

HyperGlyphs: New Multiliteracy Models For Interactive Computing

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Abstract

In interactive multimedia computing, the ability to explore dynamic networks of associations should encourage the creative synthesis of information. Unfortunately, creative inquiry is often hampered by interface designs that separate information into categories and hierarchical structures. This paper discusses new multiliteracy models for user interface designs, called HyperGlyphs, that are derived from dynamic, time-based communication structures used by oral cultures. This paper explores the implications of these models on the design of interactive computer programs. These interface designs, which are based on symbols with universal meanings, also demonstrate the potential for an intercultural grammar for global networking.

Introduction

In today's interactive, multimedia programs and on the World Wide Web, students have the ability to navigate through large databases of information. No one disputes the advantages of these interactive databases that provide quick access to large numbers of references for research and learning. However, users can easily get caught up in the process of navigating to various locations in a multimedia environment, and the continuity between ideas is obscured. Students often feel overwhelmed with the large amounts of information and don't know how to organize the information into a coherent whole.

The ability to synthesize information is hampered by interface designs that separate information into fixed categories and hierarchical structures rather than emphasizing relationships. For example, search engines on the Internet create categories for accessing information, and interfaces use windows to separate information on the screen. The computer interface uses hierarchical structures to categorize the available information (e.g., the *Programs*, *Documents*, and *Settings*). The standard computer interface uses the desktop metaphor to separate information into files and folders. We organize information in these files and folders by categories that we identify with textual labels. Often these labels are not accurate reflections of the content but mere semantic devices that allow us to save information by attaching text that conforms to a specific filename format.

The links in multimedia programs are supposed to highlight relationships, but instead they tend to emphasize the end object or destination. Rather than promote the continuity between ideas, links often promote "disassociation" because they are abstract references that do not help the user identify the relationships between information in the database.

Today's multimedia interfaces emphasize details more than relationships. We read for fixed links between screens rather than focusing on a network of dynamic relationships between ideas. The "from-to" sequence in the linking process encourages the user to

add links together as a sequence of events. The links do not encourage the user to reevaluate relationships and synthesize ideas. The user assumes the role of an active participant by interacting with the links, but in reality, the cognitive involvement in the interactive process is limited.

Many of these problems with the interface designs are directly related to the underlying programming languages that rely on sequential logic, deduction, and hierarchical structures. As Michael Joyce (1995) points out in his book *Of Two Minds*, "Hypertext software . . . forces us to represent contours of interaction in rectangles and arrows plotted on Cartesian space . . ." (p. 64). Michael Streibel (1986) discusses the constraints these syntactical restrictions place on the educational experience. He points out that computer programs force us to "structure information in precise and systematic ways and carry out logical operations on abstract representations of that information" (Streibel, 1986, p. 155). As a result, computer programs "delegitimize" interpretation, intuition, introspection, and "dialectical synthesis of multiple and contradictory realities" (Streibel, 1986, p. 154).

In addition, since the invention of the printing press, modern forms of mass communication have produced a "standardized knowledge" that has resulted in a "collective memory" (Brown, 1997, p. 31). In other words, forms of mass communication do not encourage the individual to seek individual answers and interpretations. The current interface designs in today's Internet browsers and operating systems are just another step in the evolution of standardized knowledge in mass communication.

Because of this standardization, we are not accustomed to "thinking in terms of the fluidity" of text, and we find it difficult to understand "multiform" relationships (Murray, 1997, p. 194). In hypertext, dynamic patterns of relationships are important. Jay Bolter (1991) points out that "Elements in the electronic writing space are not simply chaotic; they are instead in a perpetual state of reorganization. They

form patterns, constellations, which are in constant danger of breaking down and combining into new patterns . . . ” (p. 9).

While printing and other forms of modern mass communication have contributed to our inability to think in terms of fluid relationships between ideas, this problem actually began with the introduction of writing. With the development of writing came linguistic categories, deductive reasoning, and diachronic logic, all of which defined sequential hierarchies in space and time (Search, 1996). Scientific logic, including the Cartesian concept of the mind/body split, perpetuated the idea of duality and an “either/or” perspective rather than the synthesis of ideas. Hypertext with its layers of meanings requires multiple perspectives and multiple readings. With all the changing relationships, how do we perceive coherent patterns in these complicated networks of information? How do we integrate the “transformative” process into the interface and not just rely on static events that are detached from other events. We need new ways of organizing this information that promotes the concept of fluid relationships. We need to visualize the temporal transformation of ideas. As John Perry Barlow (1996) points out, “The economy of the future will be based on relationship rather than possession. It will be continuous rather than sequential” (p. 172).

