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EUTIC 2007 -

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COMMUNICATION SPACE, FROM CANVAS TO SCREEN

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This article considers the major role of the television and computer screen as a point of convergence of different representational forms and the emergence of new ones proper to the electronic and digital culture.

Our approach is focused on the following thematic axes:
- The study of the different levels of organization of the screen space as an environment of communication and representation.
- The development of a new codification of communication based on the modalities of interaction.
- The analysis of the screen interface as a point of convergence of existing cultural forms and the emergence of new ones, proper to computer world.

Framing the visual space of representation

The long procedure of the rationalization of vision from the Renaissance to the era of digital technologies has implied the metaphor of the architectural figure of "window" in the translation of phenomenal three-dimensional space of vision to the two-dimensional plane of representation. Leon Battista Alberti was the first to imply this metaphor in his 1435 treatise on painting and perspective "De pitura". Alberti defined the rectangular frame of a painting as a view through an open window (aperta finestra). This conception of an orthogonal frame as an opening to the visual world has influenced theoretical approaches on representation media, both static (painting, photography) and moving-image (cinema, television).

Renaissance painters used secondary framing (framing within the frame) as a representational strategy. Interior spaces with openings to natural or urban landscapes offered the possibility of multiple space representations. In the 20th century, certain avant-garde movements (cubism, photographic collage) experiment with the multiplication of points of view as well as with the co-existence of multiple perspectives, fragments of reality and different media. Friedrich Kittler refers to typography as the technology that first enabled the co-existence of text and image (Kittler, 2001).

The historical dominance of the single-image, single-frame paradigm has been defied by moving-image media (cinema and television). Filmmakers and video artists experimented with superimpositions of image layers, split screens and multiple screen projection, thus opening different perspectives in space (here and there) and in time (present and past). Christian Metz characterized the representational practice of using frames within frames (such as the *Rear Window* by A.Hitchkock, 1954) as a compositional *mise en abyme* (Metz, 1991). We could also refer to numerous examples: on one hand of multiple frames use in film history, from Abel Gance's 1927 three-screen *Napoleon* to Mike Figgis' 2000 four-screen *Time Code*, on the other hand of multiple image layers from Dziga Vertov's 1929 *Man with the movie camera* to Peter Greenaway's 1991 *Prospero's Books*. Although these experimentations remained limited, they offered a rich problematic and contributed to the evolution of our conception of representational space.

The screen as a human-computer interface

The emergence of digital technology has radically transformed the space of the screen. The first appearance of the screen as a visual input/ output device of human-computer communication was the invention in 1951 of the CRT vector graphics screen of the Whirlwind computer, constructed by the MIT Lincoln Laboratory in Cambridge Massachusetts for the USA Navy SAGE program (Semi-Automatic Ground Environment) connecting data coming from all ground radars. In the 1960's, Douglas Engelbart, a researcher at the Stanford Research Institute, first supplied a mainframe computer with a video terminal. The introduction of the graphical user interface (GUI) transformed the computer screen from a page surface with text symbols to an iconographic communication space.

When the concept of interface first began to emerge, it was commonly understood as the hardware and the software through which a human and a computer could communicate. As it has evolved, the concept has come to include the cognitive and emotional aspects of the user's experience as well. Today, the implication of the term human-computer interface (HCI) includes:
physical input and output devices, use of metaphors to conceptualize the organization of digital data, ways of manipulating data, that is a grammar of meaningful actions that user can perform on it, the cognitive and emotional aspects of the user's experience.

We should bear in mind that the space of the screen has a double status: visual as well as symbolic (Couchot, 1988). The screen has a double identity, on one

hand as a visual communication space and on the other hand as a digital reflection of the data organization in the computer memory. As a result, the modification of the screen space alters the codification of digital data in the level of memory programming.

Screen space can be considered as an electronic collage, organized with multiple levels of space and information. The architectural composition of the screen space is the result of the integration of different media types in multiple layers and electronic windows. The combination of the media types is a consciously constructed aspect of the aesthetic of the space organization. The organizations of active areas or spots, on the surface of the screen, enable interactive communication and navigation.

