Bridging cultures in electronic communication: New multiliteracy models for interaction design

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In my research I am developing new multiliteracy models for computer interface design. These design models are derived from dynamic, time-based communication structures used in oral communication in Indigenous cultures. The research uses visual patterns to represent the changing semantic structures in an interactive information space where there are numerous networks of associations. These multiliteracy models integrate the semiotics of early oral cultures with the semiotics of modern electronic communication. They reflect pluralistic, aural-visual, community-based communication styles that differ from Western perspectives of temporal sequencing, logical analysis, and fixed hierarchies. For these reasons these designs have important implications for improving global networking and closing the digital divide.

New multiliteracy models

Interactive multimedia technology provides an opportunity to expand the learning environments for underdeveloped communities and improve intercultural communication in global networking. There is a great deal of talk about bridging the digital divide by making electronic hardware and software available to remote or underdeveloped areas of the world. Little focus, however, has been given to the importance of developing computer interfaces that are appropriate for the diverse learning and communication styles in different cultures. Such interfaces need to reflect pluralistic, aural-visual, community-based communication styles that differ from Western perspectives of temporal sequencing, logical analysis, and fixed hierarchies. Just providing underdeveloped communities with traditional computer hardware and software will not bridge the digital divide. The human-computer interface must reflect the user's cultural and social methods of interaction and communication.

Unfortunately, modern interaction design is dominated by Western concepts in design that emphasize logical hierarchies. Designers are taught to use grouping, contrast, and white space to create visual hierarchies that separate and prioritize information. These concepts in interaction design limit the potential for using interactive technologies to visualize the complex relationships and layers of simultaneous events that characterize modern information spaces and the cognitive models of many non-Western cultures.

The origins of non-Western cognitive models can be found in the oral communication techniques of early Indigenous cultures. The semiotics of oral communication is characterized by 1) duality and pluralism; 2) focus on potential events as well as actual events; 3) emphasis on interrelationships; 4) emphasis on totality and the integration of individual elements into a whole; and 5) the "collapse" of space and time (Search, 2002). The term "polysemiotic" accurately describes the semiotics of oral communication. In oral cultures, symbols are not restricted to singular meanings. In these cultures, all relationships are in flux, and new, potential relationships are possible. As a result, symbols can represent many different ideas and relationships. There is no division of space and time. Past, present, and future are one. There can be simultaneous events that overlap because there are no spatial divisions in time (Swain, 1993).

Because the *relationships* between entities are so important in oral cultures, the *space* between events or actions is also important. There is less emphasis on individual elements per se. The focus is on how events *fit together*. This "positive" interpretation of space contrasts with

Western concepts of space where the space between objects is usually interpreted as empty and void of information and content.

Oral cultures use numerous design techniques to represent pluralism, the actual and the potential, interrelationships and totality, and the collapse of space and time. These techniques include geometric symbols that represent unity and timelessness such as the circle, spiral, square, and chevron. Top-down views and transparency (including the "x-ray" style in Aboriginal paintings in Australia) symbolize multiple perspectives, actual and potential relationships, and the integrated whole. Repetition and rhythm in shapes, textures, and sounds establish unity by creating a coherent structure for diverse elements. There is also an emphasis on the space between visual objects and the space between audio sounds and phrases because this space represents associations between current ideas and new relationships (Search, 2002).

The semiotics of interactive multimedia communication parallels the semiotics of oral communication. Multimedia computer programs provide opportunities to explore multiple relationships as well as the relationships between individual elements and the integrated whole. There is always the "potential" to establish new networks of associations. Electronic environments redefine spatial and temporal perspectives by collapsing geographic, physical, and temporal boundaries.

In my research I am using these parallels between oral communication and electronic communication as a foundation for new multiliteracy models for computer interface design. These designs, called HyperGlyphs, represent new approaches to user interface design that challenge traditional Western approaches to interaction design. The concepts behind these designs are derived from audiovisual communication techniques in oral cultures.

HyperGlyphs incorporate the structure and fluidity found in the audiovisual symbols of oral cultures. The designs represent pluralism and duality, the actual and the potential, interrelationships between ideas, the integration of individual elements into a continuous whole, and the collapse of space and time. The goal of these designs is to create a dynamic information structure that stimulates creative inquiry and the synthesis of new ideas.

