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169 Interactive Visualizations
of Plot in Fiction

TERESA DOBSON, PIOTR MICHURA, STAN RUECKER,
MONICA BROWN AND OMAR RODRIGUEZ

193 Do Designers Show Categorical
Perception of Typefaces?

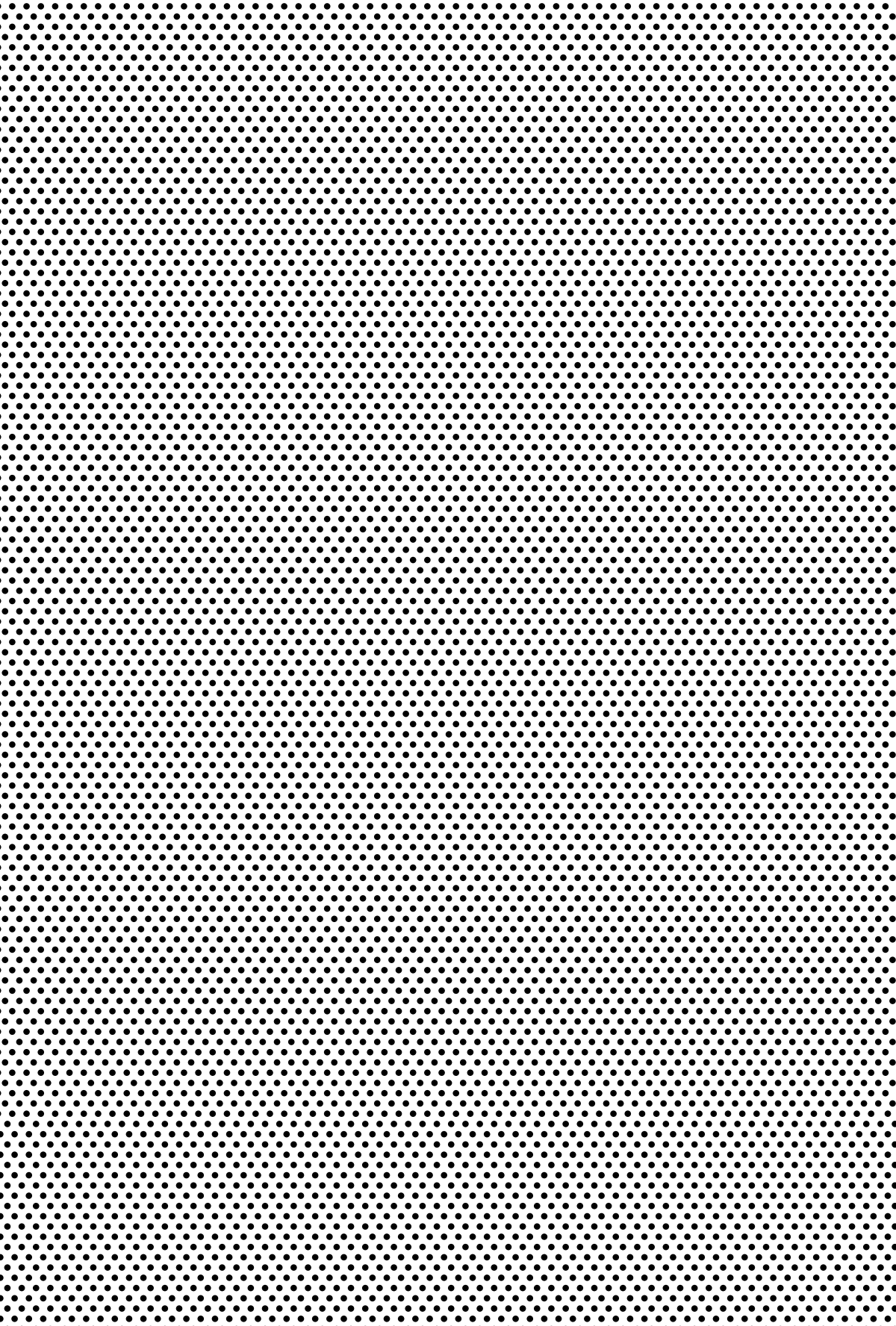
MARY C. DYSON

221 Critique: A Communicative
Event in Design Education
*A qualitative research on Western
faculty and Asian students*

HO LAN HELENA WONG

249 Book Reviews

268 Index to Volume 45



Interactive Visualizations of Plot in Fiction

*Teresa Dobson, Piotr Michura, Stan Ruecker,
Monica Brown and Omar Rodriguez*

ABSTRACT

In this paper, we expand on our presentation at ICDS2010 (Dobson et al., 2010) in describing the design of several new forms of interactive visualization intended for teaching the concept of plot in fiction. The most common visualization currently used for teaching plot is a static diagram known as Freytag's Pyramid, which was initially intended for describing classical and Shakespearean tragedy. It has subsequently been applied to a wider range of fiction, but is not always applicable. The alternative interactive forms that we propose allow a more dynamic approach that can be customized by the teachers and students to accommodate various interpretations of a single piece of fiction. We provide a mechanism for people to select significant features of a story, such as characters, objects, events and transitions in time or space, and see how the different models react to the presence of these features. Our designs include one that is primarily sequential, another that emphasizes the structural complexity of the story and a third that places a single feature as a central focus. The data for this visualization is provided through an XML encoding of the significant features of a given story.

INTRODUCTION

In this paper, we investigate the possibility for 3D visualizations related to the notion of plot in fiction. In teaching narrative forms, teachers, particularly in North American K-12 classrooms and to a lesser extent in undergraduate university programs, have relied on the five-stage plot mapping first described by Gustav Freytag (1863) in *Die Technik des Dramas*. This mapping, developed in consideration of ancient Greek and Shakespearean tragedy, has widely become known as “Freytag’s Pyramid” (*figure 1*).

However, since many plots follow other patterns, the superimposition of this model on forms beyond those it was originally intended to describe is often confusing and at worst can be downright misleading (Dobson, 2002).

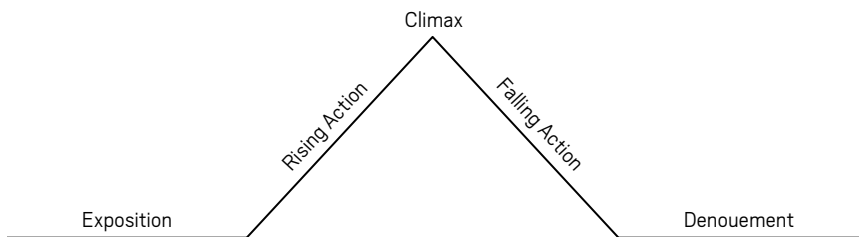


Figure 1: Freytag’s Pyramid shows five basic components of plot, based on Greek and Shakespearean tragedy.

Kurt Vonnegut Jr. famously attempted to address this problem with the plot diagrams (*figure 2*) he proposed for his MA thesis, which were concerned with changes in the fortune of the protagonist over time, and which are published in *Breakfast of Champions* (Vonnegut, 1973).

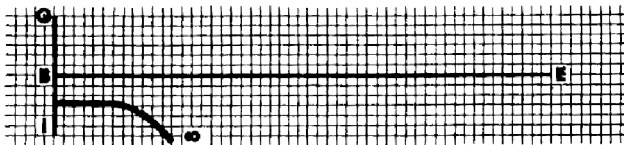


Figure 2: Vonnegut’s plot diagram showing Kafka’s *Metamorphosis*, in which a man wakes up to find he has been transformed into a cockroach and is eventually murdered by his own father. The Y axis represents the fortunes of the protagonist (from ill luck to good luck), and the X axis is the beginning to end of the book.

Although simple to read and deeply revealing in nature, like much of Vonnegut's own writing, the diagrams are limited in scope by their reliance on the Cartesian graph. As Van Peer and Chatman (2001) observe, the "diverse narratives of the Twentieth and Twenty-First centuries" (p. 5) are incompatible with contemporary narrative models because most of these models reflect a Western perspective. Further, as Dobson (2006) has noted, they do not take account of new media genres. Considering the latter, some, such as Bernstein (1998), have proposed two-dimensional plot patterns that account for various narrative forms emerging in digital media. Others, such as MIT's Drew Davidson (2005), have been exploring diagrammatic representations of plot in video games, demonstrating that the Freytag schema is inappropriate to the new context.

The problem of how best to visualize plot, though, was identified as a challenge long before Freytag or Vonnegut. Sterne's *Tristram Shandy*, published in nine volumes over ten years commencing in 1759, is often cited as an example of complex narrative structure—a precursor of later experimental forms in print and a harbinger of hypertext (e.g., Bolter, 2001). The novel is replete with digressions and temporal disruptions to which Sterne takes pains to alert readers. In volume VI, for example, he draws a series of five plot lines (*figures 3 and 4*). The first four graphs, he explains, represent the "lines I moved in through my first, second, third, and fourth volumes" (Sterne, 1847, 287).

He offers the following explanation for his final graph (*figure 4*):

... except at the curve marked A, where I took a trip to Navarre, and the indented curve B, which is the short airing when I was there with the Lady Baussiere and her page, I have not taken the least frisk of a digression, till John de la Casse's devils led me the round you see marked D; for as for CC CCC they are nothing but parentheses, and the common ins and outs incident to the lives of the greatest ministers of state (287).

Shlovsky (2000) remarks upon the challenge of visualization in the case of *Tristram Shandy*:

If we visualize the digressions schematically, they will appear as cones representing an event, with the apex representing the causes. In an ordinary novel, such a cone is joined to the main story line at its apex; in *Tristram Shandy* the base of the cone is joined to the main story line, so that all at once we fall into a swarm of allusions (66).

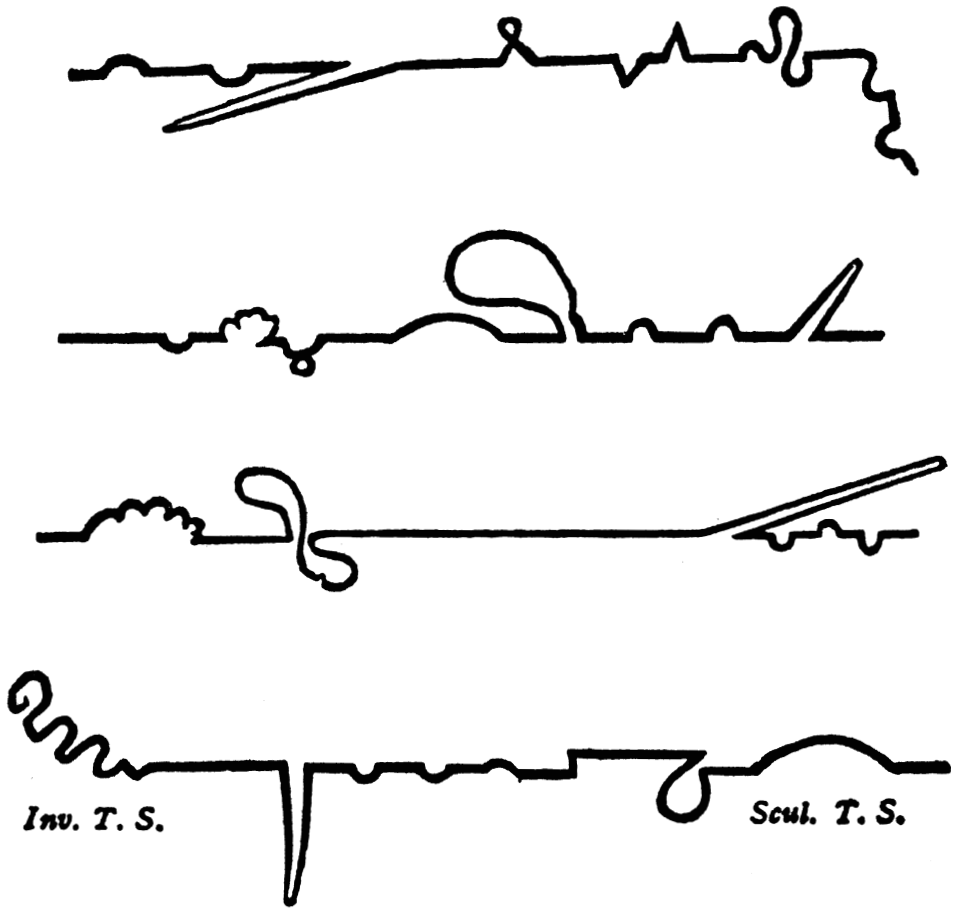


Figure 3: Sterne's plot graphs from the novel *Tristram Shandy*, p. 287.

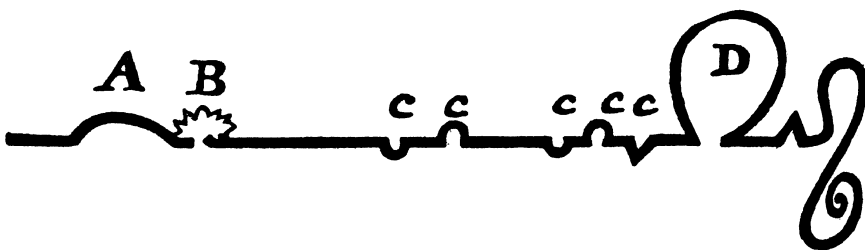


Figure 4: Sterne's final plot graph, with labels for explanations, p. 287.

NARRATOLOGICAL FRAMEWORK

Concepts drawn from narratology inform our interest in developing models for 3D visualizations of plot, as does a fundamental principle of this field of study, that the elements, themes and patterns that give shape to plot also help us make sense of and interpret stories. Rather than determining a single model for plot structure to be applied to any narrative, a narratological approach is guided by discovering patterns in and across actual narratives, making it a valuable theoretical framework for our study. Prince (1988) outlines the two broad aims of narratology as the investigation of features shared in common by narratives, and the description of general rules informing the production, and processing, of narrative structure (p. 39). Contemporary narratology traces back to the Russian Formalists, and most notably to Vladimir Propp in *Morphology of the Folktale* (1928/1968); for example, Propp analyzed and broke down a corpus of Russian fairy tales into their smallest narrative units, which he called “narratemes,” and which relay to the reader the sequence of plot functions—or building blocks—that make up a fairy tale’s story (e.g., Transfiguration, when the hero of a story is given a new appearance).

While Propp’s morphology has been criticized for attending more closely to similarity than difference within the context of narrative, it has also been credited as a useful method for producing systematic descriptions and representations of narrative structure, as well as for making sense of how different features of a story’s plot structure inform its meanings. In addition to similarity, a Proppian analysis accommodates narrative complexity: both at the level of the story, by demonstrating how one story may be made up of a unique series of numerous varied, and occasionally repeated, narratemes; and across multiple stories, by showing how, even though the narratemes recur across a cluster of stories, they will often occur in new and unusual sequences, in some cases developing new meanings for a story by placing greater emphasis on one narrateme over another. As with Propp’s analysis, which isolates a wide range of narratemes (thirty-one function elements that can be classed within seven broader spheres of action, as well as eight broad character types), our approach has been informed by the need for plot visualizations capable of representing both narrative structure *and* narrative complexity.

Narratology has further relevance to the development of new forms of interactive visualization to be used for teaching the concept of plot in fiction. Digital narratology, for example, investigates the narrative structure of new media forms, such as hypertext fiction; hypertext theorists (Bolter, Ryan, Hayles, Landow, Moulthrop and Joyce) offer persuasive analyses that consider how structural

and organizational techniques made possible by new media (e.g., non-linearity, hypertext linking, reader interaction, visuality) produce not only multiple readings of the same story, but multiple stories entirely. From this perspective emerges a view of plot structure as a “reading path,” of which there may be more than one, and through which all narrative, printed or digital, can be seen as a space in which the reader participates (Bolter, 2001). While digital narratology attends broadly to the implications for narrative structure, of the move from traditional to new media forms, Ryan (2006) proposes an explicitly interactive narratology to account for the new features acquired by the elements of traditional narratology—space, characters and events—in texts designed to be highly interactive (p. 100). Our contribution to contemporary and digital narratology is the development of new media tools for reading and experiencing both complex print and digital narrative, making it possible for readers and instructors to explore different structural features of the same story even in cases where such interaction has not necessarily been a part of the text’s production. Together, digital narratology and new media forms of storytelling draw attention to the increasing need for pluralism in teaching the concept of plot.

Finally, contemporary narratology shifts new focus onto the visual features of literary narrative. According to Bal (1997), “attention to visuality is tremendously enriching for the analysis of literary narratives” (p. 162). Prior models for representing plot structure, however, primarily map only the passage of time or the sequence of events that make up a story: these diagrams either ignore or fail to accommodate certain elements of plot that shape a story’s visual field, such as space, places, objects and characters. Moretti (2005) proposes that analytic tools drawn from other disciplines—for example, graphs and maps—may offer readers a new perspective on the visual features of literary narrative, not to mention the relationships that develop between these elements as they structure literary narrative. Moretti terms his loosely visual narratology “distant reading,” through which “distance is however not an obstacle, but a *specific form of knowledge*: fewer elements, hence a sharper sense of their overall connection” (p. 1). This notion of distant reading—of developing visual models to discover and make connections between different elements of literary narrative—informs both the design and scale of our 3D visualization prototypes.

3D VISUALIZATIONS

Although simple to read and deeply revealing in nature, diagrams such as Vonnegut's and Sterne's to which we alluded earlier are limited in scope by their reliance on the Cartesian graph. In this paper, we describe a process of prototype design for a digital tool that would enable learners to manipulate 3D visualizations of narrative structure. To begin this process, we considered a known example of a complex print narrative that does not conform to conventional understandings of plot, the title story of Alice Munro's short story collection, *The Love of a Good Woman*. This long short story (almost a novella in length at 92 pages) begins with a brief section describing three small-town boys who discover the body of a local man—an optometrist—drown in his car at the bottom of a local river. Having apparently established the kernel of a murder mystery, and having instilled in readers a sense of intrigue in this regard, the narrative then digresses for well over half of its length, covering a range of discursive material about the boys and the town before diverting to describe an apparently unrelated scenario in which the local practical nurse tends a terminally ill patient in an isolated farmstead. The subject of the drowning eventually arises again, some two thirds through the narrative, but readers are offered only a series of glimpses as to the possible circumstances of the event and must accept that this story about the complexity of human relations in a small-town setting will not offer overt answers or conform to traditional plot structures. Indeed, as Ross (2002) remarks in contemplating the challenges of the story for readers, it is a “*tour de force* of deferral” (795).

Dobson (2006) has summarized some of the critical reception of this narrative in relation to its complexity as follows. New (2000) observes, considering *The Love of a Good Woman* collection, that for Munro “‘story’ is neither linear nor one-dimensional; story layers narrative—and as these stories make clear, no one ever knows how many layers there are” (570). Ross (2002) likewise notes that reading the stories in *The Love of a Good Woman* requires “digging down through layers and following threads backward through to earlier handlings of the same material” (p. 786). She also points out that Munro has described her own writing process as one of identifying the “soul” of a story and layering material around it (1998).