The computer screen as a window to extending space

In the history of computing devices, the use of metaphor became a direct component of the graphic display screen. The "page" and "window" metaphors constitute key features shared by all modern human-computer interfaces. The computer screen is at the same time a page and a window, opaque and transparent (Friedberg, 2006). Overlapping windows were first proposed by Alan Kay in 1969, which seems to be the first to invoke the window metaphor. In his dissertation at the University of Utah, Kay described a graphical object orientation system that had viewports and windows. In 1984 Apple introduced an interface of overlapping windows following the stack of papers and book metaphors. Thus the page was extended by scrolling and going back and forth. In 1987 Apple introduced the HyperCard program which extended the page concept in new ways enabling the co-existence of multimedia elements and offering the possibility of establishing links between pages. Hyperlinking became a new way of organizing and accessing media. HTML stretched the concept of page even further creating distributed documents that are the location of the parts of a document in different parts of a computer network. The computer screen shifts from the singular frame of perspective to the multiplicity of windows. All modern interfaces display information in overlapping and resizable windows. As a result, a computer screen can present the user with a practically an unlimited amount of information despite its limited visible surfaces. The graphical user interface transformed radically our spatial imagination while visual metaphors contributed in the emergence of a new paradigm of information communication (Johnson, 1997).

The fluid and dynamic character of the digital space gives birth to a new mental experience, the one of interactive navigation. This experience is an association of glance and gesture which is operated by the program in the data space. The

virtual displacement in the multimedia environment is based on the organization of different possible paths and the codification of this displacement. This codification uses metaphors of space organization and has developed a new digital ergonomy and identification. Designing interaction is diagramming the potential flows of possible events.

On the other hand, evolutions in digital representation have highly influenced televisual iconography. In the last decade, television screens have been invaded by insert screens, pop-up windows and text crawls. As a result, today's television looks much more alike a website environment than the single frame cinema projection, thus enabling the viewer to perform a virtual window-shopping.

Interactivity and Navigation

In 1945, Vannevar Bush in 1945 described in one of his articles the *Memex*: a machine for browsing and annotating a large collection of different documents. It included a mechanism for creating links between documents, allowing documents related to one currently being read to be retrieved. Bush's innovative concept was that association of ideas was fundamental to the way people think and that document storage systems should be organized in a way that reflects these associations. Computer technology made possible Bush's concept enabling the co-existence of multiple representational media (text, photographs, drawings, moving image, sound and so on) in the same digital environment and allowing a non-linear linking between them.

Digital co-existence seems to strengthen already existing media forms while on the other hand acts as a catalyst of new forms. Concepts and techniques invented by avant-garde movements of the beginning of the 20th century became embedded in the commands and the interface metaphors of computer environments. As a matter of fact avant-garde strategies of collage, photo-montage, constructivist design, film editing, etc. became materialized in a computer environment. In an analog way, the shift from the material object to the variable digital information has been prepared by the electronic technologies during the 20th century (sound synthesizers, video art). Artistic preoccupations of 20th century artists such as the escape from the two dimensional canvas or screen surface and to correlate different media find today a new dimension. Elements of different media are placed next to each other on the screen surface, both in width and depth, in an attempt to establish visual, stylistic, semantic and emotional relations.

In a multimedia environment the user moves through the multimedia space each step at a time, trying to explore each element, enjoy its media sources (text, video, animation, sound) and then move to the next one. He establishes an itinerary, thinks in terms of performing actions such as indexing, selecting out of menus, pointing at objects and so on. Exploring a multimedia space allows the user at the same time to unfold the logic organization of the content.