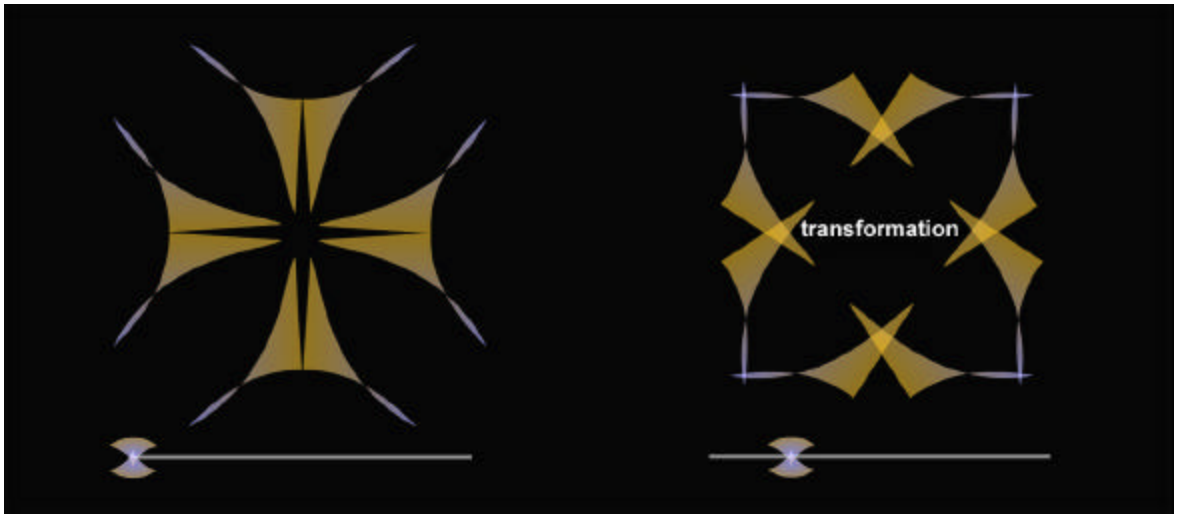
Key design elements in the HyperGlyphs designs include geometric shapes, transparency, and animations that visualize the transformation of ideas. The animations use visual patterns to represent the changing semantic structures in an interactive information space. Users can navigate through a series of pattern transformations where forms, space, color, and text change over time and carve out new visual and conceptual associations. Static information hierarchies give way to visual patterns that present information in parallel, synchronous formats as well as linear progressions. The designs highlight individual elements, their relationships, and the integration of ideas. The visual transformations represent the "spatial grammar" of interaction and the flexible interrelationships within the information structure.

Metaframes, a new audiovisual aesthetic for interaction design, integrate important design elements into the pattern transformations. Metaframes use digital design techniques, such as animations, fades, dissolves, changes in color and transparency, to create patterns that visualize the temporal dynamics of the interactive program and transcend the limitations of the static, two-dimensional screen (Search, 2003). This paper includes sample interface designs that illustrate these pattern transformations. The designs represent site maps that enable the user to view the content of the program and then move to more detailed information on a specific topic.