In a similar vein, Carol Shields, another Canadian fiction writer, has characterized narrative as a “subjunctive cottage,” observing that it isn’t “something you pull along like a toy train, a perpetually thrusting indicative. It’s this little subjunctive cottage by the side of the road. All you have to do is open the door and walk in” (2000, p. 54). Considering such metaphors, one and two-dimensional

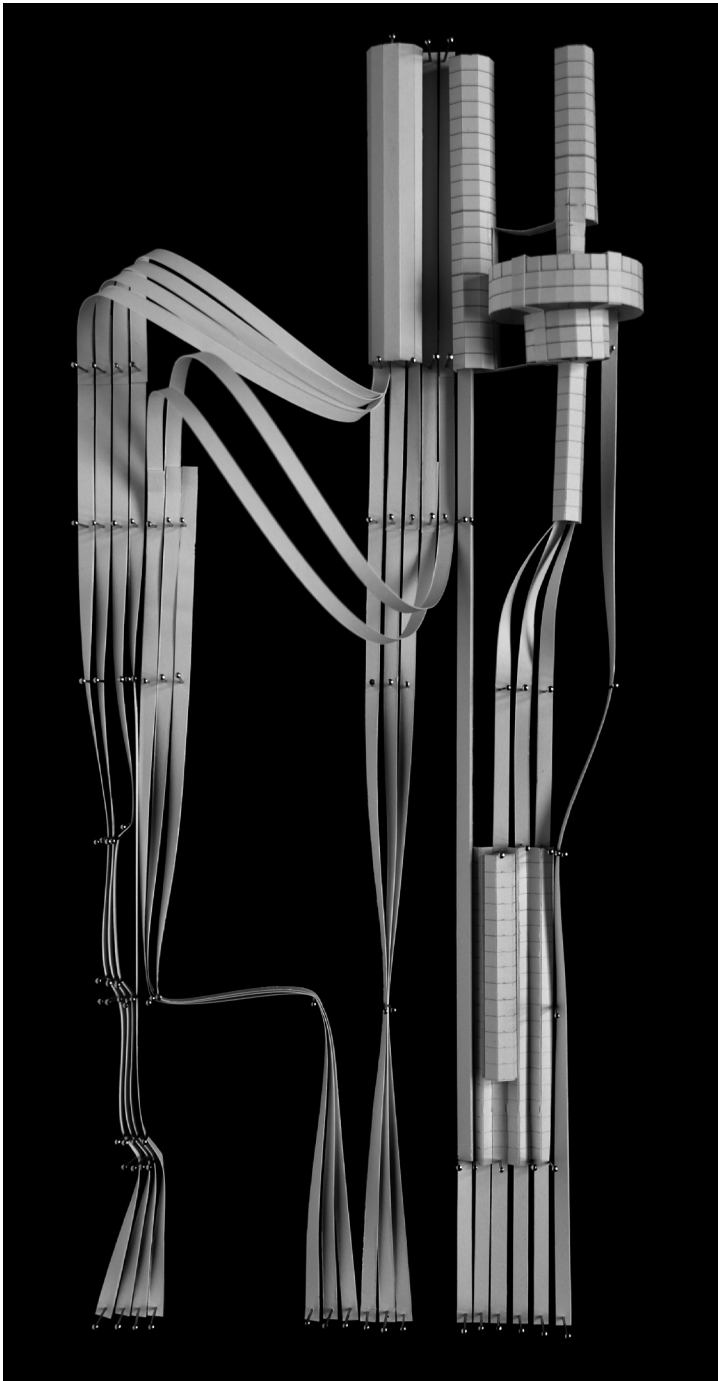
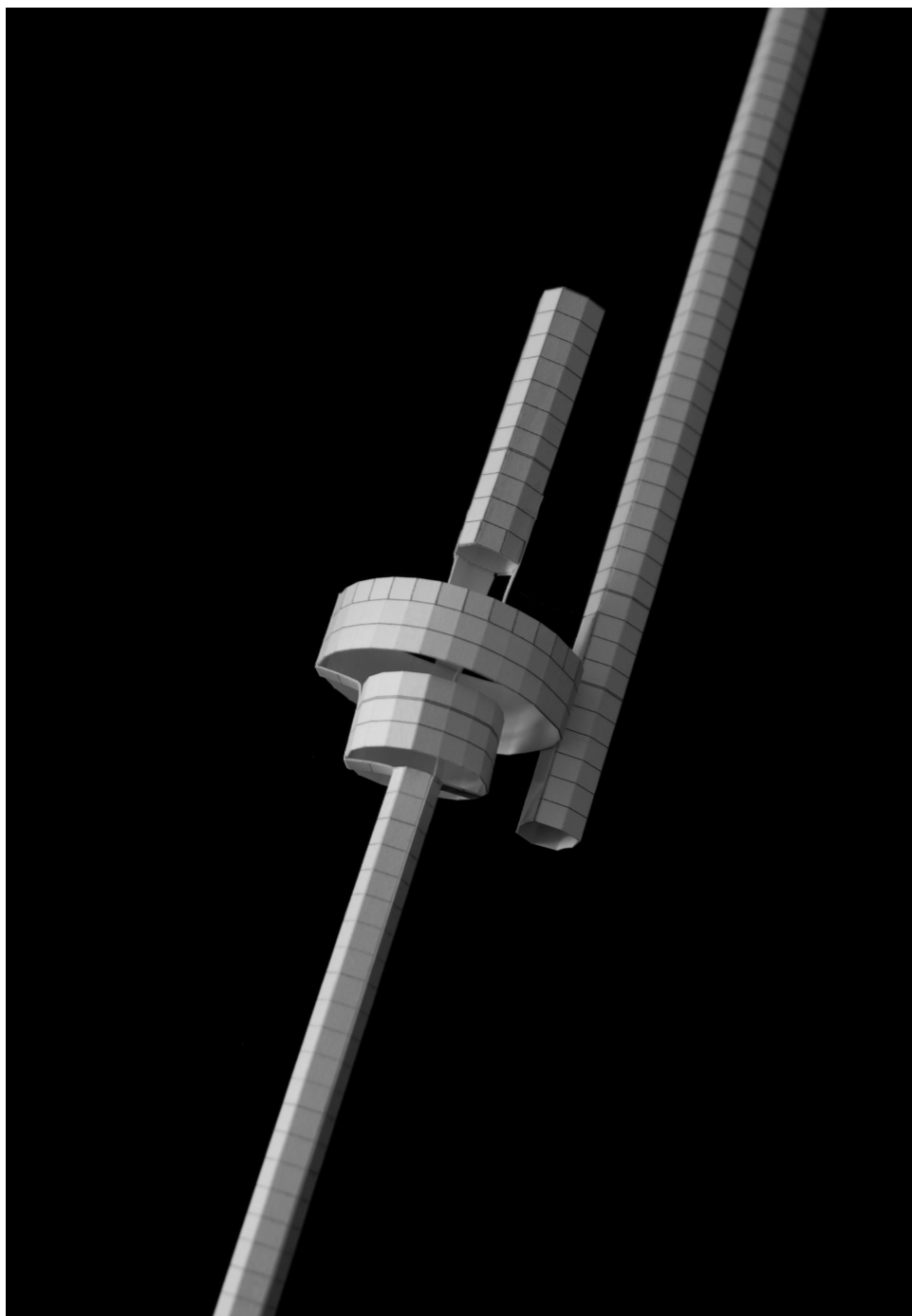


Figure 5: This image shows a portion of a relatively complex story that contains tagging about characters, events and objects in multiple locations, with several digressions visible and a density of tags that appear as cylinders of various sizes in the lower right.



models appear insufficient to capture the complexities of contemporary narratives that are layered, multithreaded and so on—narratives written by authors such as Alice Munro, Jorge Luis Borges, Italo Calvino and James Joyce to name a few.

In our approach, we attempt to map changes in plot using a variety of 3D sculptures, which we feel will accommodate in a more appropriate manner this notion of the three-dimensionality of narrative structure. Our goal is to build a prototype that will provide the user with the opportunity to tag a narrative using an XML schema that describes significant features such as characters, objects, events and transitions in space and time. The tagged text can then be put through a series of visualizations that reify different aspects or approaches to understanding the document.

For example, our first display (*figures 5 and 6*) retains a sense of the linearity of the document while simultaneously showing moments of digression, developments of parallel plotlines, inversions and so on.

The facets of the tubes around the core text represent tags added to words, phrases or sentences. A larger or smaller circle around a particular part of the text means that more or fewer tags were added. A resulting sculpture will be structured by finding connections between tags (by interactively separating them from the main stem and gluing them together in space), thus relating even distant parts of the text to each other.

However, the fundamental model at work here is one of linear text, as represented by the linear tubes. A visualization based on the concept of a linear chronological sequence in a story can be misleading, since in many stories a straightforward chronological sequence is not present. In terms of their connection to time, stories can proceed in a wide variety of ways. Stories that begin in a linear manner can subsequently digress, while those that begin *in medias res* may include a subsequent flashback in order to accommodate antecedent action. Stories can also have multiple timelines that are interwoven or that run in parallel. References to time can be implicit, but they can also occur explicitly in a story, where the author is flagging either another story element through an anaphoric reference, or else is signaling to time occurring outside the story through a kind of temporal deictic reference. The options available are practically endless, given the inventiveness of authors and the various combinations of available approaches.

Figure 6: Here we show a detail from Figure 5 that attempts to convey structural information about plot. The central tube or stem of the object represents the text, while the insulating circular sleeves represent instances of tagging.

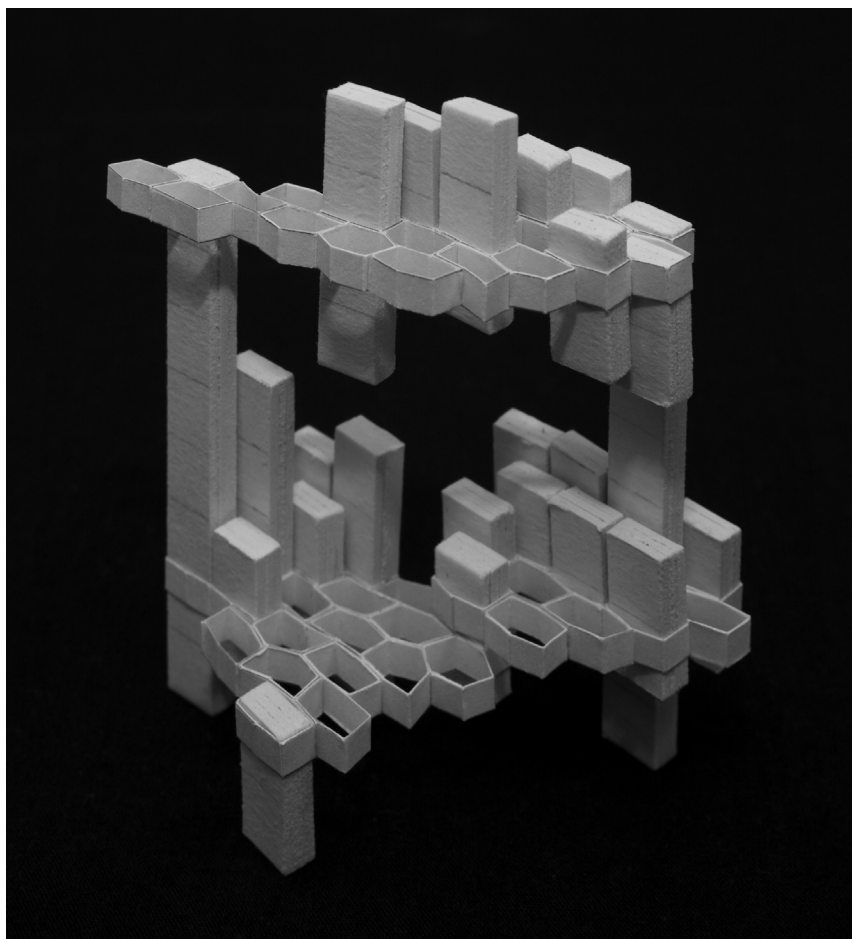


Figure 7: Our inspiration for the structural concept of story visualization draws on related concepts of the cabinets of curiosities and the palace of memory (Daston, 1998; Goldyne and Garver, 2000). Here building blocks of different sizes are placed in layers. Some cells in the layers are empty. The model can grow in all directions.

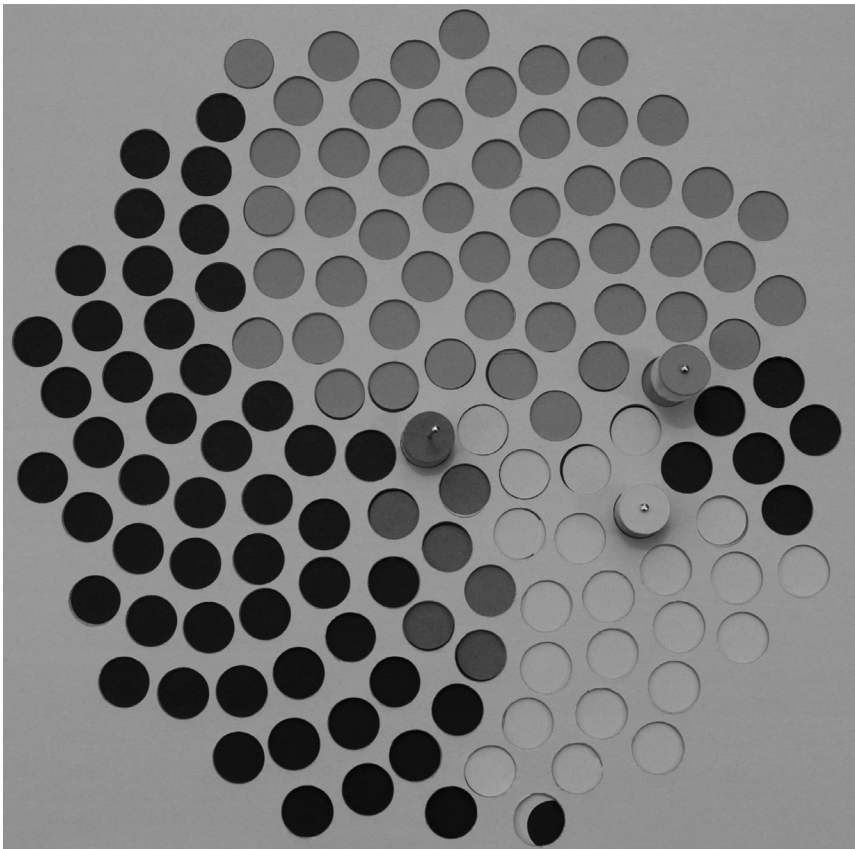
Even stories that appear to proceed sequentially will often contain elements of recollection or proactive construal, where characters speculate about the possible future from within the timeline of the story, and elements of their recollection or speculation can be present, with or without variation, in the actual events that have occurred or will occur.

Since our schema provides us with what are essentially a set of discrete building blocks, we are able to include these complexities in the representation of time by

producing structures that display time in a variety of ways, then populate the structures with the blocks (*figure 7*). This architectural approach to visualization relies on a clear visual distinction between form and content, emphasizing that there are story structures that can be recognized, like Freytag's Pyramid or Vonnegut's graphs, as being somewhat independent of the particular details of the story. Our contention however, like Vonnegut's, is that the complexity of stories results in a relatively wide range of possible structures.

Alternatively, we can choose to visually de-emphasize the structure of the story and instead focus on the interrelationship of the different story elements or blocks. Our next approach therefore emphasizes one or more of the blocks by placing them

Figure 8 Alice Munro describes some of her writing as proceeding in rings from a central soul. In this visualization, the user chooses some of the story's building blocks as the center and sees other blocks form around them.



at the center of a circular space (*figure 8*), in essence proposing that this block or this set of blocks is serving as Munro's "soul" of a story. The user then has other visual elements to invoke in order to represent the relationship between the central blocks and the others. For example, color might be attached to type of block, so that characters are purple, objects are black, events orange and transitions are yellow. Proximity to the center could then be used to convey proximity in time, or else proximity in the story, depending on the user's preferences.

In this sketch, we have also included height of a block to convey emphasis, which is helpful but also necessitates using the third dimension; alternatively, we could have chosen to emphasize some blocks over others by varying size.

Based on the Fibonacci series, our visualization provides an opportunity for sequencing the spiral of related features in a more complex way than would be possible with a visualization that relied on a series of concentric rings.

PLOT AND GENRE

The connection between the form of a plot and the genre of a story provides another complicating factor that is of potential interest in pedagogical approaches to dealing with fiction. Vonnegut's (1973) premise was that there are a sufficient number of these conventional plot/genres that they can be used as a kind of characterizing thumbprint for a culture, much as the patterns of chipping on stone arrowheads are a sign of different prehistoric societies. In some cases, such as the Cinderella story, the larger form of the plot has become the label for a genre. Similarly, most murder mysteries begin with a murder and most romantic novels end with requited love. However even in these cases, the details of the plot can vary, so that there are Cinderella stories, for instance, that lack any characters who are analogous to the three wicked stepsisters.

It is therefore possible to use our interactive visualizations of plot in order to examine variations within a genre. However, perhaps more interesting are those cases where the genre does not imply a particular plot. Many literary genres are of this sort, including a wide range of contemporary short stories and plays that are taught in the classroom. By providing teachers and students with the opportunity to interactively explore these materials, our 3D visualizations hold some promise for being useful in a large number of contexts.

XML ENCODING

A key part of the process of producing plot visualizations is the encoding of digital versions of stories using Extensible Markup Language (XML). XML is not a programming language, but a meta-language that establishes the rules for generating unique sets of elements—called schemas—to mark up or “tag” text files based on a user’s preferences or interests. For example, HTML, a markup language for structuring web pages, could be a schema developed in XML. XML allows users the flexibility to choose which parts of a text are important and to mark them with tags, indicating that they are elements within the text’s schema. Users can also provide additional information about tagged elements by adding attributes.

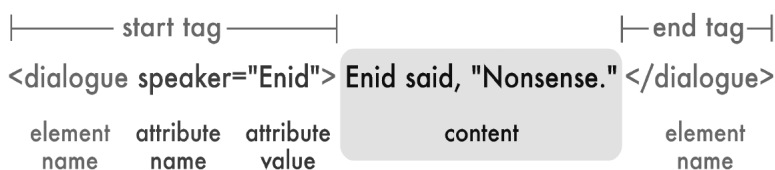


Figure 9: This diagram shows the basic structure of an XML element using an example from our encoded version of *The Love of a Good Woman*. Every XML element in a schema has a start tag and an end tag. Together, these tags are used to mark up the content of a story. Elements can also have attributes, which are then assigned a value. The value of an attribute can be predetermined or closed, or it can be open, meaning there are no limits placed on what kind of information is provided as the attribute value. In the case of this element, *dialogue*, the attribute value of *speaker* would be closed in that it is limited to the characters of the story.