Navigating in an interactive multimedia environment includes two main procedures: On one hand we have the spatial composition of the surface of each screen and the time-based composition of audiovisual events. Parallel to that, we have the composition of the structure of the interactive navigation. The spatial composition of each screen is deconstructed in terms of the hyperlinks and the space of the entire multimedia project is a complex one of different types of media, of location and of travel. Moving from one element or event into another establishes a third dimension in the mind of the viewer, that of the interactive narrative.

Navigable space has become a new tool of labor and a common way to visualize and work with any data, since it can be used to represent both physical spaces and abstract information spaces. Hyperlinking separates data from its structure. The same data can be endlessly assembled in new structures. Parts of a single document can exist in physically distinct locations, i.e. a document has a distributed representation. The design of space functions is characterized by interactivity, non-hierarchical organization and modularity.

The screen as a communication interface

Lev Manovich employs the term cultural interface to describe the ways in which computers present and allow us to interact with cultural data such as Web site interfaces, CD-ROM/DVD-ROM titles (Manovich, 2001). The language of cultural interfaces is largely made up of elements of already familiar cultural forms.

We can distinguish three main forms: cinematic tradition of moving image, text/typography and painterly tradition, each one bringing into the digital space its own set of conventions. Painting brings the linear perspective organization, the juxtaposition of forms and materials and the opening to a homogenous, space. Moving image tradition brings the mobile camera representation of space, editing techniques, narrative conventions and spectator activity. Typography brings the rectangular page organization with columns of text, images framed by text, ordered sequence of pages, table of contents and indexing.

A fourth tradition, a recent one, has developed inside the computer world and concerns the conventions and principles of the human-computer relation itself as it evolved from the early 1950s to 1980s and the final appearance of Xerox Star (1981), Apple Lisa (1982) and the Macintosh (1984).

Shifting between viewer communication and user control

Each window is in essence a variable-size virtual screen that presents the progress of some activity. During human-computer communication in a multimedia environment we shift between perceiving and making choices, oscillating between the roles of a viewer and a user. This oscillation constitutes the cyclical organization of the digital space user's experience. At the same time the screen alternates between representation and control, between an illusionary universe and a set of controllable elements. Modern HCI principles, such as direct manipulation of objects on the screen, overlapping windows, iconic representation and dynamic menus, are today broadly accepted and they constitute a cultural language of their own.

Digital homogenization of different media permits the creation of a new object that can keep its initial modularity. In other words, a typical new media object is put together from elements that come from different sources. These elements need to be coordinated and adjusted to fit together, through digital compositing, which allows the control of the transparency of individual layers and the combination of a great number of layers of information. As a general operation, compositing can be considered as a counterpart of selection. This relationship is more interactive and is made possible due to the modular organization of a new media object.

Windows are particularly valuable in allowing the execution of different software at one time (multitasking). The user's navigation through multiple windows and software applications poses the question of a new experience of time. Time-based representation evolved from the film single-image, seen in sequence, to the simultaneous vision of adjacent multiple images. Anne Friedberg considers the twenty-first century multitask user as the heir of Walter Benjamin's nineteenth *flâneur* (Friedberg, 2006).

Conclusions

The computer screen functions both as a page and a window, serving as a dual opaque and transparent visual representation surface. Computer screen can

present the user with a practically an unlimited amount of information despite its limited visible surface. The graphical user interface has transformed radically our spatial imagination, while visual metaphors contributed in the emergence of a new paradigm of information communication

Information and communication technologies have spatialized all representations and experiences while digital narrative is equated with travelling through information. Navigable space is already an accepted and familiar way of interacting with any kind of data. The compositional structure of interactive multimedia works on the one hand as a visual, spatial composition and on the other hand as a narrative and navigational structure. Taking into account the new way in which space functions in computer culture, navigable space represents a new challenge shifting from the geometry and logic of contemplating a static area, to a trajectory through digital data space.

As distribution of all forms of knowledge and culture becomes computer-based, we are no longer interfacing to a tool but to a culture encoded in digital form and computer screen emerges as a cultural interface. In this sense, the screen is not a picture neither a window, but rather an ambiguous and unfixed location of communication and representation.

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