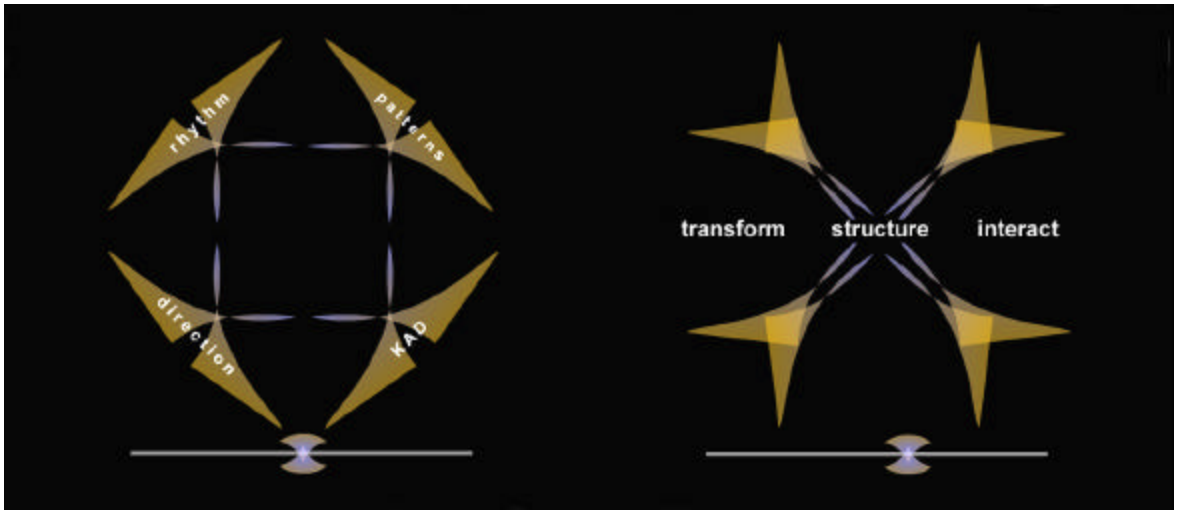
Dynamic pattern transformations

The HyperGlyph examples in this paper are animations composed of continuous pattern changes. The illustrations show only a few frames from two animations. In the first example, illustrated in Figure 1, the user moves the graphic on the navigation bar at the bottom of the screen to control the pattern transformations. The design shown in the first frame (Figure 1a) opens and rotates to create a series of new visual patterns (Figures 1b-1e). Text appears and disappears as the patterns

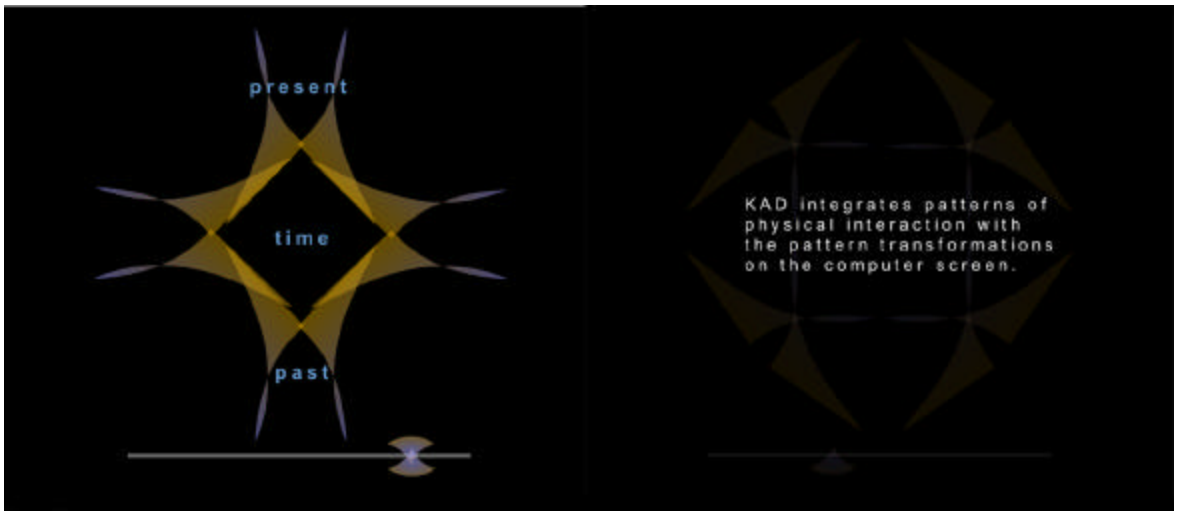
Figure 1: HyperGlyph Pattern Transformations



(a) (b)



(c) (d)



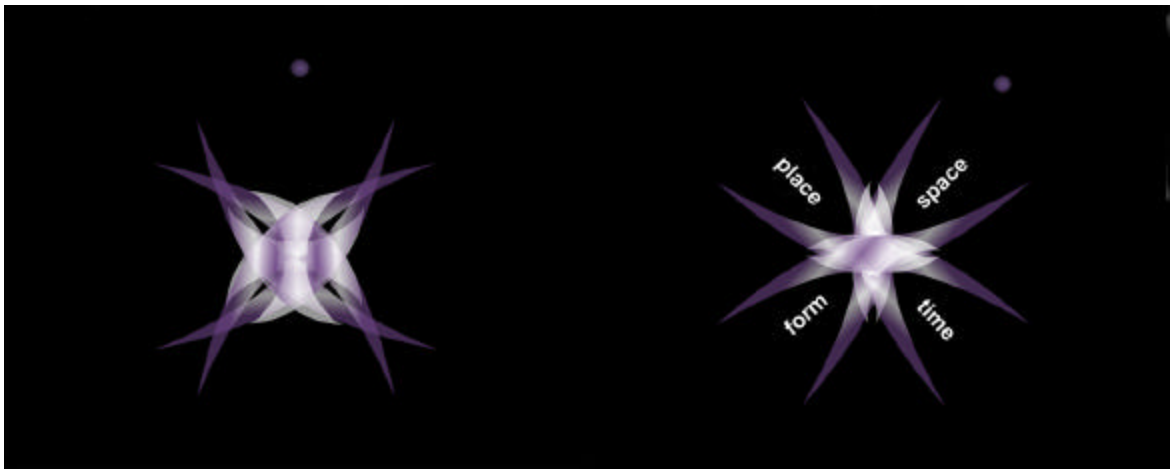
(e) (f)