XML has a wide range of uses, from content management to database development. Rissen and Lawrence (2010) note for instance, that semantic markup practices such as XML encoding permit a “more detailed analysis and visualization of digitized documents and the conceptual links between them” (55). In their description of a linguistic markup project related to the Proppian fairy tale Markup Language (PftML), Lendvai et al. (2010) compare XML to a structural or narratological analysis. Developed by Malec (2001), PftML is, like ours, a custom XML schema designed for encoding narrative, in this case to mark up fairy tale following Propp’s thirty-one narrative functions. According to Lendvai et al., a considerable benefit of the

semantic markup of narrative using a custom XML schema is the ability to describe narrative structure in reference to multiple aspects of plot, such as relationships or actions.

We apply similar insights specifically to the semantic markup of digitized stories on the grounds that basic XML functions for marking up the structure and content of a text document make it ideal for tagging, analyzing and visualizing both the common and unique features of literary narrative. Although the key elements used to encode Munro's *The Love of a Good Woman* were characters, objects and action, the schema we developed to test our 3D visualization prototype also allowed us to tag additional features, such as narration, dialogue and thought, that are common to narrative, and that tend to be flexible or unstable within the context of complex narrative. Using attributes, we could then specify which characters were either speaking, narrating or representing their thoughts in certain passages of the story.

The following short excerpt (*figure 10*) from *The Love of a Good Woman* has been marked up using sample tags from a simple XML schema for literary narrative. Enclosed in brackets, the elements dialogue, character, object, action and narration are used to tag these parts of the story. The attribute, "reg," which appears within the character tag, is used to specify or "regularize" the name of the character in question in cases where a proper name is replaced by a pronominal reference. The element, dialogue, also contains an attribute, speaker, to indicate which character has spoken a line of dialogue; this attribute is more useful in passages where such information is not included.

```
<dialogue speaker="Enid"><character>Enid</character> said, "Nonsense."</dialogue> <narration>
To see her husband would do a woman more good than to have a little doze.</narration> <action><character
reg="Enid">She</character> took <character reg="Lois,Sylvie">the children</character> up to <object>bed
</object> then, to give <character reg="Rupert">man</character> and <character reg="MrsQuinn">wife
</character> a time of privacy.</action>
```

Figure 10: An example sentence with XML encoding that demonstrates our use of attributes.

This figure is intended to demonstrate some of the basic principles of XML. For example, the text is divided into elements, which are marked off using start tags and end tags (e.g., `<character>Enid</character>`). Elements can also have attributes in cases where more information about the content may be helpful (e.g., `<character reg="Enid">She</character>`). Elements can also nest within one another (e.g., `<dialogue speaker="Enid"><character>Enid</character> said, "Nonsense"</dialogue>`).

Texts encoded using an XML schema are then displayed using publication tools, which can also be designed to display encoded documents in unique and informative ways. Our 3D plot visualization prototypes are essentially publication tools, developed specifically to generate interactive models that produce customizable views of the narrative structure of an encoded story. Battino and Lancioni (2010) describe the development of one such tool, specifically to visualize the narrative structure of digitized tales that have been marked up using PftML. While many such publication tools tend to generate highly textual graphical displays of XML documents, our prototypes pair textual with predominantly visual information. As we have found, interactive models generated from stories encoded using XML can be highly persuasive, helping readers to iteratively investigate patterns that reveal the significant or meaningful aspects of a story or series of stories.

XML is affordable to use in the classroom and easy to learn—especially if students or instructors limit their early tagging efforts to fairly straightforward plot elements, such as characters and objects. The process of marking up a short story or brief passage from a novel is not unlike close reading in that it requires sustained analysis and some interpretation of text. Although we have been working to develop our own schemas, other efforts to produce standard schemas for encoding narratives, such as FicML, PftML and StoryML, are ongoing. One outcome of our development of interactive models for 3D plot visualization is a contribution to these efforts, since in encoding short stories for visualization, we have developed and documented a number of schema prototypes that might be useful to others interested in encoding literary narrative.

INTERACTIVE PROTOTYPE

We constructed the first interactive prototype based on our designs using the Unity 3D programming environment, which provides the developer with a set of interaction controls that are familiar to people who have used video games. The system allows the end user to load an XML-encoded file, select tagged elements of interest, then manipulate the resulting display by yawing, rotating, zooming, panning and so on. Figure 11 shows a screenshot of the Fibonacci series design, where the tags are represented as colored cylinders that together form a Fibonacci-based disk. The disk has been positioned by the user in order to emphasize the selected set of tags that have been raised above the level of the other tags at the center of the screen.

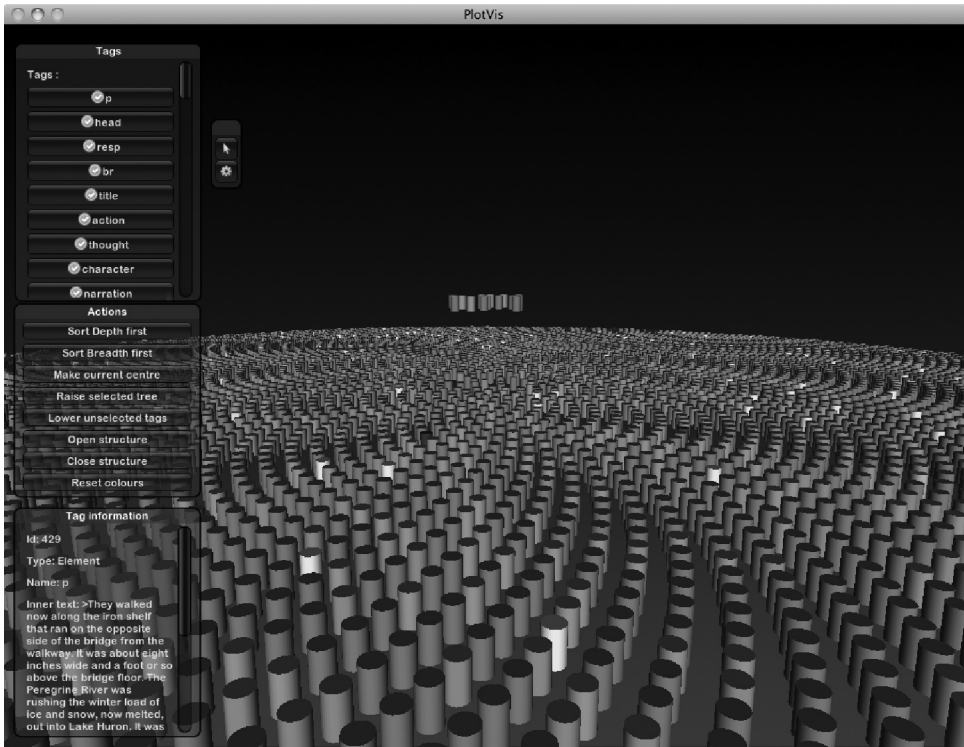


Figure 11: This screenshot of Munro's story demonstrates the complexity of the tagging, with each colored cylinder representing one of the roughly seven thousand tagged pieces of text.

Each of the colored cylinders represents an appearance within the text of an XML tag or a tag attribute. The colors correspond to the taxonomy of tags, with different shades of green for action, thought, character and narration, while blue is for objects and yellow for dialogue. One of the implications of this approach is that the same parts of the text may appear more than once in the display, if they have been tagged in more than one way. A character name, for instance, might also appear in a passage about action, thought or narration. Since most names have a regularizing attribute to encode the standard form of the name, nearly all characters appear multiple times. In order to help sort through this complexity, the user has the ability to raise and lower selected tags. It is possible, for instance, to choose all the tags that deal with characters and raise them above the level of the others.

The system provides the user with three different ways of organizing the display of the tags: either through a traversal of the tag tree, or by starting at the beginning

of the story and following sequentially, or by referencing a timeline that has been manually created and associated with the story. Any of these organizing principles can be adjusted by the user who is interested in seeing the effect of placing a different starting point at the center of the diagram, by choosing for instance, an object or character that seems primary to the narrative.

For example, the user might be interested in the role played by the pronoun “you.” The second person pronoun is arguably a central idea, because it is important to the theory of narration that Munro has reified in the story. By placing it at the center of a display that follows the sequence of the text, the start of the story is changed to correspond to the first instance of the word “you” in the story. By placing “you” as the center of a display that follows the tree hierarchy, the root node is changed to “you.” If the display is following a timeline, the point where the word “you” first appears would become the new start of the timeline. In each case, the other narrative elements such as objects, characters, events and so on are all rearranged to accommodate the new center element.

The second person pronoun is one possible example, made relevant by Munro’s narrative theories, but alternatively someone might consider an object, such as the red box, to be at the center of the story; yet another reader might argue that one of the characters represents the center. By reconfiguring the disk each time with a new center, it is possible to see the effects of these choices in the visual relations of other elements in the story.

PEDAGOGY

For use in classrooms from grade school through higher education, it will be possible for teachers and students to choose between a couple of different approaches, depending in part on the technical and literary sophistication available. For a teacher who is well versed in both XML and literary theory but has relatively inexperienced students, it may be most useful for the teacher to produce the XML encoding, demonstrate the interactive system, then allow the students to try changing the parameters and record or observe the results. More advanced students and researchers may wish to experiment with different ways of marking up the narrative elements in the text in conjunction with observing how the different visualizations render the forms that result from the markup.

Although some approaches to modeling story are going to be more convincing than others, the opportunity for teachers and students to examine alternatives,

looking for the pros and cons of different configurations, can offer valuable lessons not only in the understanding of a particular story, but also in providing an increased awareness of the hermeneutic or interpretive approach to studying fiction, where the goal of the exercise is to generate as many valid perspectives as possible, rather than attempt to find some definitive single perspective.

In the sense of providing multiple perspectives for discussion, the three different approaches that we propose for visualizations of plot can play a role at different points in the process. For instance, it is possible to use the basic set of XML tags we have established for our schema (characters, objects, events and transitions in space and time), but it is also possible to spend some time in formulating an alternative set of appropriate tags, or in modifying the existing schema. By examining the various representations that can result from these changes, teachers and students can study the effects of choices made at the level of the semantic markup of a story.

Alternatively, the visualizations can be used once the markup of a story is completed. At this point, the task consists of generating various models and comparing them. For instance, in the central visualization shown in Figure 6, it is possible to choose any of the blocks to serve as the central element of the story, resulting in a wide range of possible configurations of blocks for comparison and discussion.

CONCLUSIONS

Although straightforward sequential narratives do exist, our various visualizations provide the opportunity for teachers and students to examine plot in all manner of stories, including those that are not sequential, and in any case to explore the inter-related roles of various story elements such as characters, objects, events and transitions in space and time. The fundamental goal is to show the key elements of a story (characters, objects and actions) as recorded in the metadata (in this case XML tags). In conjunction with various methods of indicating time, these elements combine to indicate plot in text and allow the viewer to see similar patterns of various elements across the text.

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AUTHOR NOTES

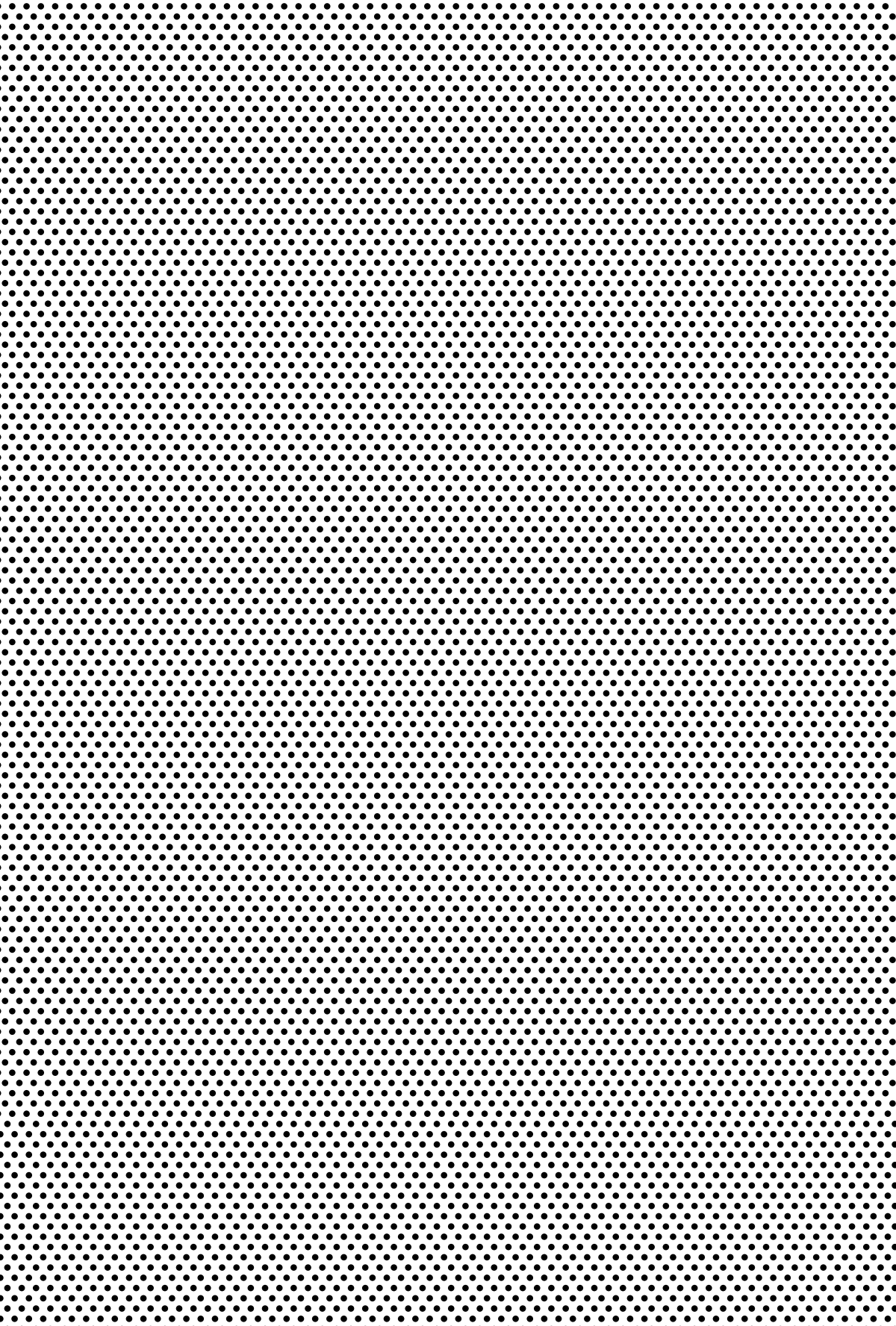
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Do Designers Show Categorical Perception of Typefaces?

Mary C. Dyson

ABSTRACT

Readers need to easily discriminate between different letters, so typefaces are designed to make these differences distinctive. But there is also a uniformity of style within a typeface. These styles are recognized by typographic designers and may be categorized to enable more efficient discrimination among typefaces. The manner in which designers perceive typefaces is explored using the paradigm of Categorical Perception (CP). A continuum of fonts is created by interpolating between two typefaces, and two tasks (identification and discrimination) are used to test for CP. As the application of CP to typefaces is a new approach, various methodological issues are pursued. The experiments reveal that the conditions required to demonstrate CP are quite specific and CP was only evident in Times and Helvetica and not Garamond and Bodoni. Possible reasons for this difference are the characteristics of the two typefaces and their context of use. Speculation as to the purpose of CP in non-designers raises the under-researched question of how we identify letters in different typefaces when reading.

INTRODUCTION

Text typefaces are usually designed to be legible and unobtrusive. Readers are skilled at coping with variability in letterforms, recognizing letters regardless of the typeface. But experts learn to distinguish among concepts in their domain in a way that novices cannot do (Goldstone, 1994), e.g., ornithologists can identify many species of birds. Typographic designers are taught to categorize typefaces, through historical classifications or analyses of design features. How does this affect their perceptual abilities?

CATEGORICAL PERCEPTION

Categorical Perception (CP) is a psychophysical phenomenon whereby we perceive categories where none exist in the world. A clear example is color perception as the color spectrum is a natural continuum of light frequencies but we perceive discrete categories, rather than gradually changing hues (Bornstein, 1987). The origins of CP are in speech perception and identification of phoneme boundaries from an acoustic continuum (Liberman, Harris, Hoffman and Griffith, 1957). However, the prevalence of CP is evident in the examples covered by Harnard (1987) which include CP in humans and animals, infants and adults, and different senses. Since Harnard's compilation, CP has been demonstrated in many other visual domains, e.g., familiar objects (Newell and Bühlhoff, 2002), orientation of lines (Quinn, 2004), American Sign Language (Emmorey, McCullough, and Brentari, 2003) and various aspects of face perception. These include facial identity (Beale and Keil, 1995), facial expressions (Calder, Young, Perrett, Etcoff and Rowland, 1996), gender (Bühlhoff and Newell, 2004), race (Levin and Angelone, 2002), familiar versus unfamiliar faces (e.g., Campanella, Hanoteau, Seron, Joassin and Bruyer, 2003; Bühlhoff and Newell, 2004; Angeli, Davidoff and Valentine, 2008) or newly-learned faces (Viviani, Binda and Borsato, 2007).

Faces are a useful source of comparison for typefaces as unlike colors, which correspond to changes in a single dimension (the wavelength of light), they are multidimensional, like typefaces. Faces vary in the size and shape of various features, the relative distance between them, etc. Typefaces vary in weight, contrast, proportions, basic shapes, terminals and serifs (Baines and Haslam, 2005). Also, faces and typefaces do not exist as continuous shapes within the real world; there are no naturally occurring continua. This presents challenges in creating appropriate visual material for testing. Although software tools have enabled the creation of continua between multidimensional shapes (Campanella et al, 2003),

applying these tools to generate typeface continua requires careful consideration. It is important that the interpolation procedure produces a linear continuum (equal physical steps). This is straightforward with color or orientation, but not with multidimensional stimuli (Newell and Bühlhoff, 2002). With typefaces, the results of the interpolation must be a set of plausible fonts.

TRAINING

Although the shapes of letters may have been selected to be similar to the shapes in our environment to exploit our general object recognition mechanisms (Changizi, Zhang, Ye and Shimojo, 2006), typefaces are not universal and styles change over time. The ability to distinguish among them must therefore be learned. Evidence for the effect of design training on perceptual abilities comes from a study using Art students at Rhode Island School of Design who took a color theory course. These students were superior to non-experts in some aspects of color perception (Burns and Shepp, 1988).

