Narrative Strategies for Learning Enhanced Interface Design
" Symbol Mall"

URL: http://uregina.ca/~uttaranj/chap&gal.swf
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Abstract: Recent works in the area of multimedia studies focus on a wide range of issues from the impact of multimedia on culture to its impact on economics and anything in between. The interconnectedness of the issues raised by this new practice is complicated by the fact that media are rapidly converging: in a very real way, multimedia is becoming a media prism that reflects the way in which media continually influence each other across disciplines and cultural borders. Thus, the impact of multimedia reflects a complicated crossroads where media, human experience, culture and technology converge.

An effective design is generally based on shaping aesthetics for function and utility, with an emphasis on ease of use. However, in designing for cyberspace, it is possible to create narratives that challenge the interactor by encoding in the design an instructional aspect that teaches new approaches and forms. Such a design offers an equally aesthetic experience for the interactor as they explore the meaning of the work.

This design approach has been used constructively in many applications. The crucial concern is to determine how little or how much information must be presented for the interactor to achieve a suitable level of cognition. This is always a balancing act: too much difficulty will result in interactor frustration and the abandonment of the activity and too little will result in boredom leading to the same negative result. In addition, it can be anticipated that the interactor will bring her or his own level of experiential cognition and/or accretion, to the experience providing reflective cognition and/or restructure the learning curve. If the design of the application is outside their present experience, interactors will begin with established knowledge in order to explore the new work. Thus, it may be argued that the interactor explores, learns and cognates simultaneously based on primary experiential cognition.

Learning is one of the most important keys to establishing a comfort level in a new media work. Once interactors have learned a new convention, they apply this cognitive knowledge to other new media experiences they may have. Pierre Lévy would describe this process as a "new nomadism" that creates "an invisible space of understanding, knowledge, and intellectual power, within which new qualities of being and new ways of fashioning a society will flourish and mutate" (Levy xxv 1997). Thus, navigation itself offers the interactors the opportunity to both apply and learn new cognitive skills. This suggests that new media narrative strategies are still in the process of developing unique conventions and, as a result, have not reached a level of coherent grammar.

This paper intends to explore the cognitive aspects of new media design and in particular, will explore issues related to the design of new media interfaces. The paper will focus on the creation of narrative strategies that engage interactors through learning curves thus enhancing interactivity.

1. Introduction

Human cognitive processes are inherent to the human condition. Intimately linked to environment and circumstance, human cognition changes and adapts as new experiences expand and alter our perceptions. Thus, it may be argued that human cognitive processes are prepared from birth to embrace life-long learning as a basis for conceiving new circumstances and dealing with shifts in environmental contexts (Walter III 1935). Computer-based applications have extended human cognition through the development of what might be termed as "interactive cognition" by expanding our ability to multitask in interactive environments. Lev Manovich suggests that the demands of multitasking demands that users rapidly alternate "between different kinds of attention, problem solving, and other cognitive skills. All in all, modern computing requires of the user intellectual problem solving, systematic experimentation, and the quick learning of new tasks" (2000 210). Therefore, this paper will explore this issue by the analysis of an application that has been created to test how interactive cognition in navigation can actively incorporate learning as a key feature of its design. This experiment demonstrates how the use of design aesthetics can offer learning as a means of sustaining user engagement and as a means of creating meaning.

2. Theoretical Perspective

A minimalist approach to design can enhance interactor interest and the quality of the interactive experience in computer applications. However, the crucial issue is determining the level of navigation information required to achieve a suitable level of cognition. If there is too

little navigation, users will become frustrated and abandon the activity. As well, if there is too much and the user faces cognitive overload, then the application will not achieve its user goal. A third condition exists between these extremes in which navigation is designed too simply and the user fails to remain engaged in the activity. Thus, one of the key elements for a successful design lies in finding a middle ground that allows the interactor to engage experiential cognition and accretion as a means of sustaining interactivity over time. For example, if the interactor is faced with an unfamiliar task in navigation, the natural response is to seek a solution beginning with the interactor's previous experience in computer applications, therefore encouraging reflective cognition and/or restructuring their current level of learning. In this way, as the interactor explores the application, they are simultaneously learning and collecting cognitive experiences. This results in a stair-step experience in which the initial experiential cognitive engagement with the application results in the use of reflective cognitive experiences to solve specific tasks and finally culminates in a new level of experiential cognition as the new task is solved, understood and added to the interactor's understanding.

