer screen listing current arrival and departure times (see Figure 2). Despite the designer's effort to make the display more enjoyable by incorporating it in a decorative object, the dull appearance of what is presented on the screen makes it stick out rather than blend in. A more sensible way of designing a decorative information display might be to use people's aesthetic preferences as a starting point when developing information displays that are intended to be enjoyable rather than just usable. Imagine, for example, a weather forecast presented in the style of a painting of a well-known artist such as Piet Mondrian, displayed on a flat panel screen on your living room wall.



Figure 2. At the central station in Göteborg a computer screen is built into a tower to make the display more esthetically pleasing.

This is a scenario that might be more feasible than one may think. Plasma and LCD screens are already advertised for hanging on the wall like paintings (T3, 2002). They are intended for viewing TV, video and DVD, but could also become part of spaces where we socialize, read and relax, e.g. displaying a decorative picture. In this case, the computer screen works fairly well as an adornment, but the possibilities that advanced technology offer are much greater. This is especially obvious if you consider that in the near future, things like curtains, walls, lamps and tables could be augmented to present real-time information. Computer technologies are becoming more affordable and unobtrusive every year and new technologies such as "electronic inks" and electro-luminescent materials may soon allow flexible materials such as paper and fabrics to become computer displays. If people are to have various objects in their everyday environments constantly presenting information, it is necessary to make the presentation blend into the surroundings.

Pictures are often used as decoration and considered enjoyable. A picture that presents complex information can be beautiful, and at the same time be a very

effective way to describe Information visualization overviews and manipulation make it possible to show interpret (Card et al, 1999) it possible to dynamically transformations, such as t

Informative Art is a p posters and paintings) an piece of informative art l static image its visual dynamically changing in wall-mounted display to g informative art have pre SIGGRAPH Emerging Te

1.1 An Example of Info

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Figure 3. Informative a

The colors of the field sent an e-mail. A field can his compositions, i.e. red, person is "hot", i.e. that person sending an e-mail, has not sent an e-mail in a

effective way to describe, explore and summarize a set of numbers (Tufte, 1984). Information visualization uses the possibilities given by computers to present overviews and manipulate large data sets or complex data. In this way, pictures make it possible to show information that would otherwise be hidden or hard to interpret (Card et al, 1999). Furthermore, advances in computer graphics are making it possible to dynamically transform pictures, e.g. with painterly rendering and color transformations, such as those found in Adobe® Photoshop® filters.

Informative Art is a playful combination of traditional wall decorations (such as posters and paintings) and dynamic computer displays (Redstrom et al, 2000). A piece of informative art looks like a piece of abstract art, but instead of providing a static image its visual appearance is continuously updated to reflect some dynamically changing information. The resulting visualization is then shown on a wall-mounted display to give the impression of an ordinary painting. Installations of informative art have previously been displayed in conference settings, such as SIGGRAPH Emerging Technologies (Skog et al, 2001).

1.1 An Example of Informative Art

To illustrate the concept of informative art, we will now describe the display seen in figure 3. The projected image is reminiscent of a Mondrian painting and provides a visual display of e-mail traffic for a group of people working in an office. The visualization has six colored fields, each of them reflecting the e-mail traffic one person has been involved in during the last 24 hours. The more e-mail a person sends and receives the larger the field representing that person gets.

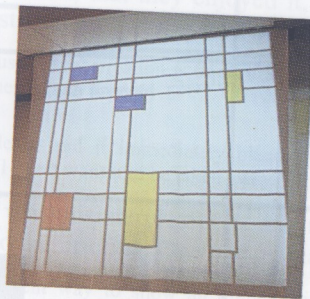


Figure 3. *Informative art: A visualization of e-mail traffic inspired by the Dutch artist Piet Mondrian*

The colors of the fields indicate how much time has passed since a person last sent an e-mail. A field can be of any of the three primary colors Mondrian used for his compositions, i.e. red, yellow and blue. In our visualization, red indicates that a person is "hot", i.e. that she recently sent an e-mail. As time passes without this person sending an e-mail, the color "cools down" to yellow and finally, if the person has not sent an e-mail in a long time, the field turns blue.

western style, left-to-right, top-to-bottom. The first square (top-left) represents today's weather, the next top one tomorrow and so on. This gives a four-day weather forecast in the following way:

The size of each square reflects the temperature for that day. The warmer it is that day, the larger the square becomes.

The colors of a square show the weather condition of that day: yellow represents a sunny day, blue represents a rainy day and the remaining primary color, red, represents clouds.