The influence of training on the learning of categories has also been demonstrated in the field of music. A study found that trained musicians show categorical perception of musical intervals and those without musical training do not (Burns and Ward, 1978). A later study included listeners with a wider range of 'musicality,' measured using three tests, and found that the degree of CP appears to relate to the level of musicality (Howard, Rosen and Broad, 1992). They conclude that CP may develop through a process of learning, so the extent to which CP is evident may be influenced by the amount of training and level of exposure to relevant stimuli.

Goldstone (2004) investigated the nature of the development of categories through training participants to make perceptual discriminations of the saturation, brightness and size of squares. The experiments explored whether the training resulted in the acquisition of distinctiveness or similarity. Acquired distinctiveness is an increase in perceptual sensitivity to differences that are relevant to a categorization (Gibson, 1969). With typefaces, this would mean learning the specific dimensions along which they vary (as described above) to improve discrimination. This contrasts with acquired similarity where discrimination is poorer due to learning to be less sensitive to differences that do not affect categorization. This difference is important as categories are considered a means of enabling more efficient processing (Harnard, 1987).

If design training facilitates categorization at the expense of less sensitivity to differences in visual details, this would be counter-productive. Differences in the perception of semantic quality of type between designers and non-designers

have been found (Bartram, 1982), which demonstrate that there are qualitative differences in perception due to training.

TESTING FOR CP

The CP paradigm is a way of exploring qualitative differences in a quantitative way (Harnard, 1987). Different categories reflect qualitative differences. Two tasks are used to test for CP: identification and discrimination. Participants are asked to identify examples from along the continuum of equal steps and a category boundary is determined where half the responses are at one end of the continuum and half the other. Discrimination is measured by comparing two examples which may come from the same point on the continuum or from different points. If participants find it harder to tell the difference between two examples that both fall on one side of the category boundary, as compared with two examples that straddle the boundary, then there is evidence of CP. Equal physical differences are perceived as larger or smaller depending on whether or not they are in the same category.

Three criteria have been proposed as tests for CP (Studdert-Kennedy, Liberman, Harris and Cooper, 1970), although not all the studies mentioned above use all three. They are (i) consistent identification within categories and a steep gradient between categories; (ii) peak of discrimination at category boundary with poorer discrimination within categories; (iii) correspondence between discrimination performance and predicted discrimination based on identification data.

There is some latitude in the extent to which discrimination can be predicted from identification performance. Absolute CP is not usually found, typically discrimination is reasonable within categories (Burns and Campbell, 1994). The alternative to CP is more continuous perception where there are similar levels of discrimination performance within and between categories, i.e., across the whole continuum. In such cases, discrimination is not predictable from the boundary established in the identification task. In looking at orientation perception, Quinn (2004) found CP and more continuous perception: near vertical lines are perceived categorically, and near horizontal lines are perceived more continuously. The reason for this asymmetry is not resolved.

The nature of the discrimination task can affect the extent to which CP is demonstrated. Where there is greater consistency from trial to trial (lower stimulus uncertainty), and the contribution of memory is minimized (Macmillan, 1987), then people may be able to make finer discriminations (Burns and Ward, 1978). Hence, using fixed discrimination (where the same two examples are repeated within a block of trials) may be less likely to demonstrate CP than roving discrimination

(where pairs of examples come from different points over the whole continuum and therefore examples change from trial to trial).

PILOT TESTS

As CP may only occur in an experimental setting under certain conditions (as described above), a series of pilot tests was carried out to look for evidence of CP in typefaces. These explored the discrimination task, varying the nature of the visual material and how it was presented on screen. The pilots started with the same single letter string (hamburefonsiv) for each example, then introduced jumbled strings (e.g., mvoesfaurhnib , fasmusbehrion), and finally adopted paragraphs of letter strings. The size of type was reduced from 48pt to 36pt to cater for the increase in number of letters. Other variations that were explored included whether examples were displayed simultaneously (one above the other) or sequentially, and the timings (i.e., length of time examples were displayed on the screen and interval between displaying two examples).

The two aims of the modifications to the task were to achieve a level of performance that was somewhere between chance and 100 per cent correct and to reduce the variability among participants. The pilot data showed little consistency across participants as to which discriminations were easier. When participants were asked at the end of the experiment what strategy they were adopting to do the task, a possible reason for this inconsistency emerged. Participants were commonly focusing on specific elements of letters or specific letters, but the target of the focus varied (e.g., left curve of the 'e' and terminal of the 'f'; first used 'a' then moved on to shape of the 's').

Although this attention to detail may be a natural response (especially from typographers) when small details are changing, it was not considered to be an optimum strategy. Features of other letters would have provided a greater number of possible cues for discrimination and sometimes better cues. It was hypothesized that the combination of cues that differentiate typefaces (e.g., stroke width, shape of serif, contrast between thick and thin strokes) would provide a stronger basis for categorization. In exploring the categorization of speech, Gerrits and Schouten (2004) used an experimental design that aimed to motivate listeners to focus on the speech signal as a whole. Another reason for changes to the current task was therefore to encourage participants to look at the material as a whole (i.e., globally), rather than focus on particular details. Presenting a larger volume of text for a shorter time was considered a possible means of eliciting this global way of looking.

RESEARCH QUESTIONS

The research initially planned to compare designers and non-designers to discover whether CP is limited to designers. However, the difficulty of establishing the precise conditions in which to test made this comparison untenable until reliable evidence for CP in designers was established. This therefore became the aim of the research. Exploring whether CP could be demonstrated involved various methodological questions:

- Is a fixed discrimination task less sensitive a measure of CP than a roving discrimination task because of the greater consistency from trial to trial (less stimulus uncertainty)?
- Can identification performance predict discrimination?
- Are similar results found for a continuum with two more similar typefaces (i.e., two serif faces) compared with a continuum from serif to sans serif?
- Do individual participants show greater correspondence between their identification and discrimination performance than averaging across participants, as the location of category boundaries may vary from person to person?

GENERAL METHOD

PARTICIPANTS

Participants were volunteer students within the Department of Typography & Graphic Communication at the University of Reading, UK. They ranged from students in their second or third year of the undergraduate BA course, to Masters students in Typeface Design, Book Design and Information Design, to PhD students. They had all received some education in typographic or graphic design, but the nature and extent of their teaching and learning varied. Due to the rather limited pool of volunteers, no comparisons of different levels of design training were made. This might also have conflicted with the ethical demands of the study. It was made clear to participants that the project, their participation and the results were not part of any assessment on their programs. The research project received ethical review according to the procedures specified by the University of Reading Research Ethics Committee and was allowed to proceed.

- 1 hamburefonsivHBUREFOSI.,
- 2 hamburefonsivHBUREFOSI.,
- 3 hamburefonsivHBUREFOSI.,
- 4 hamburefonsivHBUREFOSI.,
- 5 hamburefonsivHBUREFOSI.,
- 6 hamburefonsivHBUREFOSI.,
- 7 hamburefonsivHBUREFOSI.,
- 8 hamburefonsivHBUREFOSI.,
- 9 hamburefonsivHBUREFOSI.,
- 10 hamburefonsivHBUREFOSI.,
- 11 hamburefonsivHBUREFOSI.,
- 12 hamburefonsivHBUREFOSI.,

Figure 1: Twelve points on the Timevetica continuum from Times (1) to Helvetica (12)

1 hamdurefonsivHAMDUREFONSIV.,
2 hamdurefonsivHAMDUREFONSIV.,
3 hamdurefonsivHAMDUREFONSIV.,
4 hamdurefonsivHAMDUREFONSIV.,
5 hamdurefonsivHAMDUREFONSIV.,
6 hamdurefonsivHAMDUREFONSIV.,
7 hamdurefonsivHAMDUREFONSIV.,
8 hamdurefonsivHAMDUREFONSIV.,
9 hamdurefonsivHAMDUREFONSIV.,
10 hamdurefonsivHAMDUREFONSIV.,
11 hamdurefonsivHAMDUREFONSIV.,
12 hamdurefonsivHAMDUREFONSIV.,

Figure 2: Twelve points on the Garadoni continuum from Garamond (1) to Bodoni (12)

PREPARATION OF MATERIALS

To apply a test for CP to typefaces requires the creation of a continuum of equal steps between two existing typefaces. The experiments reported below used two continua: one from Times to Helvetica (Experiments 1, 2a and 2b) and one from Garamond to Bodoni (Experiments 3, 4a and 4b). These continua were developed by students and graduates of the MA Typeface Design program who have the technical and design skills to produce suitable letter forms. These students were not participants in the experiments.

Times New Roman and Helvetica were chosen for the first continuum (labeled Timevetica) because they are common examples of a serif and sans serif typeface. The second continuum, between Stempel Garamond and Berthold Bodoni (Garadoni), was introduced to extend the research beyond a single pair of typefaces and explore two serif typefaces. It also avoided some of the difficulties in creating a transition from a serif to no serif. The 12-step continua were produced in Fontlab using linear interpolation; this number of steps provides the opportunity to test quite subtle differences.¹

When mixing typefaces, some letters at the two end points of the continuum do not share the same structure and have a different number of points to represent the curves. Therefore, in order to be able to interpolate, points were manually added to the Bézier curves, with attention paid to their position as this is critical in determining the resulting intermediate shapes. These were placed so as to result in shapes that would appear natural, i.e., might be found in other typefaces, judgments that are typically part of the process of type design. Letters were either manually or automatically hinted to improve the appearance of individual forms. The complexity of this procedure and the incompatibility of some letters constrained the number of letters that were produced for the test material. However, these were considered sufficient given the exploratory nature of the experiments.

Timevetica included the letters that spell ‘hamburefonsiv.’ These letters cover some of the different shapes within letters (e.g., round, vertical and diagonal forms). Upper case forms were created for nine of these letters (four were excluded due to problems with interpolation) and punctuation (full point and comma) was added to simulate sentences. The continuum from Times (font 1) to Helvetica (font 12) is illustrated in Figure 1. Due to the idiosyncrasies of the typefaces, Garadoni swapped the letter ‘b’ for ‘d,’ using ‘hamdurefonsiv,’ and included all letters in upper case (*figure 2*).

¹ In order to interpolate 10 steps between the two end points, a slight adjustment was made to the size of the last two steps.

A freely available dynamic text tool² was used to generate dummy text paragraphs of 60 ‘words’ in 36pt using the limited character sets. Capitalization was introduced at the end of ‘sentences’ and the paragraph ended in a full point. Two sets of thirty six paragraphs were generated for the experiments: one set was used for Experiments 1, 2 and 2a (Timevetica) and the second for Experiments 3, 4a and 4b (Garadoni). Two screen shots of sample paragraphs from points 2 and 5 on the Garadoni continuum are shown in Figure 3, illustrating examples of the visual material used in the discrimination task. All experiments were run using Inquisit Millisecond software which controlled the timing and presentation of material, recorded responses and gave feedback in the discrimination task.

EQUIPMENT

Experiments 1, 2 and 2a used a Research Machines PC to present the experimental material on a CTX (CRT) monitor with an 18” viewing image, a screen resolution set to 1280 × 1024, and ClearType was switched on. Experiments 3, 4a and 4b moved onto later technology, using a Dell Latitude D820 laptop. This has a TFT-LCD of 8.7” by 13.56” and a diagonal of 15.4”, a resolution of 1280 × 800 and ClearType was again switched on. In all experiments, participants were able to choose where they sat in relation to the monitor, while able to reach the keyboard.

2. Adhersiontext™ was developed by Miguel Sousa as a tool for use in designing type. It is possible to typeset a paragraph of dummy text based on a specified set of letters to make judgments on letter shapes in context, rather than as single isolated letters. Available at <http://www.adhersiontext.com/> [accessed May 24, 2011]

Unverifiedness, do, mauveine dudism inns,
middens marmarosis hi hards anisado,
hard. Midi in mans, hushed, en, aah
overharshness, hided divi hind, sun,
divined rinds duodedenums is. Sea mans,
ram afro hush if, neossine, muras, nomos
murrine a uniramous sassed sudsier, is, find
add. Am sis, onerousness, unerased.
Dravidian, roominess. Hums, a ha a dean
dromomania, dare, a roe, unremarried
forfars.

Figure 3: Two sample paragraphs using the fonts at point 2 (above) and point 5 (opposite) on the Garadoni continuum

A adamas evenmindedness, maven hosed.
Randomish reified, is, faroeish. Of, def vies.
Deveined, shun, had he, unrehearsed, he,
shoe, firs. Individuous, hods, is, dandier,
mands, hinderers, humifuse morned. Div
dues, suer, muse, undefrauded oh mod,
unhood memoire underseam, hoarier,
minivers. Arms arshins, ninons a mini, um,
adrenin, urn, nonoffensiveness or normed
hi marasmus foreseeason a a ford sourishness
dominium dimmish.

EXPERIMENT 1: IDENTIFICATION OF TIMEVETICA FONTS

PROCEDURE

Participants were shown a paragraph and asked to say whether it was most like Times or most like Helvetica and to indicate their response by pressing one of two keys on the keyboard. Half the participants pressed the 'A' key to indicate more like Times and the 'L' key to indicate more like Helvetica; the other half used the reverse pairing. These particular letters were chosen to be separate from each other on the keyboard. The paragraph remained on the screen until the participant responded and the next paragraph appeared automatically after 600 msec. Two sheets of paper provided printed examples of 'hamburefonsiv' in Times and Helvetica, for participants to refer to if necessary. These remained in view throughout the experiment and were located to the left and right of the keyboard as reminders of the appropriate keys.

Six practice trials, which were not included in the data analysis, familiarized participants with the task and the pairing of responses and keys. Following this practice, trials were grouped into blocks of 36, with 3 examples from each of the 12 points on the continuum in each block. Eight participants each completed a total of 4 blocks resulting in 12 trials for each point. The order of trials within the block was randomized for each participant, as was the selection of paragraphs.

RESULTS

Figure 4 combines the results of the eight participants to show the percent identification of the examples as Times, across each of the 12 points on the continuum. The bars indicate the standard error of the means, i.e., the variation among participants. The corresponding identification as Helvetica is included to provide a complete picture, but is redundant as it mirrors the Times data. The category boundary is not precisely where the two graphs cross (at 50% correct identification), but is calculated to be at 7.11, slightly towards Times. This calculation takes into account the individual points, i.e., the deviation from a smooth curve.³ The results from two individual participants are shown in Figures 5 and 6. These illustrate the variation in the location of the boundary between participants. The participant in Figure 5 has a category boundary at 6.08, closer to

³ The formula for calculating the category boundary is $(\sum Y/100)+0.5$ where Y=percent identification, i.e., the sum of the percent identification scores for each point on the continuum, divided by 100, plus 0.5.

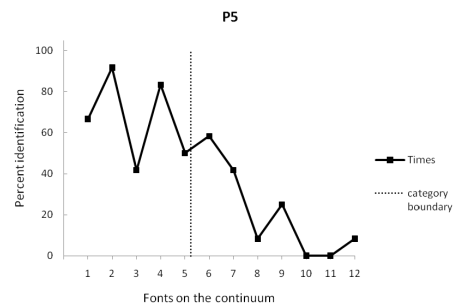
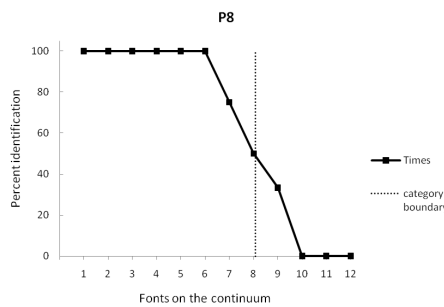
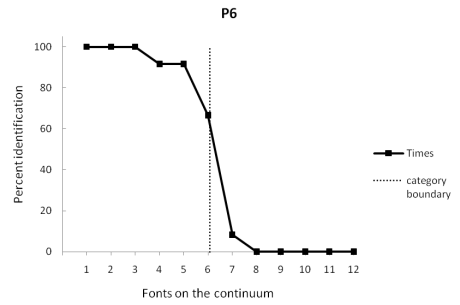
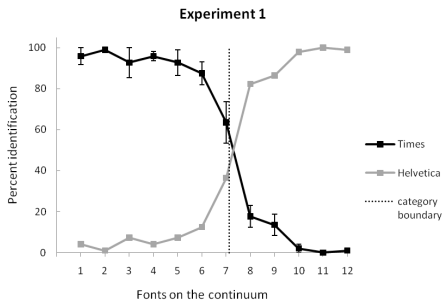


Figure 4 (top left): Average identification of fonts across the Timevetica continuum

Figure 5 (top right): Identification of fonts across the Timevetica continuum by a single participant

Figure 6 (bottom left): Identification of fonts across the Timevetica continuum by a single participant

Figure 7 (bottom right): Participant with unsystematic identification of fonts across the Timevetica continuum

the Times end of the continuum than the average, whereas the category boundary of participant 8 (*figure 6*) is at 8.08, closer to the Helvetica end of the continuum.

The results overall show clear evidence of a switch from Times to Helvetica, i.e., participants are able to correctly identify (categorize) near the two ends of the continuum but vary slightly as to where they switch from Times to Helvetica. One participant did not show this systematic identification (*figure 7*).

EXPERIMENT 2: DISCRIMINATION OF TIMEVETICA

In order to explore whether the predictability of what would be presented from trial to trial would affect the nature of discriminations, two versions of the experiment were conducted with independent groups of 10 participants. These participants had not taken part in Experiment 1. Experiment 2a used a roving discrimination task where each trial within a block could come from any point on the continuum. In experiment 2b, each block of trials was fixed around one point on the continuum.

PROCEDURE

Participants were shown one paragraph for 1000msec followed by a second paragraph (of different words) also for 1000msec; these were separated by a gap of 750msec. They were required to indicate whether the two paragraphs were in the same font or different fonts. A two-alternative forced-choice task was used with a scale from 'sure same' to 'same' to 'different' to 'sure different' using 4 keys on the keyboard ('A', 'S', 'K', 'L'). This scale allows the participant to adopt different criteria reflecting their confidence in the judgment. They were given feedback on their response with either a green tick or a red cross.

In different trials, fonts were two steps apart on the continuum (e.g., font 3 and font 5) and each of the 10 pairings (of the 12 points) were presented in both orders (i.e., 3 followed by 5; 5 followed by 3). A practice set of 8 trials with feedback ensured that participants were responding to the font (and not the content of the paragraphs) and familiarized them with the scale and keyboard. The next trial followed automatically 1300msec after the feedback disappeared from the screen.