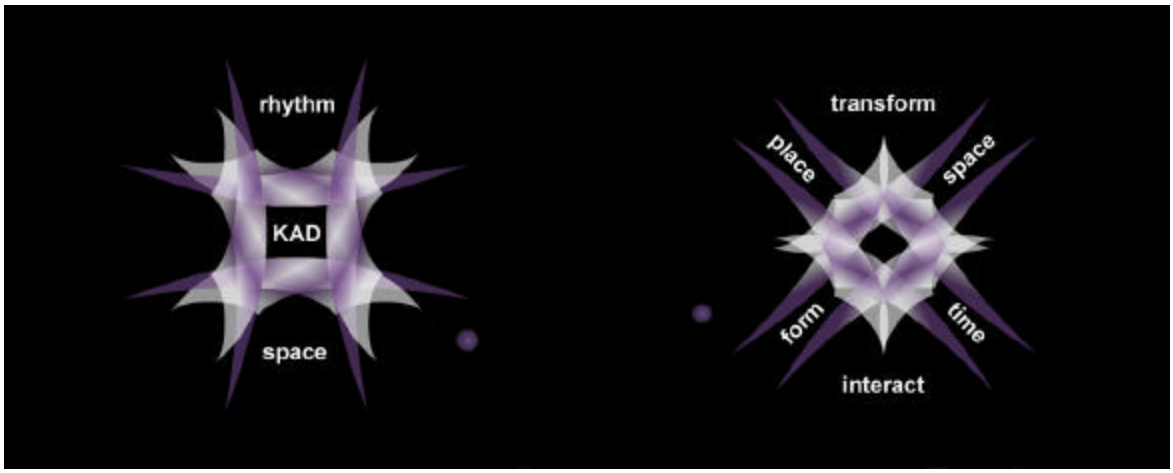
change. At any time during the navigation process, the user can select a word and link to more detailed information. This information appears on a new screen with the pattern transformation slightly visible in the background (Figure 1f). To leave this screen, the user clicks on the navigation bar at the bottom.

Within the patterns there is an underlying structure that also symbolizes continuity and integration. This structure comes from the geometric shapes such as squares, triangles, and circles that periodically appear within the transformations (Figures 1c and 1e). These shapes create familiar patterns the user can easily recognize and remember within an array of changing patterns. The shapes become important landmarks for navigation.

In the second example shown in Figure 2, individual forms symbolizing the multiple elements in the program overlap to create an integrated whole. As the animation unfolds, the individual elements separate and reveal text that defines the underlying content. Curved forms create a sense of integration as they embrace space and the text that emerges in that space. The patterns transform as the cursor, which is a small circle, moves in a circular path around the outside of the design.

Figure 2: HyperGlyph Pattern Transformations





In these pattern transformations, space, color, and text play significant roles in visualizing a flexible information environment. In traditional Western design, graphics and text are the focus of the visual designs while the space between objects separates information into categories and visual hierarchies. This space is usually referred to as “negative” space. However, in the HyperGlyph designs, space is just as significant as form. Space is a “positive” design element that reshapes relationships and suggests a fluid information network. It is the place where new ideas emerge.

Color and text are also key elements that symbolize changing relationships as well as the integration of ideas. Transparent colors in the forms overlap to create new colors. Gradations of colors within forms suggest connections between ideas. In these designs, text appears and disappears in the transformations. The “fixed” meaning of the text gives way to fluid associations as moving forms “sweep” text off the screen to make way for different text, unveiling new visual and cognitive relationships.