In order to understand new concepts in information design, we need to look at alternative perspectives in communication. There are many overlapping parallels between oral and electronic communication because both involve dynamic, not fixed, communication models that change over time. In previous research the author has identified several characteristics of oral communication that are also found in electronic communication (Search, 1999). The author discusses these characteristics and shows how the semiotics of oral communication in aboriginal cultures can provide insights into new ways to design user interfaces in multimedia computer programs.

The Semiotics Of Oral Communication

Oral communication in aboriginal cultures 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.

The term “polysemiotic” accurately describes the semiotics of oral communication. In oral cultures, symbols are not restricted to singular meanings. Aboriginal cultures reject the idea that nature is divided into discrete entities. Instead these cultures emphasize relationships in nature, especially changing relationships. In these cultures, all relationships are in

flux, and all relationships are possible. As a result, symbols can represent many different ideas and relationships, and individuals use these symbols to form personal interpretations. As anthropologist Levi-Strauss (1962) points out there is “no limit to the variety of interpretations” (p. 64).

In turn a *collection* of symbols, sounds, and actions also represents fluid rather than fixed structures that change over time. The significance of symbols in these oral cultures is “derived from the perception of relationships between the components of form rather than the form's direct representation of the cultural facts . . . ” (Hardin, 1993, p. 11). Bards and singers “had a repertoire of formulaic ways to describe common people, things, and events, descriptions that could be rearranged and plugged into a template of the chanted line in a way that made for pleasurable variation within an overall pattern of regular rhythms and sounds” (Murray, 1997, p. 188). For Navajo Indians, the underlying patterns that result from the process of creating ceremonial dry paintings are more important than the individual elements in the paintings (Hatcher, 1974).

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*. As Levi-Strauss points (1962) out, communication involves the cataloguing of *relations* and *connections*. Oral cultures “use a structure to produce what is itself an object consisting of a set of events” (Levi-Strauss, 1962, p. 26). This structure is multidimensional and pluralistic because it is defined on several axes according to 1) *contiguity*, how elements relate functionally; and 2) *resemblance*, common characteristics between elements (Levi-Strauss, 1962, p. 63).

This pluralistic thinking even extends to the concept of “center.” In Western cultures, the center is based on the “logic of exclusion and contradiction” because “logically a cosmos can have only one center” (Tuan, 1977, pp. 99-100). In oral cultures, the cosmos can have many centers. The larger “whole” can be made up of many parts, and each of these parts may be a “whole” with its own center, structure, and function.

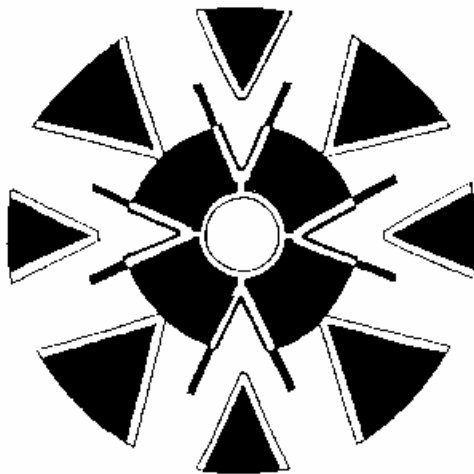
Pluralism also means there is no division of space and time. Past, present, and future are one. There can be simultaneous events that overlap because the events always occur without reference to time (Swain, 1993). Because the concept of linear time does not exist, there is no causality as we understand it in Western cultures. Events are not considered unique results of sequential actions. Causation is all-inclusive rather than restrictive. All events and all actions are possible at all times.