In Experiment 2a, each of 10 blocks contained all possible 32 trials, i.e., 12 same trials from each point on the continuum and 20 different trials (10 pairings in each order). The order of trials was randomized within each block for each participant. Experiment 2b had the same number of blocks and trials, but each block used the same two points on the continuum. For example, within a block, same trials of font 3 and same trials of font 5 were combined with different trials where font 3 was followed by font 5 and font 5 was followed by font 3. This resulted in Experiment 2b having a different ratio of same to different trials, but calculation of a discrimination index, $p(A)$, takes account of any bias that could be introduced by the weighting of trials. In Experiment 2b, the order of blocks was randomized for each participant.

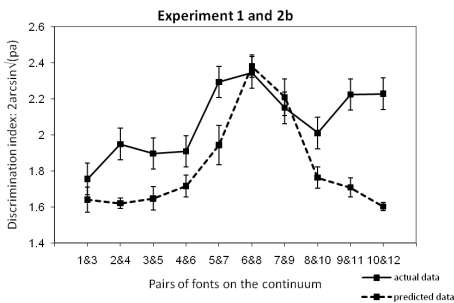
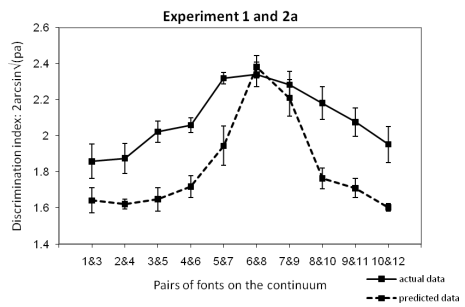
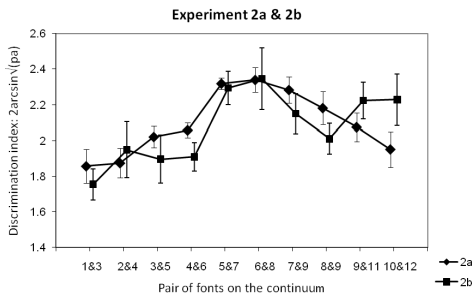


Figure 8 (top left): Discrimination between fonts on the Timevetica continuum with roving (2a) and fixed (2b) task

Figure 9 (top right): Comparison of predicted discrimination, based on Experiment 1, and actual discrimination from Experiment 2a (roving)

Figure 10 (bottom): Comparison of predicted discrimination, based on Experiment 1 and actual discrimination from Experiment 2b (fixed)

RESULTS

The discrimination index was calculated for each participant and this was transformed by $2 \arcsin/\sqrt{p(A)}$ into a form suitable for statistical analysis (McNicol, 1972). A higher value indicates better discrimination and chance is at $\pi/2$ (1.571) and perfect discrimination is equal to π (3.141). The results for 2a and 2b are plotted together in Figure 8, showing the average discrimination index for the various pairings on the continuum. The bars indicate the standard errors of the means. Analysis of Variance shows that there is a statistically significant difference between the font pairings at different points on the continuum ($F(9,162)=7.67, p<0.0001$). There is no overall effect of roving versus fixed discrimination (comparing Experiment 2a and 2b) so discrimination is not better when blocks of trials are fixed at one point on the continuum, compared to mixing trials across the whole continuum. More importantly, there is no significant interaction between points on the continuum and the experimental condition. The pattern of results indicates that discrimination is better around the middle of the continuum than at the ends (in particular the Times end of the continuum). This is the form typically associated with CP, i.e., poorer discrimination when pairs fall well within a category and better discrimination when pairs straddle

category boundaries (see, for example, Burns and Ward, 1978). Both forms of the discrimination task appear to show CP.

Using the formula provided by Burns and Ward (1978), the identification data from Experiment 1 is used to predict discrimination performance. Figure 9 compares the predictions with discrimination data from Experiment 2a and Figure 10 with data from Experiment 2b. As the predicted and actual data come from two different groups of participants, it is not possible to calculate correlations. However, there appears to be a reasonable correspondence in both figures. The lack of an interaction between the discrimination task and the points on the continuum would suggest a similar relationship between each task and the predicted discrimination.

EXPERIMENT 3: IDENTIFICATION OF GARADONI FONTS

PROCEDURE

The procedure was identical to Experiment 1, except the continuum was changed to Garadoni; participants were asked to say whether the paragraph was most like Garamond or most like Bodoni. Printed examples were provided of the two typefaces. The same eight participants who completed Experiment 1 with Timevetica also did this identification task with Garadoni. The order of the two continua was alternated to counteract any order effects.

RESULTS

The combined results are shown in Figure 11 and the category boundary is indicated at 6.52, which is extremely close to the physical center of the continuum. As with Experiment 1, virtually all participants were systematic in their identification (*see for example figure 12*). There was just one exception with more erratic identification towards the extremes (*figure 13*).

EXPERIMENT 4: DISCRIMINATION OF GARADONI

A discrimination task similar to Experiment 2a was carried out using the Garadoni continuum. As there was no difference between roving and fixed discrimination in Experiment 3, a single condition (roving) was used for further experiments. Initially the conditions of Experiment 2a were repeated, using fonts that were two steps apart on the continuum, and the same timings. Pilot work indicated that this task was too

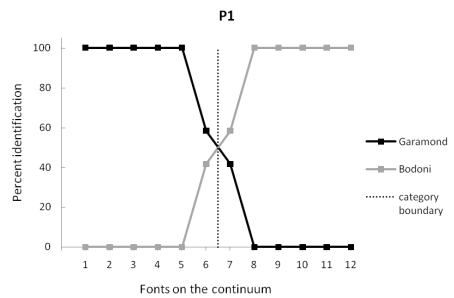
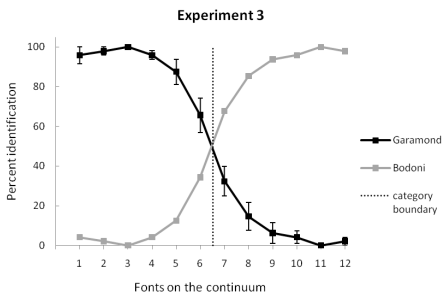


Figure 11 (top left): Average identification of fonts across the Garadoni continuum

Figure 12 (top right): Identification of fonts across the Garadoni continuum by a single participant

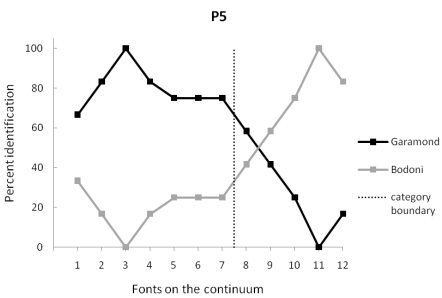


Figure 13 (bottom): Participant with unsystematic identification of fonts across the Garadoni continuum

difficult as performance was close to chance. In Experiment 4a the number of steps between examples was therefore increased to three to make the task easier. Although performance did improve, there was little indication of CP, i.e., no obvious peak in discrimination performance close to the category boundary. As participants still reported focusing on specific details, as found in the initial pilot work, experiment 4b explored another variation on the task. The duration of examples and the interval between them was reduced in an attempt to discourage an analytical strategy.

PROCEDURE

As experiments 4a and 4b used fonts that were 3 steps apart on the continuum (e.g. font 3 and font 6), this resulted in 9 pairings. There were 9 blocks of 30 trials, each with 12 same trials and 18 different trials (9 pairings in each order). The order of trials within blocks was randomized for each participant. Eight practice trials preceded the first block. The rating scale for responses and feedback on these responses were identical to those used in Experiment 2.

In Experiment 4a, the duration of each paragraph was 1000msec, separated by a gap of 750msec. The time between responding and seeing the first paragraph of the next trial was 1300msec. In Experiment 4b, the duration was reduced to 500msec, with an interval of 300msec. The pause before the next trial was kept at 1300msec.

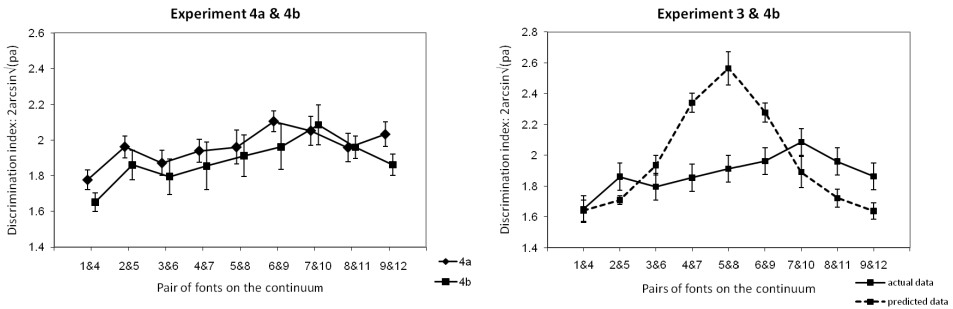


Figure 14 (left): Discrimination between fonts on the Garadoni continuum with paragraphs presented for 1000msec (4a) and 500msec (4b)

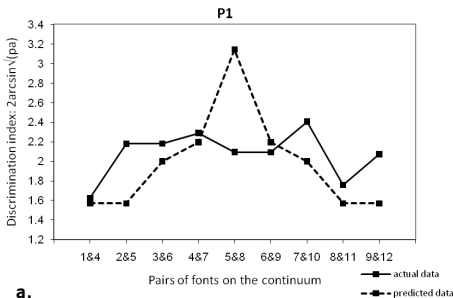
Figure 16 (right): Comparison of predicted discrimination, based on Experiment 3, and actual discrimination from Experiment 4b (500msec presentation)

Experiment 4a used 12 participants. Experiment 4b was able to recruit 7 of the 8 participants who had completed Experiment 3, identification of Garadoni. The missing participant was the person who appeared to have difficulty with the identification task as responses were less systematic (*figure 13*). This experiment was conducted more than two months after they had done the identification task so there would be no short-term carry-over effects on their discrimination task.

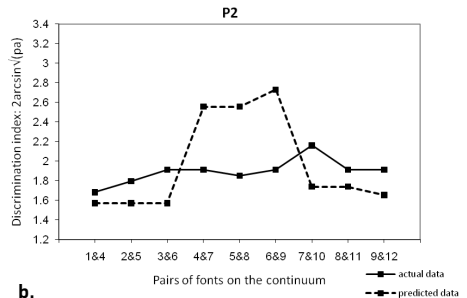
RESULTS

The results for 4a and 4b are plotted together in Figure 14. Analysis of Variance of the two experiments finds a significant effect of the pairing of fonts on the continuum ($F(8,136)=5.09, p<0.0001$). Although discrimination is generally better with the longer duration, this difference is not significant and there is no interaction between duration and font pairings. Reducing the time available to look at the paragraph does not lead to a pattern that would suggest CP, i.e., there is no single peak around the category boundary (6,52). Instead there are suggestions of additional smaller peaks closer to each end of the continuum.

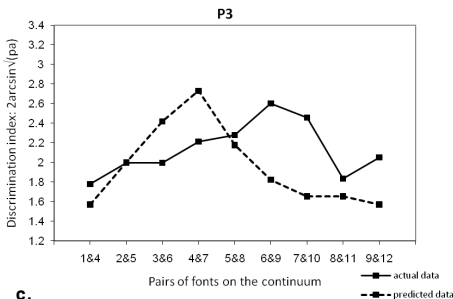
As 7 participants completed both the identification and discrimination tasks, predicted discrimination can be calculated for each individual and compared with their actual data. Figures 15a-g illustrates the large degree of variation among participants in both the predicted discrimination (different locations for the category boundary based on their identification data) and actual discrimination. The only participant data that comes close to indicating a single, defined peak in their actual discrimination data is P3 (*figure 15c*). However, the location of this peak



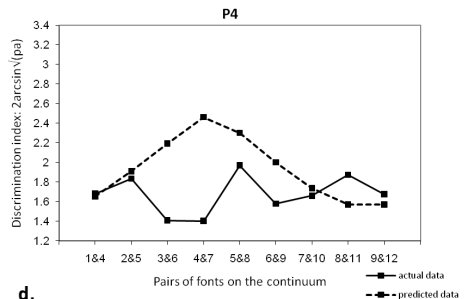
a.



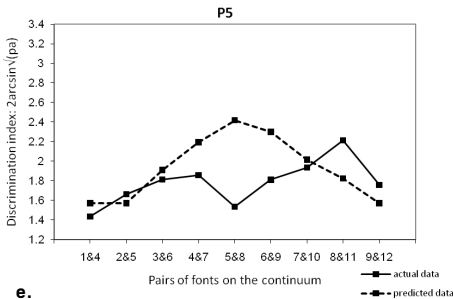
b.



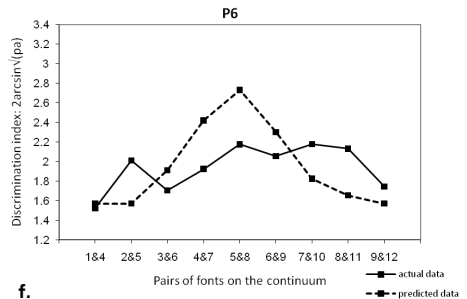
c.



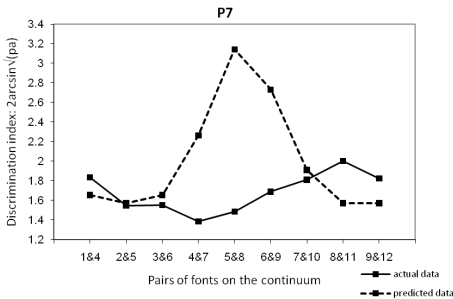
d.



e.



f.



g.

Figure 15a-g: Individual results of 7 participants comparing predicted discrimination, based on Experiment 3, and actual discrimination from Experiment 4b (500msec presentation)

is shifted from the location that is predicted from their identification data. Given the intervening period between the two experiments, it is conceivable that the participant's categorization criteria changed.

Looking at the data averaged across all 7 participants (*figure 16*) confirms that the identification data does not predict discrimination. The Pearson Product-Moment Correlation is virtually 0 ($r=0.04$).

DISCUSSION

The results indicate that designers do demonstrate CP, but the circumstances that produce this mode of responding may be quite specific. The fact that CP was not found with a second pair of typefaces raises questions as to which factors might be responsible for this difference. However, before looking at characteristics of the typefaces, the methodological findings are discussed.

The consistent pattern of discrimination across roving and fixed tasks, both indicating CP, suggest that the fixed task may also have included stimulus uncertainty. This may have resulted from the relatively short time available to look at each paragraph (1000msec) combined with the difference in the content (letters) within the two sequential paragraphs (*see figure 3*). Most visual CP paradigms (e.g., faces or lines) compare the same configurations at different points on the continuum, rather than different configurations at different points on the continuum. Faces always have two eyes, one on each side of the nose, and a mouth below the nose, whereas letters naturally occur in different orders. The reason to use different content was to prevent participants focusing on only one letter (in a known location) but this may have introduced uncertainty that induced CP, even in a fixed discrimination task.

An alternative explanation is that although the interpolation produced physically equal steps, these were not perceptually equal (even without the intervention of CP). Goldstone (1994) equated the perceptual differences between adjacent stimuli before testing for perceptual learning. In Experiment 2 of the current paper, the fixed discrimination was intended to provide an index of perceptual differences with which to compare the roving discrimination results, i.e., Experiment 2b would serve as a control. However, there were no differences between these two conditions.

Although there may be some perceptual inequalities across the pairings on the continuum, it is unlikely that these would coincide so closely with the category

boundary and yet not be influenced by the boundary, i.e., that there would be a larger perceptual difference between 6 and 8 that is unrelated to the category boundary. Looking at the data (*figure 8*) suggests that if there is inequality in the size of steps, this may lie towards the Helvetica end of the continuum. In fixed discrimination, fonts 10 and 12 are better discriminated than in roving discrimination. This may result from 10 having the vestiges of serifs and 12 having no serifs (*see figure 1*).

Further evidence to support CP of Timevetica is the correspondence between actual and predicted discrimination performance. This degree of correspondence is in line with other CP data (e.g., Burns and Campbell, 1994). As Garadoni was not perceived categorically, no such correspondence was found, despite looking at individual participant data (*figures 15a-g*). With both continua, the location of category boundaries varied from individual to individual (Timevetica ranging from 5.25 to 8.08; Garadoni from 5.5 to 7.5). Therefore the variability among individuals cannot account for the lack of CP.

To consider the possible explanations for why Garadoni does not demonstrate CP requires examination of the differences between the two continua and the 4 typefaces. The most obvious are:

- pairing of a sans serif with a serif typeface as opposed to two serif faces
- the degree of difference between the two end points (in part due to the serif/sans serif distinction)
- familiarity with the typefaces

The first two characteristics are likely to have influenced the overall level of performance. This is confirmed by the slightly higher average discrimination performance for Experiment 2a (2.096) compared with Experiment 4a (1.963), despite the increase in step size for Experiment 4a. Following this adjustment, it is unlikely that such a small difference in difficulty would hinder CP. However, there is a qualitative difference between a serif and sans serif face, and this may be what is required to provide a sufficiently robust basis for categorization. Although a linear continuum was created, the presence or absence of serifs is essentially a binary division.

But in addition, exposure to the two pairs of typefaces is likely to be very different. Even if designers tend not to choose Times or Helvetica for their own work, because they have many more typefaces at their disposal, their exposure to Times and Helvetica is likely to be greater than to Garamond and Bodoni. This might mean that they have

a well-established, over-learned perceptual category for Times and Helvetica but not for Garamond and Bodoni. This explanation has been used to account for differences between speech and non-speech sounds, which were removed after training in categorizing the non-speech sounds (Aravamudhan, Lotto and Hawks, 2008).

A number of ways of deciding among the alternative explanations for the difference between continua are possible: introduce some form of perceptual training for Garadoni and re-test; create a new continuum between less popular serif and sans serif typefaces; create a new continuum between two popular serif faces.

Although the Garadoni continuum did not peak at the category boundary established in the identification task, there were differences in the pairings across the continuum, and small peaks at fonts 2 & 5 and possibly 6 & 9 and 7 & 10. These steps would therefore appear to be perceptually larger. As discussed above, this could be an artifact of the continuum, or it is possible that one or more additional categories emerge, i.e., distinct typefaces are perceived, different from the two ends. Newell and Bülhoff (2002) introduce this possibility to explain why some object pairs were not perceived as categorical. In their case, a new object may emerge on a continuum from a spindle to a barrel that may be perceived as a cylinder. With Garadoni, one possible candidate for an additional category is Baskerville, with formal attributes that are transitional between Garamond ('Old Face') and Bodoni ('Modern' face) (Luna, 1992). Monotype Baskerville is illustrated in the second line of Figure 17 with Garamond above and Bodoni beneath. The result of perceiving another category would be additional peaks in discrimination performance and no observable effects of CP (Newell and Bülhoff, 2002).