Donald A. Norman argues that we, as humans, "have invented a wide variety of things to aid our cognitive, some physical, some mental. Thus tools such as paper, pencils, calculators, and computers are physical artifacts that aid cognition" (1993 4). Norman makes the point that mental artifacts such as reading, arithmetic, logic, and language encode their power in the "rules and structures that they propose, in information structures rather than physical properties" (4). From Norman's perspective, experiential cognition is "reactive," based on an instinctive response to information we receive from our senses, but it is upon the reservoir of experience we have built over our lives (15). Reflective cognition, on the other hand, engages concepts and planning, and generally requires "both the aid of external support – writing, books, computational tools – and the aid of other people" (15-26). Norman's position is supported by Brenda Laurel when she suggests that " What is represented in the interface is not only the task's environment and tools, but also the process of interaction- the contributions made by both parties and evidence of the task's evolution.... Interface design should concern itself with representing whole actions with multiple agents" (1991 7). Both these authorities associate the process of learning with interface engagement and thus provide a framework for innovative navigational design.

Norman in particular offers three categories of learning that are worth consideration in terms of their potential to identify navigational design strategies. The first category is accretion, which involves the accumulation of facts (28). Tuning is the process of collecting experiences that aids in the updating of knowledge or expertise (29). Finally, restructuring, which is reflective, involves shaping and extending current information to adapt to new challenges and problem-solve unfamiliar tasks (30).

Norman's approach to cognitive learning offers the potential in interface design to considering experiential cognition as the first step of computing interactivity. The mouse click, the command prompt, the keyboard menu, the menu bars, the toolbox, the folder, means of dragging and dropping, and the folder are all conventions of computer interface options which generally are the basis of primary cognition and are gained through accretion learning. However, in the case of game design or those applications that use a game design approach, interface strategies deliberately engage restructuring of these conventions to challenge interactors with unusual experiences as they explore the game space. In terms of reflective cognition, the most obvious current application occurs in computer games, where interfaces are specifically designed to go beyond existing conventions in order to challenge the interactor as they explore the game space. In this case, restructuring learning is one of the main means of sustaining interaction.

The extension of reflective cognition and restructuring to applications beyond games is possible and in fact has already occurred. The post-modern period, in which computer technology has arisen, has placed a value on aesthetics and intellectual engagement which challenges spectators to develop their own understanding of art systems. In this regard, computer interactors expect a certain level of learning and are often prepared to seek experiences in which less presentation is more effective. This trend can be linked to nomadism in which cognition, as an artifact can be reinvented to expand capabilities, in the sense that interactions with computer applications are stored by experience, carried to a new application and then restructured to assume new forms as new tasks are accomplished (Levy xxv 1997).

What is under examination here is not the architectural structure or technology of the application. Rather, the examination is focused on the narrative structure of the individual elements that comprise the interface. Certainly the application should contain a good architectural structure with a clear vision of mapping and links. It must contain enough direction or information to allow the interactor to navigate the application, but it must also contain enough challenge to bring the interactor's reflective cognition to the fore. From a design point of view, the narrative and aesthetic elements are crucial in the creation of an environment, which encourages the interactor to explore the interface. If narrative and aesthetic elements are properly employed, the interactor will succeed in meeting the

challenge of the interface and mastering the specific task. The pay-off of success encourages the interactor to gain more confidence and prepares them psychologically to build on their cognitive experience.

In order to construct an appropriate narrative and aesthetic experience for reflective cognition, an application designer must first give careful consideration to the needs of the interactor. As Florian Brody has observed, "the task of the designer is not to create a better button, but to determine if buttons are required in the first place" (1999 140). Thus, the designer must first identify the key needs or criteria that must be met for an interactor to achieve a successful experience: for example, the designer might determine the number of pages required and how each page will be linked. This type of evaluation process is crucial to the development of the application, as a poorly designed interactor protocol will result in the sub-standard performance of the application.

Aesthetic elements in interface design rely primarily on metaphor, symbolism, semiotic relationships and cognition, which are in turn modified or influenced by culture. Once the designer has established the interactor criteria, aesthetic strategies are developed to best render these in terms that engage experiential and reflective cognition through the creative use the aforementioned elements. The aesthetic design of the application can assist in shortening the learning curve for interactors by offering low-navigational multitasking such as deciphering metaphors as a means of encouraging exploration and appropriate comfort levels during use.

3. The Case History

In order to explore the issues of experiential and reflective cognition in application design, I created "Symbol Mall," a CD-ROM work that explored virtual ethnicity through the use of cognitive designs intended to engage male and female subjects. The basic goal of the work was for interactors to collect information on specific symbols by solving navigational challenges with a minimum of visual clues in the interface design, based on a few repeating patterns.

The CD-ROM was tested on 20 human subjects who were provided with no initial information on the goals of the project or its structure. This was intended to demonstrate that in low navigational situations, interactors are able to problem-solve challenges based on previous accretion, and develop new skills by engaging experiential cognition. In addition, the intention was to demonstrate that interactor comfort level would rise as each new task was mastered successfully and that this comfort level would rise with interaction over time.