Oral cultures use design techniques in audiovisual

symbols to represent pluralism, the actual and the potential, interrelationships and totality, and the collapse of space and time. These design techniques include geometric symbols that represent unity and timelessness such as the circle, spiral, square, and chevron (Figure 1). Top-down views and transparency (including x-ray views) symbolize multiple perspectives, the actual and the potential, 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 musical phrases because this space represents interrelationships including potential relationships.

In addition, oral cultures use action and memory to reinforce these complex ideas. In ceremonial rituals participants use gesture and movement, often in the

Figure 1
Symbols From Oral Cultures
(Mescalero Apache Design)



form of dance, to reenact events and relationships. Memory requires concentration and encourages insights by bringing “the student to deep knowledge” (Matthews, 1996, p. 47). As a result, memory is a form of active rather than passive participation. In fact, in oral cultures memory is a highly interactive process because, without written documents as records, individuals need memory aids so they structure relationships between events or concepts to serve as those aids. Consequently, “a way of thinking [becomes] a way of remembering” (Levi-Strauss, 1962, p. 67).

Moreover, individuals use memory to synthesize information into a coherent whole and adapt ideas for

personal use. Bruce Brown (1997) points out that since the invention of the printing press, the role of memory and the active participation of users in the synthesis of information have diminished. The result is a “fracturing of identity” which “continually seeks to fracture and subvert each person’s ability to construct their personal landscape of memory—to make a coherent self and be empowered” (Brown, 1997, p. 37).

In interactive electronic programs, we can use these audiovisual design techniques as well as action and memory to help filter, organize, and integrate information into coherent patterns that encourage new perspectives and interpretations. The following section presents some possibilities for interface design that are based on the semiotics of oral communication.

HyperGlyphs For Electronic Interface Designs

Oral communication uses recursive symbols and semantic structures that are midway between divergencies and parallels, order and disorder, diachrony and synchrony, event and structure, the aesthetic and the logical (Levi-Strauss, 1962, p. 70-74). This pluralism leads to the “ability to detect obscured realities and hidden possibilities” (Basso, 1996, p. 131)—the ability to see what may not be there and the ability to create what may not have been created.

The information space in interactive multimedia programs is also made up of recursive symbols. The text and graphics have multiple meanings that change as new relationships are found. How do we represent this transformative process in the interface design? How do we visualize dynamic patterns of information that represent currently defined associations while at the same time, encourage the user to seek new relationships? How do we represent networks that have open-ended meanings?

We need to combine logic and perception into flexible information structures that allow the user to shift perspectives and redefine relationships. Some logical, underlying structure is necessary to provide continuity. However, this logical structure should not restrict the flow of ideas. Audiovisual design techniques used by oral cultures create perceptual patterns that augment logic and encourage the creative synthesis of ideas. As previously mentioned, these techniques include geometric shapes, top-down views, transparency, repetition, and rhythm. In addition, we can use basic concepts in Gestalt psychology such as the laws of similarity, proximity, closure, and figure-ground relationships to convey the concept of the integrated whole. Logical analysis can be augmented by the perceptual, holistic synthesis of audiovisual patterns, resulting in interface designs that encourage the user to identify new relationships.

My designs, called 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, the integration of individual elements into a whole, and the collapse of space and time. The designs symbolize dynamic, flexible relationships, but at the same time, the repetition of geometric forms provides an underlying structure that suggests synthesis and coherence.

The HyperGlyphs included in this paper are examples of interface designs that can be used to represent the content and structure of an interactive program. Users can create new relationships by modifying the graphics and moving individual forms to reveal additional layers of information (Figure 2). The visual designs use abstract, geometric forms with open-ended meanings that carve out forms in space and time. Transparencies and layers of visual rhythms represent simultaneity and the integration of space and time. A top-down, all-encompassing perspective encourages multiple interpretations rather than the single vantage point perspective that has flourished in Western cultures since the Renaissance. Some designs incorporate oblique perspectives that also suggest multiple perspectives.