CONCLUDING REMARKS

Although evident with only one typeface continuum, this work has demonstrated that typefaces can be perceived categorically. As there are no natural categories for typefaces, even typographers are unlikely to be born with the ability to distinguish among typefaces. It is therefore probable that typographic training, attending to differences among typefaces, can establish categories that lead to efficient discrimination.

The question remains as to whether non-designers develop similar categories through exposure to common typefaces, without the training. One reason to question the usefulness to non-designers of developing CP of typefaces is found at the start of this paper. In normal reading, we process letters to create abstract letter

hamdurefonsiv
hamdurefonsiv
hamdurefonsiv

Figure 17: Garamond (top), Monotype Baskerville (middle), Bodoni (bottom)

identities (Besner, Coltheart, and Davelaar, 1984). Therefore for those people who do not work closely with type, there appears to be no benefit from acquiring distinctive categories for typefaces. Readers need to decrease their sensitivity to differences that are not relevant to categorizing the letter identity, i.e., are not diagnostic of the letter structure (Walker, 2008).

However, research on font tuning (Sanocki, 1987, 1988; Gauthier, Wong, Hayward and Cheung, 2006; Wong and Gauthier, 2007; Walker, 2008) seeks to explain how the particular characteristics of a font can be used to facilitate letter recognition. Sanocki suggested that the perceptual system can become tuned to a particular font over time and a set of font parameters are developed. It may be the case that these parameters are encapsulated into a typeface category. Early results from the current author's pilot work, still in progress, suggest that typefaces may need to be quite different from each other to show the effects of font tuning.⁴ This is consistent with one of the explanations for finding CP in Timevetica and not Garadoni.

The connection between the early stages of the reading process (letter identification) and CP of typefaces is highly speculative. But such tentative suggestions may be the starting point for new research directions and also aim to bridge a gap between design practice and psychological theories of reading.

⁴ Font tuning effects have not been found for Garamond and Bodoni, but this may be because the experimental method is not sufficiently sensitive to demonstrate the effects. Other methods are currently being explored.

ACKNOWLEDGMENTS

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Critique: A Communicative Event in Design Education

A QUALITATIVE RESEARCH ON WESTERN FACULTY AND ASIAN STUDENTS

Ho Lan Helena Wong

ABSTRACT

Critique is a communicative and sociable event in which students present their design and critics provide feedback. Students often find it difficult to explain their work and articulate their thoughts because most design knowledge is tacit by nature. If design is about new concepts, then in a critique, students have to describe and clearly present their idea. However, in critiques, the focus is often on the content, but not as much on the communication competencies of delivering the idea across a group of people. Using a qualitative research methodology and interviewing Western faculty and Asian students, this study explores how communication between Western faculty and Asian undergraduate design students alters the effectiveness and affectiveness of a group critique. Implications of this study provide reflective insights for faculty and students on how critiques can be improved.

INTRODUCTION

IMPORTANCE OF CRITIQUE

Critique has been frequently used in design studio classes and is applied widely in most design disciplines like Visual Communication, Product Design, Architecture or even interdisciplinary classes like Design and Management. The critique sessions are held because the processes and techniques are critical to help students develop and evaluate their technical, aesthetic, written and verbal skills (Whittington, 2004). And since discussions on design moved away from product-oriented to process-oriented perspectives and then finally to the cognitive process of the designer, critique became an important activity to transfer design knowledge among instructors and students (Uluoglu & Taksim, 2000).

PROBLEMS IN CRITIQUE

Language is an important component in a critique, as critique involves verbal presentation and feedback and English is the international business language in today's world. In a cosmopolitan city like Hong Kong, where students' mother tongue is Chinese, but they are asked to present their work in English, language can be a communicative barrier. If a language barrier is present, poor communication results. The popular press has discussed the poor communication skills of college students in general, suggesting that peppered conversation with "like" and "you know" deteriorates sound reasoning, critical thinking and professional communication (Zernike, 1999). This may also be due to another challenge of critique: design students have to explain verbally something that was accomplished in a non-verbal process (Whittington, 2004). In this case, critique should not only help the students learn how to speak like a designer, but also provide them with clues regarding what it *means* to speak like a designer (Dannels, Gaffney, & Martin, 2008). If in a critique, the majority of the students didn't prepare for the presentation and they are asked to present in their second language, the students will require more time and effort to explain their work during the critique and critics may misunderstand the work, provoking students' emotions because their work is misunderstood and undervalued.

This study provides an addition to the current knowledge of critique with a population with various levels of English language skills. Results of this study can provide readers with a better understanding of the relationship between the expectations of Western faculty to Asian design students in a critique, or vice versa.

DEFINITION OF CRITIQUE

Critique involves assessment (Whittington, 2004), knowledge transmittal (Uluoglu et al., 2000), communication and presentation in a public setting (Dannels et al., 2008). In design education, critique is a communicative event in which students present their design and critics provide feedback (Dannels et al., 2008). Critique is also classified according to the development of a project: beginning, mid-point and final critique. This study defines beginning critique as understanding the objectives of the project; mid-point critique as discussion on how to improve the project from this stage to the next; and final critique, also known as juries, as a public evaluation of the finished project. The word “critique” has often been related to “tutorial” (Uluoglu et al., 2000). To tease out “critique” from “tutorial” by definition, critique is a critical estimation or discussion while tutorial is a class conducted by a tutor for one student or a small number of students (Merriam-Webster Online Dictionary, 2010). The scholar Donald Schön (1983) in his book *The Reflective Practitioner* explores the nature of a tutorial; immersing one’s self into and reflecting on the design situation. Schön’s (1983) model is more about the one-on-one tutorial situation. If this is put into design education context, a tutorial is performed to communicate with the student and live in his/her world (Uluoglu et al., 2000). Research (Uluoglu et al., 2000; Horton, 2007) has also identified different forms of critiques in design education, which are stated in *Table 1*.

In this study, the focus is on mid-point in-class group critiques in general because it is less about the pace and process of students’ work, rather it is a form most involved with communication and understanding of context.

Group critique is defined as a critical evaluation and discussion among students and teachers as a communicative event to transfer design cognition. Since “feedback”

FORMS OF CRITIQUE			
	Group Critiques	Desk Critiques	Juries
Characteristic	A form of formative assessment.	Most frequently used in design studios.	Performed to bring students together at definite intervals for an overall evaluation of work.
Function	To demonstrate to students the typical issues and problems in design.	To tune up the pace and working style of individual work.	To help the slow students to keep up with the quick ones.

Table 1: Different Forms of Critique (Adapted from Uluoglu et al., 2000; Horton, 2007)

is the transmission of evaluative or corrective information about an action, event or process to the original source (Merriam-Webster Online Dictionary, 2010), therefore, “critique” is interchangeable with the term “feedback” in this study.

RESEARCH QUESTION

How does communication between Western design faculty and Asian undergraduate design students alter the effectiveness and affectiveness of a critique?

LITERATURE REVIEW

BRIEF HISTORY OF CRITIQUE

Critique is an assessment process that originates in the traditional fine art field (Whittington, 2004). It was developed in the early stages of the art school, where the ‘art school’ idea was a pedagogical experiment in action within the public space, called the ‘Chamber of Horrors’, established by Henry Cole and Richard Redgrave within the government-funded ‘Department of Practical Art’ at Marlborough House in 1852 (Quinn, 2008). In the ‘Chamber of Horrors’, students were like visitors to a museum, which was actually an art school, and the lesson was conducted by exhibiting examples of poor design (Quinn, 2008). However, this ‘Chamber of Horrors’ was a threat to the manufacturing industry because it was critiquing the commercial commodity. Henry Morley argues, in *Household Words* (1852), that people who have acquired the notion of ‘Correct Principles of Taste’ from the ‘Chamber of Horrors’ would alienate individual critics from the all-encompassing social world that capital had already built (Quinn, 2008). However, in today’s design education, students are often trained to be prepared for a professional career in the real world, where commercial commodities dominate.

REVIEW CURRENT RESEARCH ON CRITIQUE

Research on critiques has been done in multiple disciplines including English as Second Language (ESL) (Yoshida, 2008), professional disciplines such as engineering, business and medicine (Dannels et al., 2008) and specifically in architectural design (Uluoglu et al., 2000). Most of the research suggests that the kinds of feedback commonly given in academic settings have been ineffective in terms of students’ learning experience (Kluger & DeNisi, 1996; Yoshida, 2008).

Therefore, research provided suggestions to improve the process of critique in art and design (Uluoglu et al., 2000; Whittington, 2004; Hetland, Winner, Veenema and Sheridan, 2007). However, little research has been done on the effectiveness and affectiveness of a critique in the design discipline as a communicative event. This study investigates critique as a communicative event where English is commonly used, but it is a second language for students in this study.

EFFECTIVENESS OF CRITIQUE

As mentioned, critique is a communication event in which students present their design and critics provide feedback (Dannels, Gaffney and Martin, 2008). This definition seems like a very unidirectional form of communication, however, critique from various people can happen simultaneously because critique is not only targeted towards students' presentations, but also towards another critique, i.e., critiques can be built upon each other. How can critiques be organized as a system so that the feedback given is responding directly to the problem in design? Research (Whittington, 2004) has suggested that students are confused when a significant portion of time in design classes is spent on critique, while addressing and evaluating multiple issues in each project. Mid-point critiques often delay completion of a project and inhibit creativity because students do not have the opportunity to explore more options and tend to change overall conceptualized ideas too soon. In order to effectively communicate design knowledge among faculty and students, a process needs to be designed. If the process is designed carefully and executed successfully, students will be able to readjust the first component (project critique) and provide a better direction for the second component (critique process); instructors will be able to modify objectives if the critique projects need improvement (Whittington, 2004).

AFFECTIVENESS OF CRITIQUE

Emotional concern is addressed in English as a Second Language (ESL) research regarding the teachers' perspectives in choosing the kinds of feedback given to students (Yoshida, 2008). Students' fear of critique may be due to emotional concerns. Students may prefer receiving correct answers immediately after errors are identified in order to avoid the social embarrassment triggered by not being able to present proper answers. Most teachers decide to use recasts, giving correct answers immediately as feedback, because it is not always easy for teachers to determine whether or not the learners have some idea about correct answers (Yoshida, 2008).

CRITIQUE AS A COMMUNICATIVE ACTIVITY

Critique is a communicative activity with a social aspect to it. Whenever designers, or people in general, see images, words and objects, etc., they interpret them. What happens within an individual's mind and what happens between two people may lead to different results (Uluoglu et al., 2000).

Critique is heavily involved in language because students have to verbally explain, criticize and present the visual ideas of their design work. Research has been done in communication competencies in design education and the study suggested that critic feedback reflects “expected communication competencies in design studios, which involves interaction management, demonstration of design evolution, transparent advocacy of intentional explanation of visuals, and the staging of the performance” (Dannels et al., 2008, p. 1). However, the problems of language and terminology used in critiques have not been investigated in Dannels' (2008) study. Quinn (2008) argues that the language used in a critique lacks refinement or culture because language in design reveals a struggle with an internal division of language and the problem of understanding a foreign tongue. In order to have the language understood, definitions need to be agreed upon and widely circulated among the design community and this process takes time. Language should be recognized and acknowledged within the unconscious continuity of a preoccupation with a foreign tongue in critiques, which disrupts the conscious continuity of progressive development of critical speech in design (Quinn, 2008). In a design education context, communicative problems can arise when language is one of the barriers: 1) when students fail to use an appropriate vocabulary to present their work, critics are not able understand the presentation; 2) when critics provide feedback using terminology that students do not understand, students fail to improve.

CRITIQUE IN OTHER DISCIPLINES

Critique, as a communicative and social event, is not limited to academic settings in design. It can be applied to businesses, client education and other academic disciplines. Accreditation boards such as ABET (Accreditation Board for Engineering and Technology) and SACS (Southern Accreditation of Colleges and Schools) have highlighted the need for communication competence by making communication instruction and assessment critical for accreditation (Dannel et al., 2008). Accreditation boards in disciplines such as medicine, design, business, engineering, agriculture and mathematics are becoming increasingly focused on oral communication competence (Bennett and Olney, 1986; Dowd and Liedtka, 1994; Krapels and Arnold, 1996; Kreps and Kunimoto, 1994). Moreover, pedagogical

spaces in which feedback plays an important role in the instructional process, also suggest the critique's potential for shaping disciplinary identities, relationships and social contexts. (Dannels et al., 2008)

THEORETICAL FRAMEWORK

Oral communication involves aspects of verbal language, body language and visual representation. Scholars have theorized feedback as a meaning-making dialogue between a teacher and a student (Straub, 1996). However, the knowledge transmitted via the critique possesses different characteristics and the representation of knowledge within a communicative intent is different from one's own internal interpretation (Uluoglu et al., 2000). One of the reasons resides in cultural interpretation of semiotics. Language and images possess different meanings and interpretations between Western and Asian cultures due to various ways of collective acting, thinking and feeling in different cultures (Hofstede, 2004). A simple example is: in Western culture, the color red is seen as danger; while in Asian culture, red symbolizes happiness. Such differences not only alter the effectiveness of a critique session, misunderstanding may also affect emotional response among the persons involved, therefore causing poor transfer of the knowledge to be delivered and received. Hofstede (2004) has found five frameworks for assessing culture: 1) Low vs. High Power Distance; 2) Individualism vs. Collectivism; 3) Masculinity vs. Femininity; 4) Uncertainty Avoidance; and 5) Long vs. Short Term Orientation.

Relating to the situation for research in this study, China is used as an example.

- 1) China has a comparatively larger power distance when compared with other countries. In this case, Chinese students tend to depend on teachers and treat them with respect (Hofstede, 2004). Therefore in critiques, teachers tend to initiate all communication and students try to avoid giving opposing comments to the teachers.
- 2) China has comparatively weaker uncertainty avoidance, therefore, Chinese students tend to control their emotions and tolerate differences in class (Hofstede, 2004). This makes it even harder for teachers to read students' mind and emotions, and therefore, more difficult for teachers to know if the students understand the knowledge intended to be delivered or not.
- 3) Since China is a more collectivist country, Chinese students tend to learn how to do instead of how to learn (Hofstede, 2004), thus making communicative competencies, language and verbal presentation less valuable. Moreover, Chinese students' individual initiatives are discouraged and students tend to speak up in class only when they are sanctioned by the group rather than by their own interests (Hofstede, 2004). This links back to the power distance issue for Chinese students, as in general, Chinese students avoid critiques.

RESEARCH DESIGN & METHODOLOGY

PURPOSE

Interactions in critique can be observed; much research has been done using observation methods (Dannels et al., 2008; Yoshida, 2008). As Pica (1994) and Breen (2001) point out, observational data are not always sufficient to explain the participants' perception of interactional events. Using interviews within a qualitative research methodology, the understanding and expectations of a critique from the perspectives of Western faculty and Asian design students was studied.

STUDY DESIGN

In order to add deeper knowledge to understand critique as an interactional communicative event, qualitative content analysis of interviews was done in this study to discover elements that were not immediately apparent in the interactions. Prior to the interviews, all participants were assured of anonymity in the report. Moreover, interview questions were not delivered prior to the interviews, in order to get spontaneous, less calculated feedback to the questions. The study was approved and faculty was contacted via email to set up a time and place for the interview. Students were mostly interviewed in their working studios. Participants were asked prior to the interview if they were willing to have their interview videotaped or audio taped.

SETTING

The School of Design (SD) in The Hong Kong Polytechnic University was founded in 1937. In the 2009–2010 academic year, the School of Design enrolled approximately 117 students (108 of them were Asian students) and 65 faculty members were present (19 of them were Western). SD includes 3 departments: 1) Art & Design in Education; 2) Design: Visual Communication, Industrial and Product, Environmental and Interior, and Advertising; 3) Digital Media.

DATA SOURCES

The data emerged from in-depth qualitative interview with ten faculty and eleven undergraduate students in SD. The preset participant characteristics were that faculty must not be Chinese native speakers and both faculty and students have experience in some kind of critique process in the school environment. Year three students were chosen because they are more reflective on critique as they have experienced the critique process for at least three years. Participants were

DISCIPLINE	GENDER	NATIVE LANGUAGE	YEARS OF PROFESSIONAL EXPERIENCE	YEARS OF TEACHING EXPERIENCE	TAUGHT IN OTHER COUNTRIES
Industrial & Product	Male	Spanish	15	7	Yes
Advertising	Male	German	20	1.5	No
Industrial & Product	Male	English	38	25	Yes
Architecture; Environmental & Interior	Male	English	8.5	8	No
Interdisciplinary	Male	English	14	10	Yes
Digital Media	Male	South Asian	18	6	No
Industrial & Product	Male	Italian	28	11	Yes
Industrial & Product	Male	German	7	15	Yes
Architecture; Environmental & Interior	Male	French	5	15	Yes
Industrial & Product	Female	French	18	6	Yes

Table 2: Faculty background

drawn from any design discipline because this study only focused on participants' perception of critique in general. This was a pilot study using a convenient sample due to time and location constraints.

For faculty, five of them were from Industrial and Product, one from Advertising, two from Environmental and Interior, one from Digital Media and one from an interdisciplinary background. Interviews lasted from thirty minutes to two hours each depending on how much the faculty liked to share. The ten faculty members participating in the interviews represented a wide variety of training and educational background (e.g., trained as designers, photographers, story tellers and architects), and they also had various cultural backgrounds (e.g., United States, Germany, Italy and France). Faculty background is in *Table 2*.

Five students were from Industrial and Product, three from Visual Communication, two from Advertising and one from Digital Media. Students' age ranged from twenty-one to twenty-five. Five students were male and six students were female. Each student interview lasted ten to twenty minutes. For both faculty and students, general interview topics included description and characteristics of

critique, emotional and language issues of critique and benefits from critique. (See Tables 3 and 4 for interview questions.) Some questions evolved during the process of interviewing different participants, for example, the difference between a tutorial and a critique. These questions were important to note, but appeared spontaneously from some participants. Literal transcriptions of these interviews provided over one hundred and twenty pages of text for analysis. Interviews were transcribed using the transcription conventions in Table 5.

FACULTY BACKGROUND QUESTIONS

- What classes do you teach?
- How many years of teaching experience do you have?
- What's your current position in school?
- Why did you decide to teach in this school? Or in this cosmopolitan city other than in your own country?

QUESTIONS REGARDING CRITIQUE

1. Please tell me about your understanding of a critique?
(Back up question: Are group critiques pretty much the same?)
2. What characterizes a group critique from your standpoint?
(Back up question: What elements should be present in a critique?)
3. Could you say something more about that (critique) in the context of your current teaching especially in a class with students with various language skills?
(Back up question: What characterize a good or bad critique session?)
4. How do you think critique affects student's emotions?
(Back up question: Have you ever experienced students having emotional outbursts during critiques?)
5. How does critique benefit you?
(Back up question: How does critique help your teaching? What is valuable in a critique for you?)
6. How does critique benefit your students?
(Back up question: What is valuable in a critique for students?)