The test was comprised of three parts. First, the test subjects were taken computer workstations left to explore the "Symbol Mall" as they chose to. Once exploration was concluded, the subjects were then asked to fill out a questionnaire that allowed them to evaluate the work and their experience. Finally, I conducted an informal discussion of their experience, which allowed the subjects to voice opinions and issues that may not have been addressed by the questionnaire.

4. The Navigation

According to the questionnaires, 10 percent of the subjects found the navigation poor. 65 percent of the subjects found a fair level of navigation throughout the application. 25 percent of the subjects termed the navigation of the application excellent. These are the results, broken down by gender.

Table 1. Level of Navigation

	Level of Navigation		
Gender	**Poor**	**Fair**	**Excellent**
Male	2	6	2
Female	0	7	3

According to the questionnaires, 80 percent of male subjects found that previous experience with earlier symbols assisted them in finding the right way to interact with the next one. 100 percent of male subjects also found that their comfort level with the interface environment increased the further they went into the application.

For females, 90 percent of them found that previous experience with earlier symbols assisted them establishing strategies for dealing with the next symbol. 90 percent of them also found that their comfort level with the interface environment increased the further they went into the application.

Table 2. Experiencing Assistant and Comfort Level Increasing

	Experiencing Assistant		Comfort Level Increasing	
Gender	**Yes**	**No**	**Yes**	**No**
Male	8	2	10	0
Female	9	1	9	1

5. The Observation

During the test process, I observed the subjects as they interacted with the application. Initially, subjects experienced some frustration and/or hesitation in navigation, and most mistakes occurred at the beginning of testing. However, once a few symbols were completed, subjects then had learned enough about the interface structure that they were able to apply it to solving future tasks. As the tests progressed, success in the early phases permitted subjects to develop a map of

the infrastructure that allowed them to minimize trial and error approaches.

Without prompting, most subjects began their exploration by moving the mouse. When the arrow turned to a pointer, most subjects clicked in the area. This action allowed them to transit to the next step in the application. This assertion is supported by the answers gathered in the questionnaire. In answer the question, "Which visual element in the interface signals how to proceed to the next step?", 30 percent of the subjects directly identified the arrow's transformation into the pointer as the relevant transition. 60 percent of the subjects keyed on other visual cues such as identifying the "shopping bag", 'back arrow' and "dark screen." These answers seem to indicate that for the average interactor the arrow turning into a pointer is such a widely recognized convention that they did not recall it or consider it an important issue.

One of the key devices used to engage experiential cognitions is the use of red balls. In the first game played by male subjects, they were required to cat the moving red ball in order to transition to the symbol for bread. In the second game, they were required to catch the red petal in order to move on to the section on flowers as a symbol. Initially, some subjects attempted to catch the grey ball also present on the screen, but when it did not have the desired effect, they then tried to catch the red ball. In the second game, the vast majority of subjects immediately tried to catch the red petal, having learned from the first game that the colour was a cue.

Figure 1 is the image of the "bread" page. Interactors must catch the bouncing red ball in order to transition to the page where they will find the meaning of bread symbol. The red ball becomes a cue for future tasks.

Figure 1. The image of the "bread" page

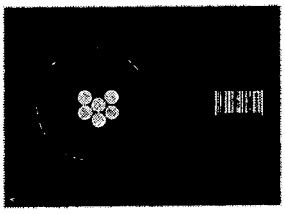

Figure 2. The image of the "flower" page

Figure2 is the image of the "flower" page as interactors must catch the red moving petal. Subjects learn from the first game and then try to catch the red petal immediately.

Subjects adopted this strategy to another similar game. In the section on the milk symbol, subjects were required to drag the red ball into the dark blue area. Most subjects, based on their previous experience, were able to easily deduce the drag and drop task because they associated a red ball with something moveable and the dark blue area as an activated area. Thus, subjects were able to take experiential cognition and restructure it to suit another task.

5. Conclusion

The test demonstrates that a low degree of navigation can successfully engage interactors by accessing experiential cognition. Average interactors, based on previous experiences in computer-based media are open to restructuring learning as a means of accessing new media aesthetic and narrative structures. This openness is likely as result of the emerging status of this medium, which prepares interactors to accept a degree of learning as part of using the media. Hence, designers can incorporate experiential cognition as an effective means of engaging interactors as most are prepared to accept a degree of "techno-frustration" as they learn to use new interface designs.

Successful learning is one of the most important keys to establishing appropriate comfort levels with new media applications. Furthermore, once interactors have mastered specific tasks, they generally display a willingness to extend this knowledge to new and different challenges. Thus, experiential cognition and restructuring offer effective design strategies to enhance and extend current interface design.

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