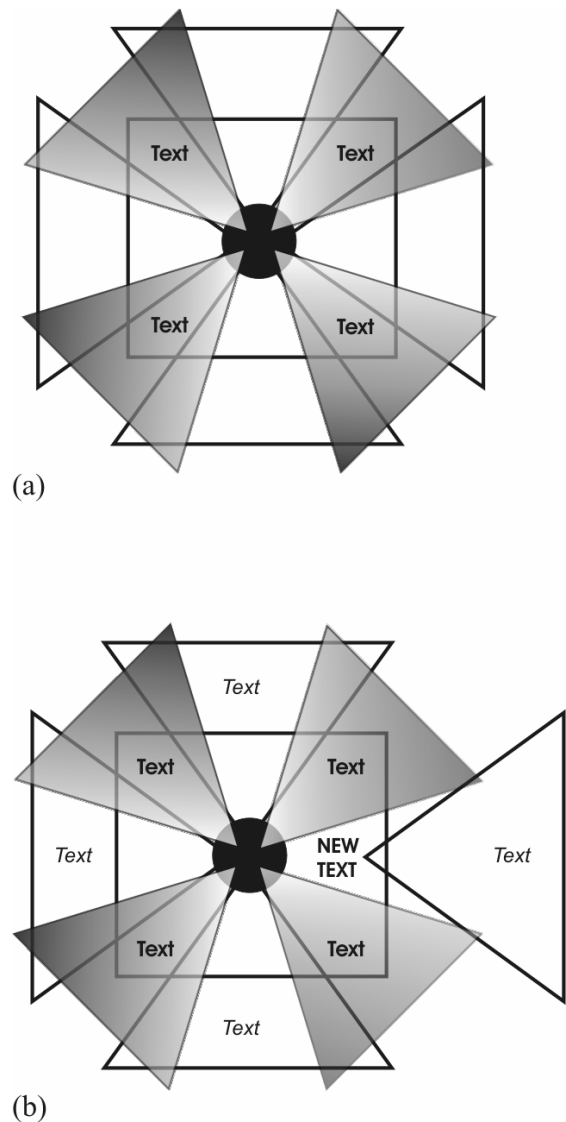
All the designs emphasize individual elements and their interrelationships. Individual elements complete the whole. Within this whole there is an emphasis on the importance of space. Open lines and spaces imply connections, and allow the viewer to “fill in” the meanings. Positive and negative space are intertwined to symbolize changing perspectives and open connections. There is a rhythmic counterpoint of forms in which everything has its right position in relation to the whole.

Transparent forms, different textures and line types (e.g., solid, dashed), photographic images, and animated transitions between the graphics (fades, wipes, dissolves, etc.) symbolize the actual as well as the possible. Some designs integrate photographic images or textures into two-dimensional line drawings (Figure 3). The juxtaposition of realism and abstraction, represented by three-dimensional and two-dimensional pictorial elements, creates visual rhythms that define multiple levels of perceptual space (Search, 1993). There is a suspended balance or equilibrium that is not fixed. The designs change as new relationships appear. Forms move in and out of other forms. The fluidity of the designs suggests new associations between elements in the interactive program while the underlying structure of the designs establishes continuity.

Repetition and rhythm, created by the interweaving of different levels of geometric symmetry, integrate the designs by bringing a coherent focus to seemingly

different ideas. In oral cultures repetition in designs creates an ordered structure within which subtle changes and different perspectives are woven (Search, 1999). Repetition serves the same purpose in the HyperGlyphs designs. Rhythm is also important in these designs. The interweaving of the different design elements in the graphics, as well as animated transitions between the graphics, creates layers of

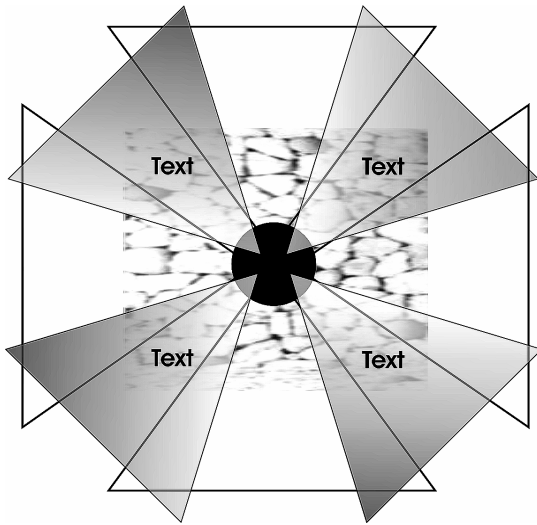
Figure 2
HyperGlyphs Designs



rhythms. In addition, the rhythmic movement of the viewer's interaction itself creates a syncopated backdrop to the rhythmic symmetry of the visual designs. This accumulating rhythm, with its changing

dynamics, encourages a broader range of interpretations and perspectives.