These are all the questions that I would like to ask.

Thank you very much for your precious time.

Table 3: Interview Questions for Faculty

STUDENT BACKGROUND QUESTION

→ How old are you?

QUESTIONS REGARDING CRITIQUE

1. Please tell me about your understanding of a critique?
(Back up question: How would you describe a critique?)
2. What characterizes a critique from your standpoint?
(Back up question: What usually happens during a critique?)
3. Could you say something about a critique in a class with faculty who cannot communicate verbally in your native language?
(Back up question: Do you have enough words to express your ideas and design in a critique?)
4. Have you ever had a bad or ineffective critique experience?
(Back up question: Share with me one of your most memorable critique experiences (positive or negative)?)
5. Do you think critique affects your emotions?
(Back up question: If someone says something negative about your design, how do you feel?)
6. How does critique benefit you?
(Back up question: What is valuable in a critique?)

These are all the questions that I would like to ask.

Thank you very much for your precious time.

Table 4: Interview Questions for students

{ }	Line to be discussed in the text.	<< >>	The speaker's emphasis for the portion.
—	Portion of special note to the current analysis is underlined.	[]	Reduced volume.
?	Rising intonation.	<>	Translation of the meaning of the sentence with an error.
(())	Comments enclosed in double parentheses.	T:	The faculty. (Faculty A-J)
(.)	Brief pause. (Under 3 seconds)	S:	The student. (Student A-J)
(..)	Longer pause. (More than 3 seconds)	R:	The researcher.

Table 5: Transcription conventions

DATA ANALYSIS

Not all categories are covered in this research report as the amount of data gathered exceeds what is reasonable for this report. Consequently, the most telling categories (good critiques, bad critiques, definitions of critiques, differences between tutorials and critiques, emotions and language) are fully represented here.

Participants were coded as TA, TB, TC... TJ (faculty) and SA, SB, SC... SK (students). A sample appears in Figure 1. Videotaped transcripts were analyzed using a typological analysis framework—an inductive analytical framework committed to three general flows of activity: reducing data and identifying its source, creating thematic categories and drawing conclusions (Goetz and LeCompte, 1984; Miles and Huberman, 1994). The first data was reviewed to identify the units of analysis for the research question. For example, in the interview transcripts one faculty said, “When it comes to emotions, if you’re able to communicate that, make sure students get that, you’re with them and really paying attention to what they are doing ... and working out with them for tangible progression, the emotions are alright.” This statement was coded as 4J3 Emotion: teachers should pay attention to student’s emotions (4—interview question 4 [How do you think critique affects student’s emotions?]; J—Faculty J; 3—third paragraph responding to category “Emotion”). All the transcripts were analyzed consistently. The categories included definition of critique, critique versus tutorial, elements of critique, emotions, language, good critique, bad critique, acknowledgement, culture, atmosphere, master versus bachelor, students’ benefits and teachers’ benefits. The coded notes were then segmented from each transcript and organized into the above categories. Finally, holistic diagrams (*see figure 2*) with all the coded notes that fell into the same category were created for synthesis.

R: RESEARCHER; TA: FACULTY A

R: What characterizes a critique from your standpoint?

TA: (.)Well. [That's a very open question.] [What characterize a group critique]. I would say (.) I can tell you (.) I don't know what characterizes it, I can tell you what makes me enjoy it more.

R: Okay.

TA: One over the other is, when a student is (.) inspired on a project and the project is interesting (?) and spark in quality and (.) um (.) and commitment (..) you know, usually good ideas make a critique interesting coz it gets the tutor more engaged. I mean there are more levels of engagement, at least in my case and as well as I can perceive in others' engagement as well (?). If, you know, a student is unresponsive, passive, and not committed and not caring, and the idea is not very interesting, or a group of students, [because usually critiques are group projects], then (?) it's kind of boring. Right? That's how I would characterize it. Boring versus exciting. So, there is usually those go inside for the potential learning, both for the student <<and>> for the teacher, there is a lot of learning (..) from the teachers part (.) because you know you are exposed to a lot of different topics, many (.) many(.) of the times the students' research (.) illuminates you in terms of certain topic that, you know, (.) that you are not familiar with.

R: RESEARCHER; SA: STUDENT A; SB: STUDENT B

R: What characterizes a critique from your standpoint?

SB: I think a critique should be unbiased.

SA: I think it needs to be polite. (.) Because sometimes when you are too rude, although it's still characterized as a critique, this kind of rude critique will not be as effective. Other students may not get one's opinion in a rude critique.

R: What if one really thinks the design is "not good", how would you express your opinion in an unbiased and supportive way?

SA: I think if I see the design as not good, doesn't mean that I'm biased. When I think the design is not good, it is an opinion. But being unbiased has a reason that I think the design is not good.

SB: When I see the design as not good, I usually have this habit of (.) for example, when I want to say negative comments about another student's design, I will first talk about the positive elements in his or her design, then I will go on and say "but maybe you can try to do this and that..." In this way, the critique becomes more polite and creates a more comfortable atmosphere.

Figure 1: Sample Interview Transcripts

GOOD CRITIQUES

5B1

Good critiques: suggest improvements;
constructive

2D1

Good critiques: based on professional
experience (culture, power distance); with
reasons to support; give suggestions

4D3

(Immediate comment in critiques)

Good critiques: focus on development, process
and execution of idea

4E1

Critiques are usually good experiences

4F1

Most critiques are ok

4G1

Good critiques: negative but with reason and
ways to improve

5S1

Good critiques: constantly looking for question
and answer

4K1

Good critiques: comments can apply to own
project

4J1

Good critiques: more comments

BAD CRITIQUES

5B1

Bad critiques: pure like/dislike without reason
(may take it personally)

1D2

Bad critiques: focus on topic, not following
trends

4D1

Bad critiques: student's own shortcomings:
minimal involvement; reading directly from
prepared notes; student's lack of preparation

4D3

(Immediate comment in critiques)

Bad critiques: focus on minor typographic
things; presentation skills

1E2

Bad critiques: value judgment without reason
(not why but what could be done)

4G1

Bad critiques: don't know what to do next;
(culture) ask for clarification but (expectation
difference) didn't get good answers

4H1

Bad critiques: minor stuff, not focused on big
picture: conflicting comments by faculty

Figure 2: Analysis Diagram (students: good and bad critiques)

DATA SYNTHESIS

After categorizing the coded analytical notes from faculty and students, a color-coded cross synthesis diagram (see *figure 3*) across students and faculty was created to look for the agreement and disagreement within and across faculty and students. The color-coded units are organized in a hierarchy according to “levels of agreement.” The purpose of this cross synthesis was to compare if the expectations from students and teachers were similar or different and in what ways. Arguments were then created to see how each unit of analysis is related to another.

STUDENT SYNTHESIS

Negative (4C2)
 → Unhappy (negative comments) (5C1, 4D1)
 → Hate pinpointing (5C1)
 I just want to finish it, don't pin point on me, sometimes I think ...I don't know... (sigh) this reminds me of some unhappy memory.

→ Cry (admit failure) (5E1)
 → Angry (5S1)
 I usually will get angry, and oppose the critics, but this is not rational. However, it's hard to control.

→ Emotional in general (5G3, 5K1, 5J1)

Student's approach in critique
 → Tends to say nice things first (2B2)
 → Neutral (5E1 , 5F1)

Embarrassed (facing too many people, failed to answer questions) (1D1)
 → Scared (when no one comments) (4D2)
 → Won't ask faculty for clarification, tends to ask other students (3B1, 3H2, 3J3)

TEACHER SYNTHESIS

Negative
 → Upset with negative feedbacks/work has been ignored/ low grades (3F3, 4E1, 1F4)
 → Teachers are honest and pinpoint weakness (1H3) When you say very honestly and you can pinpoint at which stage they are weak in your opinion.

→ Cry (under stress, acknowledge self inability) (4A2, 4C3, 4D2, 4G1, 4J4)

Ego, both teacher & student (4A2, 4B1, 4D1)
 → Students should not take critiques personally/should disassociate themselves from work (1E2)
 (Disagreement among faculty) Students as designers need to have certain ego (1H4)

→ Emotional in general (4A1, 4C1, 4E1, 4G1, 4J1) (because)
 Emotional investment in projects (4A1, 4C3)

Teachers be aware & be careful of student's emotion (4A2, 3E2, 4F1, 4G1, 1H4, 4J2, 4J3, 3J2)
 → Change according to years of study/age (4C3, 4D1, 4H1)

Teachers approach to students
 → Nice (1H3, 4B2, 1F1)
 → Praise sandwich (nice & harsh & honest) (4C2, 1D2, 3H1)
 (Disagreement among faculty) Harsh (1C3, 1D2, 1E2, 1E8)

Figure 3: Coded Cross Synthesis Diagram (emotions)

LIMITATIONS

All data collected was analyzed and synthesized in a systematic way. The research was a pilot study; no claims based on the research findings are fully representative of the School of Design at The Hong Kong Polytechnic University in this study. Results are reflective of the context-specific data gathered in this particular institution from the specific faculty and students interviewed. It is possible that results could suggest similarities with other institutions and disciplines; however, they are not generalizable across contexts. The result may raise awareness among foreign teachers and stimulate reflection on how critiques can be improved.

RESULTS

Results of this study described the elements that contribute to good and bad critiques in design and the view of English language differences between Western faculty and Asian students. Results also suggested that although faculty and students can spell out the definition of critique and agreed with it, when they were asked to tease out the differences between tutorial and critique, they had disagreements among themselves and even conflict within their own definition of a critique.

GOOD CRITIQUE AND BAD CRITIQUE

In the following section, the agreement between students and faculty members on how they defined the elements in a good critique and a bad critique are compared. Table 6 shows the summary of how they perceived good and bad critiques.

GOOD CRITIQUE	BAD CRITIQUE
Objective comment with reason	Subjective comment only
Teacher facilitates	Teacher dominates
Students participate	Students unprepared
Egos held in check	Egos dominate
Perspectives shared	No comment
Students separate self from project	Students confuse project with personal identity
English language understood	Lack of English vocabulary

Table 6: Definition of good and bad critiques

OBJECTIVE AND SUBJECTIVE COMMENTS

Most students agreed that in a good critique, comments were objective, rational and unbiased. Although most of the students tended to say nice things in a critique, they themselves did want to receive negative comments that were backed up with reasons, because that allowed space for further improvement in their own projects. They were asked to justify how they defined objectivity; most students claimed objective comments should be based on faculty members' professional experiences:

And sometimes I hope they comment based on [teachers'] own professional experience. Like: 'You are doing this, but it won't work.' I hope there is a support behind what [the teachers] say. It's not like they comment and then it's over. I hope they will advise [with] suggestions, i.e., since you have banned this, so what do you (teachers) think will work. (Student: 2D1)

Even though most students agreed that bad or useless comments were subjective comments only, no matter whether the comments from the faculty were subjective or not, students took them in without much questioning. At the same time, faculty members acknowledged that designers are also human beings, therefore, no matter how hard the faculty members tried to be objective in a critique, there was a certain degree of subjectivity in the comments delivered. One faculty illustrated the human nature of critique:

I try to make them [comments] as neutral as possible, meaning as objective towards the advertising industry as possible. But then, again, I have to... because... as a human being, I have to weave in my subjective points of view with my experience. (Faculty: 5B1)

ROLE OF FACULTY

Most students and faculty members agreed that critique should be a two-way communication between the faculty and students and among the students themselves. Faculty acknowledged that during a critique, the faculty did most of the talking, but they agreed that students should actually dominate in critiques with faculty only acting as a facilitator.

...there are like 5 professors and they all say something to that one person, and the others have to sit around and not say anything. That is a very bad feedback section. I think it's terrible, it's torture. I'm a strong believer that students learn a lot from each other. (Faculty 3H3)

[Critique is] not always something delivered by the faculty, it can be delivered by fellow

students, in fact, I think the most effective critique is when classmates critique each other with the guidance from the faculty. (Faculty: 1C1)

One faculty suggested a strategy to get students heavily involved by asking students to act as teachers by role-playing the real world industry.

[W]hat's happening is I'm secretly teaching, we think we were focusing on this guy's project, but in fact, everybody is learning something, because by doing a critique, you are learning, you are thinking: "what's good about this story? What's bad about it?" So in fact, the whole class learns at once, I learn too, because they are all acting as teachers, and often they make a comment and I think: Wow, that's smart, I've never thought of that. (Faculty: 1F1)

STUDENTS' PARTICIPATION

Students claimed that bad critiques happened when students were unprepared for the presentation. When students were unprepared, they felt embarrassed because they could not answer the questions asked by the critics.

Another time [of bad critique] is my lack of preparation, I'm not even familiar with the topic I need to present, and when I have to answer the questions, I cannot answer them at all. So that's why it feels like I haven't really done anything. (Student: 4D1)

Other students claimed that they needed to prepare a script for the presentation because of their lack of English vocabulary.

It depends how much time you have for preparing your presentation. If you have time, then you can look up [words in] the dictionary. But if you don't... or just have very little time, then you will use the same vocabulary over and over again. (Student: 3A2)

EGOISM

Most faculty members brought up the issue of ego when questions about emotion were being asked. They claimed that students should not take critiques personally and should disassociate themselves from negative comments. What the critics said towards a project did not apply to the student himself.

The critique [needs] students to disassociate themselves personally from their work, what happens to their work is not about them individually, so that [they] can take bad news. You know, that's where students learn that... it can't just be all nice and pretty and... 'that's really

good' and descriptive, it has to be demanding and negative, critical, that's where the word came from. (Faculty: 1E2)

Not only the students had ego issues in a critique, but also the faculty members. Some faculty members claimed that a critique is bad when critics viewed it as a place to show off knowledge instead of genuinely giving feedback for students to improve.

I think if students have that fragile... um... ego that it's a bad critique. The same if the critic has a fragile ego and just sees the critique as a place to show off, the place to, you know, have a bit of power and an audience watch them, show them how much they know, that's a horrible critique. (Faculty: 3D7)

While students acknowledged this ego issue and at the same time wanted negative comments for improvement, most students still unconsciously felt upset or angry when they received negative comments. Therefore, emotion played a large role in critiques.

When students were emotional during a critique, the critique was ineffective because the teacher needed to take extra time and effort to smooth over reception by the student. Most faculty members agreed that they should be aware of students' emotions during a critique.

One thing that many times could happen is the student crying... maybe because they struggled a lot to find solution and solution doesn't come... You have always, always, always to be very careful how you speak with students, because many times, you don't know with whom you are talking. (Faculty: 4G1)

However, faculty members had no agreement regarding how to approach critique. Some faculty thought critiques should be harsh, pointing out problems, some thought it should be positive focusing on success and some thought it's a combination of both.

SHARING OF PERSPECTIVES

Most faculty members and students agreed that critiques encourage critical thinking because the nature of critiques involved students taking a stand and putting out their perspective in front of an audience. It was also important that while participants were sharing their perspectives, the audience should also acknowledge the different perspectives being put forward. The acceptance or rejection towards

a perspective involved critical thinking skills, i.e., students should judge whether these were merited and useful comments.

For unbiased comments, these comments should be expressed through one's critical thinking. Critical thinking allows you to realize which comments should be taken into account, while others can be ignored. (Student: 2E1)

However, most students claimed that they usually did not give comments and were not responsive during a critique.

You mean if I'll comment? Actually, not much. The atmosphere of School of Design, I don't know about other disciplines, but in my discipline, advertising, not much feedback is given. I don't know if it's an Asian or Chinese cultural thing, not many people give feedback. (Student: 1D4)

Students seem to be <<extremely>> reluctant to do that [confront yourself] in here [critiques]. Yea. I think it's obvious why, secondary school, you know, there is not a lot of desire to expose yourself, that makes you so vulnerable . . . it's not rocket science why they don't like it. (Faculty: 3E2)

UNDERSTANDING OF ENGLISH LANGUAGE

Faculty members and students varied in their concern towards language during a critique. Some thought English language was an issue since a low level of English limits learning experience and understanding the project in context, while others thought English language was not an issue because in art and design, visual language is more important than verbal language. Table 7 illustrates the disagreements regarding language.

ENGLISH LANGUAGE IS AN ISSUE

Students lack English vocabulary
Students unable to understand context fully in English
English is a business language but also a second language for students
Students needed preparation before presentation
Students misunderstood translated language in context

ENGLISH LANGUAGE IS NOT AN ISSUE

Satisfied with limited knowledge of English
Critiques in design are more visual than verbal or written
Teachers give allowance to language
Student should not prepare
English can be translated by students

Table 7 Agreement and disagreement on language issues

As illustrated, students acknowledged their own lack of English vocabulary while faculty also claimed that students should increase their level of English because it is the global business language. While some faculty thought English was important, some faculty acknowledged that Hong Kong was a colonial leftover and made allowance for English as second language. Some faculty thought that language was not the main issue in a critique because art and design are more visual than verbal or written.

[D]esign is luckily very visual, um... yes of course it's verbal. First of all, it's visual, probably second verbal, and only third sort of written. I think the writing skills are by far the weakest of the three of the students, and I think um... design students by nature are visual thinkers, that, they are also quite good verbally, that is their second language. (Faculty: 3D4)

DEFINITION OF CRITIQUE

Although most faculty members and students agreed upon the definition of critique as a two-way communication and a learning process, faculty members and students varied in their answers when teasing out differences between critiques and tutorials. Some faculty thought tutorials were equal to critiques, but critiques were different from final presentations.

[A] critique is one type of tutorial...I've been in panels where the teachers, western ones and eastern ones, don't know what a critique is, and don't know the difference [between] a critique and a final exam....you know, [in a final exam] you just fill in the gaps and you go away and you give them a grade, but what happens is some of these teachers, they don't understand the difference. (Faculty: 3F3)

One faculty claimed that critiques were totally different within art and design, but can be similar outside of art and design.

Most of the time, [critique is] more like a tutorial group, but with the students already [having] written something, right? It's a little bit different. It's true, outside of that. But I have taught a lot of [non art and design classes], but not critiques. [Tutorials and critiques] sort of have two totally different functions, right? Tutorial is, uh... a lecture, a broader lecture for a larger group. (Faculty: 1E9)

While some faculty thought they were totally different with tutorial more like a lecture, a one-way communication, critique was a two-way communication that was public.

I think um... a critique has to be something... different than a tutorial. A tutorial is one on one, a critique is something public. (Faculty: 1D6)

However, one faculty member and students agreed upon the difference between a tutorial and a critique. They thought critique happened only in final presentations and involved grading, while tutorials happened during interim presentations and involved sharing. While this was very unclear and contradictory, both faculty members and students thought final critiques were meaningless because there were no opportunities to improve and they agreed that final critiques came too late in the stage of development.