Another important dimension of the HyperGlyph designs is kinesthetically articulated design (KAD). KAD incorporates the tangible process of interaction (the action that takes place when the user interacts through input devices) into the interactive design to underscore the rhythm of the patterns in the audiovisual interface on the computer screen. In Figure 2, the round cursor moves in a circular motion around the forms to control the animation. This circular movement underscores the cyclic nature of the transformations and the concept of the integrated whole. The user’s movements enhance the visual patterns and the conceptual ideas behind the interface design. If the input device is a trackball, the hardware itself also echoes the circular continuity of the interface design. The result is a matrix of diverse patterns that connect the physical space with the electronic space. The user employs Gestalt laws of perception and memory to construct semantic relationships between the physical patterns of interaction and the virtual patterns on the digital screen. The overlay of patterns creates new semantic webs of associations between ideas.

Applications

I am collaborating with the Indigenous Academic Development Unit of the Jumbunna Indigenous House of Learning at the University of Technology in Sydney, Australia and the School of Computing and Information Technology at the University of Western Sydney on the design and development of the computer interface for an online course in Indigenous studies. This project began with a Fulbright grant from the Council for International Exchange of Scholars.

Indigenous students are the most disadvantaged group of learners in Australia (DETYA, 2001). A study conducted by the University of South Australia indicated a very high attrition rate among Indigenous students (Bourke, Burden, & Moore, 1996). These students, many of whom are mature students returning to school, find it difficult to leave their rural and remote communities and adjust to living on a university campus. Consequently, courses available on the Internet create an important opportunity for these students to continue their education.

However, the cognitive learning styles of these groups are different from Western students. Their cultures are founded on oral traditions that emphasize social and community interactions. Lyn Henderson (1993), who conducted a study in online education with students in remote areas on the Torres Strait Island, points out that these students are visual-aural learners who respond to teaching models that emphasize visual and spatial relationships. Interactive multimedia computer programs can enhance the learning environment for Indigenous learners by using multi-sensory information to create a holistic learning experience. However, these students must also learn to communicate using Western communication and teaching models. Interactive computer technology makes it possible to integrate Western ways of learning with Indigenous cognitive models by creating branches through the learning environment that provide “alternative pathways, presentation modes, sequences, sources and methods of assessment in the various aspects of the course” (Henderson, 1993, p. 172).

Multiliteracy models like the HyperGlyph designs can provide a foundation for audio-visual interfaces for Indigenous learners. There designs create a flexible cognitive model that can include

various degrees of logical structure if required by course content. The pattern transformations create recurring geometric shapes that establish visual and conceptual unity without sacrificing the fluid dynamics of the information space.

Another area of visual design that can expand the cultural dimensions of multimedia communication is visual social semiotics. Social semiotics is a branch of semiotics that is defined as "the study of social meaning and social action. . . Formal semiotics is mainly interested in the systemic study of the systems of signs themselves. Social semiotics includes formal semiotics and goes on to ask how people use signs to construct the life of a community" (Lemke, 1990, p. 183). Visual social semiotics combines basic concepts in visual literacy and demonstrates how still images and video can signify different social and cultural messages depending on how the visual images are framed and/or portrayed through camera angle, distance, and perspective. Visual anthropologists take visual social semiotics a step further and point out that it is possible to communicate cultural perspectives by juxtaposing images, sound, rhythm, and action into a montage of multi-sensory information that represents interrelated concepts (Coover, 2001). By overlapping sensory modalities, designers can use synesthesia[1] to transfer sensory responses from one medium to another and reinforce specific relationships. This type of semiotic structure creates a flexible, open-ended communication model that invites the user to create associations.

This use of multimedia to construct a flexible network of associations reflects concepts from Edward Hall's (1976) theory of context. Hall divided cultures into low-context and high-context societies. Low-context societies stress the importance of text to form explicit messages that are less subject to open interpretation. Low-context societies include Western cultures. High-context societies rely on spatial and temporal relationships to construct meaning. In a high-context culture, meanings are fluid and can change depending on the specific situation. Indigenous cultures are high-context societies. Multimedia computer programs can reflect the fluid, interpretive nature of high-context cultures by juxtaposing different media to create an open-ended communication structure that encourages different perspectives and interpretations.

Conclusion

The cultural dimensions of interaction design have usually been limited to "cultural markers," a concept put forth by Barber and Badre (1998). Cultural markers refer to the use of icons, colors, metaphors, and national symbols that help identify a specific culture. However, cultural markers can be tokenistic if they are the only cultural reference. Interface designs need to reflect the underlying cognitive models of a culture. In non-Indigenous cultures as well as many non-Western cultures, these models are shaped by aural and visual communication and strong interrelationships with community and the environment. In interactive electronic communication, the program's structure, organization, and user interface need to reflect this social-community based foundation.