Figure 3
The Juxtaposition Of Realism And Abstraction



As in oral cultures, the symbols in these designs derive their meanings from the dynamic process of interaction. Information achieves importance because of its relationship to other information. The visual space between design elements underscores these relationships. Changes in this spacing create new rhythms and intensities, new dimensions and perspectives. The visual relationships are continually changing. The HyperGlyphs designs are similar to Navajo drypaintings where “shape is not something one starts with, it is something one ends up with, and its form is almost a matter of indifference” (Hatcher, 1974, p. 51). In these interactive designs, action and memory reinforce the different patterns that appear on the screen. Memory redefines and completes new patterns as the user interacts with the interface, and the designs change. Memory synthesizes layers of information into an integrated whole.

Finally, the semantic structure of language changes as the user interacts with the interface. The user can change the text, the arrangement of words, and the relationships between the text and graphics. Because the abstract graphics encourage pluralistic interpretations, words lose their specificity and take on multiple meanings in different contexts as new relationships are formed between text and form, and between text and space. In oral cultures, the dynamic *structure* of language (i.e., how words are used in

relation to other words and actions) creates different interpretations of reality (Rothenberg, 1985, p. 623).

In the HyperGlyphs designs, language is also dynamic and encourages new interpretations. The dynamic quality of language is enhanced by three-dimensional, interactive models that fold and unfold to reveal new information and new networks of associations (Figure 4). The different layers of these models, which may include text or images, integrate linguistic syntax with visual symbols, form, and space. Text takes on the discursive characteristics of visual imagery, resulting in new levels of pluralism.

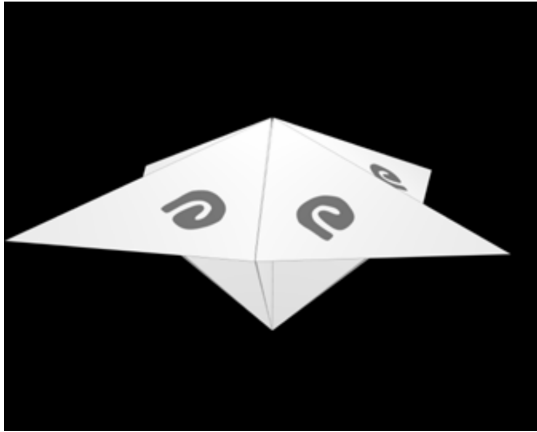
Conclusion: Global Implications

User interface designs in interactive multimedia programs should visualize fluid relationships that change over time. The interfaces should encourage users to explore new ideas and new perspectives. Educators, researchers, and students need intuitive designs that highlight the possible as well as the actual relationships between ideas. Users need to be able to synthesize large quantities of information into a creative whole.

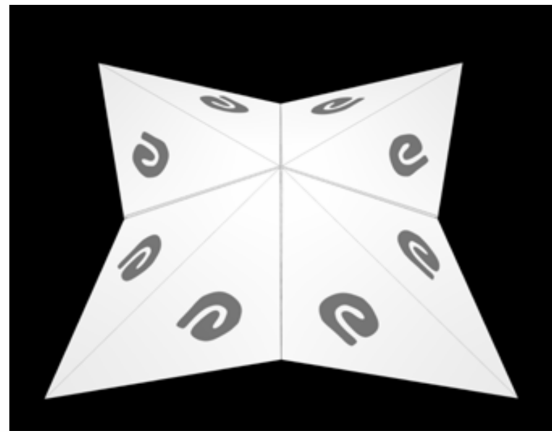
The semiotics of oral communication can provide new insights into ways to design dynamic multimedia interfaces that reduce the hierarchical structure of Western logic and analysis without losing the continuity of ideas. The temporal dynamics of oral communication are reflected in the audiovisual symbols of aboriginal cultures. We can apply similar symbols in electronic communication to encourage open interpretation and the transformation of ideas.