The piece is implemented as a java application that retrieves the weather information from the "Yahoo!" online weather service (<http://weather.yahoo.com>). The application reflects the information on the Web dynamically and is updated every five minutes to mirror any changes. In this way, the resulting image reflects the current weather and a four-day weather forecast, while still being reminiscent of a painting in the style of Mondrian.

The visualization was shown for a week on a large flat-panel screen in an open public space at the University. We conducted two studies during this testing period, one of them being preceded by a brief explanation of the piece to a group of students. During the briefing about 30 students were told about the overall concept of informative art as well as how to read the piece. The two studies resulted in a total of 40 questionnaires, of which 15 came from students who had attended the briefing.

2.1 Comments from Students Who Attended the Briefing

When provided with a brief introduction, a majority of the students indicated that they could read the visualization, that they enjoyed it, and that it naturally blended into the background. Two students made the following comments:

"I think it is good because the information is transmitted in a simple way. I don't find the display annoying either, which is positive."

"Very good. Easy to learn and it immediately blended into the background and consciousness. Actually, I don't want it to be taken away."

However, it turned out that misinterpretations and misreadings did occur, even for students who had been to the briefing. One person made the following comment:

"An interesting and different way to show an uninteresting weather forecast. The question is how interesting it is to show a forecast with graphics. It would be more informative if it was the actual weather that was being presented."

In fact the piece was designed so that the interpretation of the coming four days temperature would be guided by the current weather, which together with its representation on the display, would serve as a frame of reference. Other people also seemed to have mistaken the display for showing a weather forecast for the coming five days, rather than today's weather and the coming four days.

One student suggested that blue could be associated with a blue sky rather than rain. Another subject found it hard to map the days to the position of the squares as

they had different sizes and did not follow a line. This person also mentioned that she associated blue with cold and red with heat.

As we wanted a decorative image to become an information display, we suspected that some might find it hard to read. We also expected that people would be skeptical about this way of presenting information. Despite our fears, the comments were generally positive as the majority actually said that they liked it. One person appeared to be excited by the novelty and surprise introduced by the concept, commenting that it was:

"Fun and sensational!"

2.2 Comments from Students Who Did Not Attend the Briefing

Those who did not attend the briefing were usually not even aware that the piece was a weather display, let alone how to read it. As the piece only changed its visual appearance rarely, some students believed that it was a static image. One person made the following comment:

"...this is fairly useless as a painting. The machine is meant for animated images, right?"

This was not the only person who seemed to believe that the display showed desktop wallpaper or a temporary image rather than information:

"I don't know what it is but it looks like art."

"A bad paraphrase of a painting made by Piet Mondrian"

"Some digital art"

When we designed the piece we did not want it to be annoying or attention grabbing. Thus, instead of having gradual transitions or animations that would attract attention, the changes appeared instantly. Many who did not know that it visualized information commented that they had not noticed any changes. The fact that they did not perceive changes might have been affected by the fact that they neither expected it to reveal information, nor to change its visual appearance.

Some people clearly sensed that it probably was displaying some information, without knowing exactly what:

"It is hard to see if the pattern has changed. Whatever it shows is hard to read"

"I don't understand the content, but with some information about the context..."

Without any given context, it seems very hard, if not impossible to know that informative art visualizes information, regardless of what it is.

Some students had their very own suggestion on what was visualized. For instance, one student believed that the piece was a map, showing cold and warm fronts. Another student had a more peculiar explanation (especially considering the University was located in Göteborg!):

"It is a network visualization, part of

Those who did not understand it as a decorative item, which some see on the piece:

"Inspiring!"

"Pretty, however I think that it makes sense of art you like."



Figure 5. The local weather for the University

2.3 Discussion

Based on the results gathered from the study we see that it is hard if not impossible to give an explanation. The fact that "we think with the mind" (Solso, 1998). Whereas many information displays with informative art you need to look at it correctly. Thus, you will only be able to "decode" the visualization.

The majority of the students gave answers that they liked the piece; it was decorative and readable:

"It is a nice and easy way to get weather information"

"I got an explanation right away, it was nice."

Perhaps an even more important factor was that it was decorative and readable by some was that it was

"It is a network visualization, part of the subway in Stockholm."

Those who did not understand the information could still appreciate the piece as a decorative item, which some seemed to do, considering the following comments on the piece:

"Inspiring!"

"Pretty, however I think that it may be different (the attitude) depending on what kind of art you like."