My research and emerging research in visual semiotics and visual anthropology have implications for global networking. These areas of research involve basic concepts in visual perception that have broad, universal meanings across cultures. The research uses Gestalt laws of perception to create a common frame of reference for a diverse audience. In the HyperGlyph designs, symmetrical, geometric forms are an important part of the interaction design. Psychologists and scientists have shown that viewers recognize and remember symmetrical forms and geometric shapes better than irregular, asymmetrical forms (Attneave, 1955; Campbell, 1941; Casperson, 1950). This symmetry also aids navigation because research has shown that viewers need less time to visually orientate themselves to visual information when symmetry is detected (Locher & Nodine, 1987).

All of these concepts lay the foundation for an intercultural grammar that can expand the potential for global networking. Concepts in visual perception create a universal psychological frame of reference that enables users from different cultures to explore diverse cultural perspectives within

[1] Synesthesia occurs when sensory stimuli trigger associations with other sensory stimuli. For example, colors may suggest sounds or textures (or vice versa).

the context of their own cultural backgrounds (Search, 2002). The use of sensory stimuli in user interfaces can capture some of the intuitive immediacy of oral communication. By restoring some of the perceptual attributes of orality in interaction design, we can preserve and strengthen cultural identities and provide the abstract, holistic format that is necessary to allow users to become part of another cultural space (Search, 1993).

References

Attneave, F. (1955). Symmetry, information, and memory for patterns. *American Journal of Psychology*, 68, 209-222.

Barber, W. & Badres, A. (1998). Culturability: the merging of culture and usability. Paper presented at the 4th Conference on Human Factors & the Web. Retrieved March 19, 2004, from http://www.research.microsoft.com/users/marycz/hfweb98/barber/index.htm.

Bourke, C., Burden, J., & Moore, S. (1996). Factors affecting performance of Aboriginal and Torres Strait Islanders at Australian universities: a case study. Research report published by the Australian Department of Employment, Education, Training and Youth Affairs. Retrieved March 25, 2004 from http://www.detya.gov.au/archive/highered/eippubs/eip9618/front.htm.

Campbell, I. (1941). Factors which work toward unity or coherence in visual design. *Journal of Experimental Psychology*, 28, 145-162.

Casperson, R. (1950). The visual discrimination of geometric forms. *Journal of Experimental Psychology*, 40, 668-681.

Coover, Roderick (2001). Worldmaking, metaphors and montage in the representation of cultures: cross-cultural filmmaking and the poetics of Robert Gardner's *Forest of Bliss. Visual Anthropology*, 14, 415-433.

DETYA (2001). Facts and figures—Indigenous Australians in higher education in *Learning for all*. Retrieved April 20, 2004 at http://ww.detya.gov.au/iae/analysis/learning/1/factfigure.higher.htm.

Hall, E. T. (1976). *Beyond Culture*. New York: Anchor Doubleday.

Henderson. L. (1993). Interactive multimedia and culturally appropriate ways of learning. In C. Latchem, J. Williamson, & L. Henderson-Lancett (eds.), *Interactive multimedia: practice and promise* (pp. 165-182). London: Kogan Page Ltd.

Lemke, J. (1990). *Talking science: language, learning and values*. Norwood, NJ: Ablex Publishing Corporation.

Locher, P. & Nodine, C. (1987). Symmetry catches the eye. In J.K. O'Regan and A. Levy-Schoen (Eds.), *Eye movements: from physiology to cognition* (pp. 353-361). New York: Elsevier.

Search, P. (1993). The rhythm and structure of multicultural communication. *Media Information Australia: Art & Cyberculture,* 69 (August): 62-69

Search, P. (2002). HyperGlyphs: New multiliteracy models for interactive computing. In R. Griffin, J. Lee, & V. Williams (Eds.), *Visual Literacy in Message Design* (pp. 171-177). Loretto, PA: International Visual Literacy Association.

Search, P. (2003). The metastructural dynamics of interactive electronic communication. In R. Griffin, J. Lee, & V. Williams (Eds.), *Turning Leaves* (pp. 1-9). Loretto, PA: International Visual Literacy Association.

Swain, T. (1993). *A place for strangers*. Cambridge, UK: Cambridge University Press.