The significance of these types of electronic interfaces goes beyond the classroom and research laboratories. These interface designs can provide the foundation for an intercultural grammar that expands the potential of global networking. Oral cultures rely on “open” designs that enable different groups to create their own relationships using their own backgrounds. By restoring many of the perceptual attributes of orality, we can preserve and strengthen cultural identities (Search, 1993). For example, in a multimedia program, a highly perceptual or holistic communication model for the interface design can provide the abstract format that is necessary to allow users to become part of another cultural space (Search, 1993). Audiovisual data can convey the sensory dimensions of a particular culture on one level, while an underlying abstract structure in the interface design creates a universal language that helps users understand new cultural perspectives regardless of their own cultural backgrounds. Logic and perception define flexible information structures that help users shift perspectives and redefine relationships within the context of a dynamic global network.

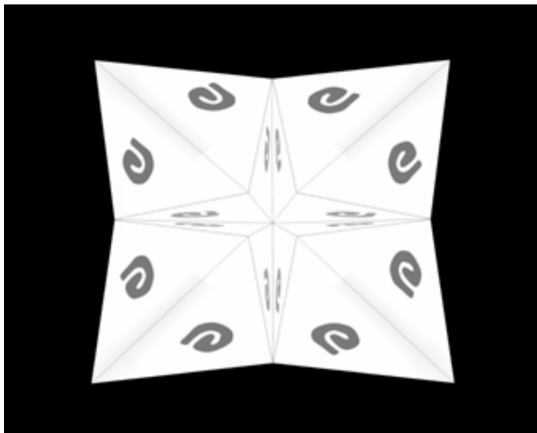
Figure 4
Three-Dimensional Models With Multiple Layers



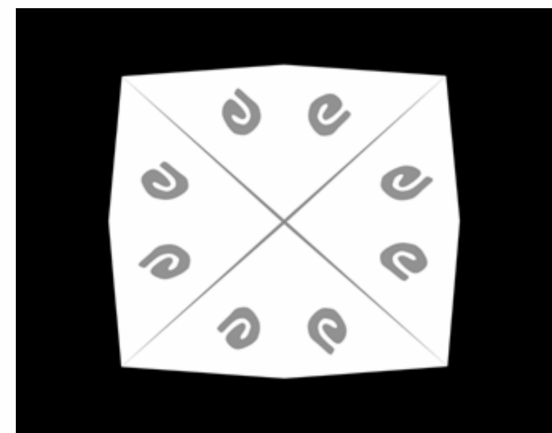
(a)



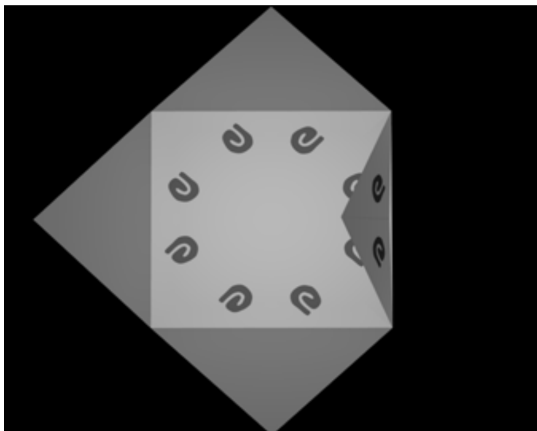
(b)



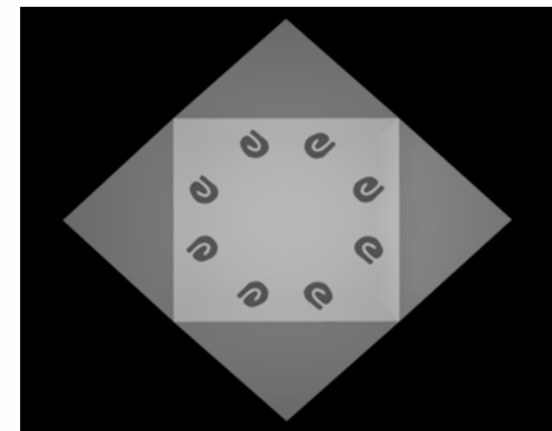
(c)



(d)



(e)



(f)

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