Figure 5. *The local weather forecast presented as informative art at the IT University in Göteborg.*

2.3 Discussion

Based on the results gathered from the students who had not attended the briefing, we see that it is hard if not impossible to figure out what the information is without an explanation. The fact that "we see things through the eyes, but we understand things with the mind" (Solso, 1999) is literally inevitable with informative art. Whereas many information displays provide the context along with the information, with informative art you need to know what to look for, in order to interpret it correctly. Thus, you will only be able to read the information if you know how to "decode" the visualization.

The majority of the students who had attended the briefing expressed in their answers that they liked the piece; some indicated that the display was both enjoyable and readable:

"It is a nice and easy way to get weather information"

"I got an explanation right away, and then I understood what it visualized, I thought it was nice."

Perhaps an even more important result that this particular piece was enjoyable and readable by some was that it suggested other applications. A student emphasized

that not only did she find it inspiring, but also that the piece raised ideas on how other information could be presented.

3. CONCLUSION

Informative art is not designed to display information in the most efficient way, but rather in a fashion that appeals to people's sense of aesthetics. In general, it does not provide the viewer with exact information, but instead gives an overview or summary of some data, e.g. that the temperature will rise in the coming days, or an overview of the e-mail activity in a group.

It is possible, however, that people could eventually learn how to extract more detailed information from a piece of informative art so that in some cases, it could replace a numerically precise presentation. For instance, in the case of the Mondrian weather display, people might after some time learn to associate the size of a square with a certain temperature, rather than just get a sense of whether it will be colder or warmer in the next few days.

People who are not aware of the informative nature of a piece are likely to perceive informative art as pure decoration. Without an explanation it is extremely hard, perhaps even impossible, to know what a certain piece represents. This suggests the possibility of showing private information in a place where other people also spend time. For example, a piece of informative art could be placed in someone's office to give a daily update about her stock portfolio, or show the time elapsed in different projects. Visitors would look at the decoration, but not be able to read the information.

Is informative art the solution for getting rid of the boring information screens displaying arrivals and departures at airports, parking meters etc. in public places? Probably not; these information displays are designed with efficiency and readability as the most important design criteria. As they display information that has a need for exactness, this field of application is probably not the best one for something that has as a primary aim to be enjoyable. If the same information is presented for a group of people who read the timetables everyday, the time left until the next bus could indeed be presented with informative art.

In the future, informative art could give us a continuously updated overview of complex information and provide opportunities to expose and visualize information that is otherwise hidden or hard to interpret. For instance, context-related information, such as the amount of people in a building or the activity in a workplace could be visualized with graphical shapes and patterns. Such displays would be constantly running in the background in everyday environments, and could ultimately provide a form of natural or "calm" technology, combining an informative function with the aesthetic and visual appeal of traditional art.

4. REFERENCES

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1. INTRODUCTION

1.1 Programming as a community activity

The increasing pervasiveness of community networks has opened new channels for community interaction (Carroll & Rosson, 2001). Residents may email questions or suggestions to town officials or leaders of other organizations (Cohill & Kavanaugh, 1997); parents may contact public school teachers online, and track their children's weekly activities through regular email bulletins; community elders may share their memories and wisdom with community youth (Carroll et al., 1999; Ellis & Bruckman, 2001). However, such activities are discretionary: residents must first believe that the new opportunities will be rewarding, if they ask to take the time to investigate and participate (Rosson et al., 2002a).

We are exploring the motivational characteristics of community-oriented collaboration in the CommunitySense project, where diverse members of our local community cooperatively design and build visual simulations that raise or illustrate community issues (Rosson et al., 2002). Participants plan, share, and discuss their projects via a Web site [communitySense.cs.tu.edu]. Our initial studies have centred on interactions between middle school children and community elders. Prior work has shown that children of this age are able and motivated to work with visual simulations (Rader, Brand, & Lewis, 1997); elders may be less likely to become simulation programmers, but several studies have demonstrated their willingness and availability for youth-mentoring activities (Ellis & Bruckman, 2001; O'Neill & Gomez, 1998; Wissmann, 2002).

Our earlier papers have described the problems experienced by students and elderly residents learning to use Stagecast Creator (Seals et al., 2002; Wissmann, 2002), the participatory design of community simulations (Rosson et al., 2002a; Lewis et al., 2002), and the nature of cross-generational collaboration (Rosson et al., 2002b). In this brief case study, we focus more specifically on participants' subjective reactions to the community-oriented simulations and to the process of simulation programming.