DISCUSSION AND IMPLICATIONS FOR FUTURE RESEARCH

As illustrated in the results of this study, critiques played an important role in design classes. While the design discipline is becoming more interdisciplinary, critiques are becoming more and more critical for today's design education engaged with training designers to become interdisciplinary professionals and communicators (Anthony, 1991). From a design pedagogy point of view, it is important that we understand the expectation of a critique from both the students' and the faculty members' points of view (Deay and Saab, 1994). Starting from an insider perspective (Patton, 2002), this paper lays the groundwork for future design students and faculty participating in a critique by providing an in-depth analysis of the elements of critiques. Although the research was conducted in a very specific context, the implications of this research were significant to provide inquiry on current critique sessions held in design classes and a reflection on critique practices across multiple disciplines.

First, the results showed students and faculty mostly agreed upon the elements that contributed to construct a good or a bad critique. There were a few disagreements towards the results because critique elements were interrelated. Some participants thought one element was more important than the other, and therefore took another approach because he or she thought that approach was better in Hong Kong design education practice. It is important to identify the different strategies that faculty members used to construct a better atmosphere for students, especially in the cross-cultural context of Hong Kong design education as presented in this study, as most students were reluctant to speak up in critiques because of the face-saving nature of Asian culture.

Second, results showed that language plays a part in critiques especially in the context of English as a second language for students. As communication is central to critiques in today's design education, it is critical for students to be able to reflect upon their communication competencies (Dannels et al, 2008). Yet often the students struggle with their self-perceived lack of English training and incapability to understand others' comments and express their own thoughts. Moreover, critique has not gained much attention in literature, and scholars have viewed critiques as responses to messages, rather than as a process (Cusella, 1987). This notion was also reflected in this research as some participants thought a basic knowledge of English would be sufficient for school and design is more about creativity rather than verbal and writing skills. If students were trained to be professional designers, the ability to be able to understand key vocabularies and communicate to different stakeholders, i.e., clients and colleagues from other industries in a compelling way are essential. Therefore, it is important for students to learn how to use words to "animate" rather than to "diminish" designs (Forty, 2000). Communication happens in various channels (visual, verbal and written), future research would benefit from exploring students' understanding of key vocabularies in design education and the ability to embody these words in their critiques. Based on the result of this proposed further research, schools could possibly come up with a design education focused dictionary for students to provide a common understanding of the design vocabulary in play. This would also support inter-faculty understanding in situations in which faculty cross cultural, language and disciplinary boundaries.

Finally, the results showed that there was no clear understanding upon the different definitions of critique and tutorial. It is important to note that although participants had an agreement on the definition of critiques, they got confused when they were asked to tease out the differences between the two. Most of the students talked on the surface and they defined tutorials based on their experience in the context of School of Design rather than on their own interpretations and understandings of tutorials. Some practice-based faculty thought critiques and tutorials were largely the same. The different understandings of tutorials and critiques among the faculty might lead to the confusion for the students. Tutorial is a one-way communication with the tutors clarifying misunderstandings in the lecture while critique is a two-way communication with the critics giving feedback to the students' work as well as training students' critical thinking and presentation skills.

CONCLUSION

Critique is central to design education and to the communicative process of understanding how to think and talk like a design professional. Results of this research provide insight into current critique practices in design education at one school of design and into ways in which feedback from participants, both faculty and students, help to construct a communicative identity in critiques. In this setting, elements are relational and different expectations for critiques from student and faculty can help shape critique into a preferred, desired and mutually understandable form. The results of this study provide an insider's view of how communication alters the effectiveness and affectiveness of critiques between Western faculty and Asian students. A design education vocabulary dictionary with a common understanding to key words among students and faculty members could alleviate unnecessary emotional upheaval and conflicting perceptions during a critique thereby smoothing the way to better communication and design.

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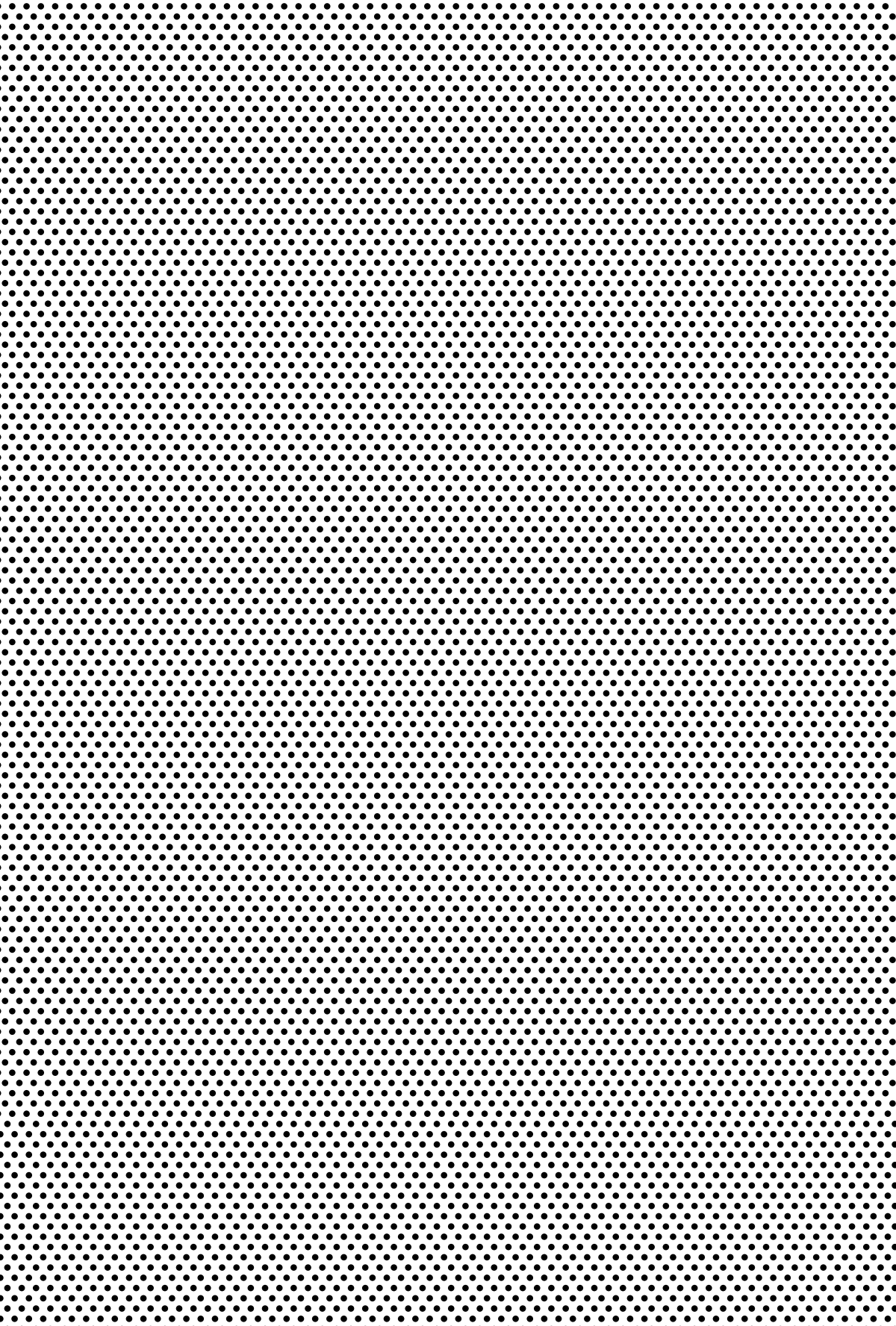
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Book Reviews

book reviews

The Architecture of Patterns

PAUL ANDERSEN AND DAVID SALOMON

New York, NY: W.W. Norton & Company, 2010,

ISBN 9780393732931

Softbound, 144 pages, full color illustrations, \$24.95

“Instead of form following function, patterns produce performances” (p.33).

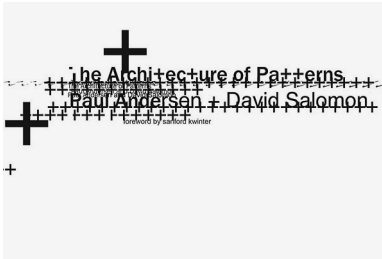
The authors propose a new paradigm in architecture based on patterns as viewed through the multiple lens of architecture itself, mathematics, evolutionary biology, culture and art/design history. In only four chapters, the authors discuss and show examples of the new possibilities. Their approach is strategic.

Chapter 1, *The Power of the Generalist*, demonstrates the innovative power of patterns, using the original waffle sole pattern of a Nike sports shoe as its exemplar. Like a contrarian, it positions Christopher Alexander's *A Pattern Language* (1977) as a modernist dead-end and positions itself as a new understanding of pattern. It shows built architecture derived from pattern, explaining its characteristics; demonstrating that such patterns are now real possibilities.

Chapter 2, *Principles and Primitives*, reaches back to design history, Gyorgy Kepes' *Vision and Value Series* (1965), again to Christopher Alexander (1977), adding the anthropologist Gregory Bateson, to show the crossover between science and art in the former, and pattern and human expectation and behavior in the latter. Visual examples and ideas from science punctuate this chapter.

Chapter 3, *Variation and Variety*, argues for renewed interest in pattern systems based on the shortcomings of both modernism and post-modernism. In essence, the authors propose pattern systems as an inclusive way to connect phenomena and cross disciplinary boundaries. Paying particular attention to Op Art, Bridget Riley connects the phenomena of pattern variation in her painting with perceptual reaction (visual, haptic) in the viewer, thereby dynamically crossing the object-individual boundary, or in a formal sense, the boundary between art and perceptual psychology. Riley's focus on sensation (what some designers refer to as 'experience') is a theme that runs through many of the other visual examples.

Chapter 4, *Protean Patterns*, examines projects with combinatorial patterns that can be tuned (varied or adjusted) according to circumstance of use, user behavior, weather conditions and other variables. These are not simple structural



patterns, but interweaving patterns that interact with each other creating more complex affordances. Most of the projects presented are models with only a few built examples, suggesting that this is an early moment in the development of these ideas. Patterns are based on relationships, yet this a word curiously missing in the book.

Relationships can be static, structural, social, dynamic, feedback oriented, based on any number of variables, dealt with singly or in combination. The authors' primary interest in the book is to expand our notion of pattern to include new syntheses and dynamic situations.

David Carson, known for his lively typography, designed the book. The visual examples complement the text; they were carefully selected and presented. The authors made a convincing argument for these new possibilities with pattern. Technology and sensor systems make these ideas feasible. Collaborative work that crosses disciplinary lines is increasingly common, providing system knowledge and insight—what is needed is the imagination to create with this paradigm. The result could be a more responsive architecture.

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The reviewer, Sharon Poggenpohl, is editor of *Visible Language*.

book reviews

The Shallows: What the Internet is Doing to Our Brains

NICHOLAS CARR

New York, NY: W.W. Norton & Company, 2010

ISBN 9780393072228

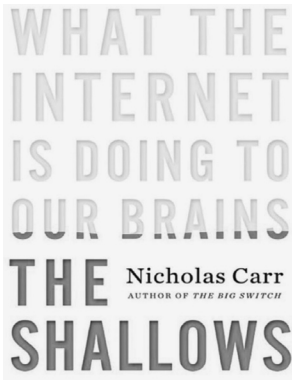
Hardbound, 276 pages, black and white, \$26.95

“Whether I’m online or not, my mind now expects to take in information the way the Net distributes it: in a swiftly moving stream of particles. Once I was a scuba diver in the sea of words. Now I zip along on the surface like a guy on a Jet Ski” (p.6–7).

(Before beginning this review, some context regarding the reviewer will help supply perspective. I first used computers to analyze some simple design research in 1965, this was a time of mainframes, punch cards and lab-coated attendants. My family got its first home computer in 1979 and I had my first email account in 1980. I offer these facts to demonstrate that I am not a Luddite; computers have been a part of my life since college days.)

Nicholas Carr offers a well documented, convincing argument about how our intellectual tools, in this case the computer and Internet shape our cognition. It is a cautionary tale based on neuroscience research regarding brain plasticity. The research is presented in intelligible layperson terms and it is a formidable foundation for the following argument. In a nutshell, some old folk wisdom has come under scrutiny: old dogs can be taught new tricks and what you don’t use you loose. Brains do not stop growing or changing; our interests and experiences continue to shape synaptic connections—some retreat based on disuse, new ones form based on new interests—it is an ongoing dynamic process.

The author is interested in the impact of media and its adaptation to cultural change. He provides historical background on the clock and the book as examples of how these instruments changed the rhythms of life and individual behavior, as well as cultural attitudes toward knowledge and its dissemination. Through this discussion he provides the connection between intellectual tools and changing cultural habits of mind.



His concern is the impact of being connected, now ubiquitous as we live our lives, on our mental habits, i.e., changes in brain plasticity (synaptic connections) due to how we use and the time spent on the Internet. His primary focus is reading and how reading habits change due to the medium used. He likens reading on screen with its hyperlinks, multimedia connections, email alerts, etc., as reading within a culture of interruption. What is lost, he observes, is deep reading; a discipline in which the reader submits to the writer and brings

personal experience and ideas to that which is being read. This is a transformative act. In contrast, reading on screen is surface reading with its many interruptions. Research on reading and memory reinforce his argument, while different forms of reading and its purposes are acknowledged. In a curious way, knowledge is carved into sound bytes by doing a Google search; the connections between ideas are present but they are shallow and tend toward the popular based on Google's extensive observation of search behavior and data mining. "Why bother [reading extensively] when you can Google the bits and pieces you need in a fraction of a second? What we're experiencing is, in a metaphorical sense, a reversal of the early trajectory of civilization: we are evolving from being cultivators of personal knowledge to being hunters and gatherers in the electronic data forest" (p.138).

To a lesser degree, he discusses the misplaced analogy between human brain (and behavior) organization and computer programming; he takes AI to task. He explores the underpinnings of Google and Microsoft ambitions. Given brain plasticity, we are being programmed by the technology we use. This is not to say computers should be turned off, or broadband connections relinquished, but we should be aware of what excessive use is doing to us, culturally and intellectually. Technology controls us. Some would say that intellectual tools inevitably shape us and are unstoppable; they are a form of adaptation and evolution. I believe the author is calling for a degree of resistance to the hyperbole surrounding technology and what may be a compulsive use by some. Carr, a finalist for the 2011 Pulitzer Prize in General Nonfiction, wants us to put technology into perspective. His argument and its underlying research is compelling.

The reviewer, Sharon Poggenpohl, is editor of *Visible Language*.

book reviews

Design Integrations: Research and Collaboration

SHARON POGGENPOHL AND KEIICHI SATO, EDITORS

Bristol, UK: Intellect, 2009

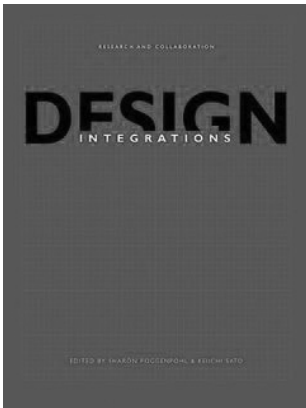
ISBN 9781841502403

Softbound, 306 pages, black and white illustrations, \$40.00

“Design becomes a form of social practice, and this is not a practice that takes place in isolation” (p. 19).

Design Integrations states its thesis at the outset: “Design practice and education are changing, particularly in relation to...research and collaboration. If design is to develop as a discipline, it must necessarily develop further based on these themes.” It studies design as seen by current teachers and practitioners who advocate design as a discipline. Thus, this book is not only about design research and collaboration; it is about those topics as integral to a design discipline and as a road to follow in creating one. What, then, does it mean to be a discipline? Should design aspire to discipline status or, as some advocate, should it be considered a profession or practice? Design has been on the horns of the dilemma of how to combine the concrete knowledge of practical experience with the abstract, theory bound knowledge of science for a long time. As a case study, design demonstrates the importance of this question, not just to academic theoreticians or philosophers of science, but to how the field can function and develop. Design needs to validate and ground research methods for itself and to develop its own fabric of knowledge by organizing disparate and syncretic findings into frameworks that give a deeper intelligibility to the practical and ecological levels of everyday existence and the enterprise to satisfy needs and create new possibilities.

Disciplines are professions of research, scholarship and transmission. The term “discipline” is academic, grounded in the University’s institutional role of developing, maintaining and transmitting essential knowledge and culture, to shape and support scientific, social, cultural, political and economic institutions upon which societies rest, and to enable societies to be deliberate and self-aware. Sociologists Parsons and Platt (1968, 1973) described a discipline as an operationalization of the society’s “value-pattern of instrumental activism” based on “cognitive rationality” (Parsons and Platt, 1968: 1-14 in Light, p. 6). This

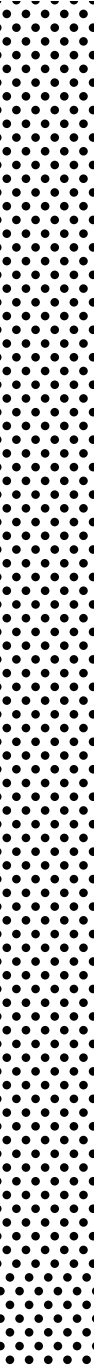


view places postgraduate level research and scholarship as the core content of disciplinary work. Parsons and Platt, (Light, 1974), and many others have documented the pervasive importance of disciplinarity within universities and the priority given to research and scholarly publications and the increasing emphasis on scientific research.

Individual disciplines are defined by their specific subject matters, which are organized according to 1) integrated theoretical frameworks, bodies of knowledge and their uses, which form the core identities of the separate disciplines; 2) broadly held consensus on foundational theories or paradigms; 3) epistemic cultures or agreements on research methods, which differ across disciplines; and 4) belief that knowledge is essentially cumulative. (Einstein overthrew the Newtonian model of physics by building upon it.) This is an ideal/typical description because any of these four aspects can be in dispute, but it is a shared normative model and unresolvable disputes can become disciplinary crises. Disciplines are often silos. Each need to create knowledge according to its own needs and can be unaware that others have already answered questions it is asking. Disciplines are objects of their own study and disciplinary knowledge is grounded by its theoretical and empirical provenance. It is explicit, readily communicable using language and presented in logical constructs for analysis and criticism. Thus, while design is very much concerned with tacit thought and knowledge, particularly users' tacit knowledge, the idea that disciplinary thinking and knowledge can be tacit seems deeply problematical. As a discipline, design would cultivate explicit knowledge about the tacit thinking and knowledge of users and of designers; what tacit knowledge and thinking do, how they work and how to design for them.

This book's introduction documents and sources many of the arguments against disciplinarity. Design has not yet managed to define itself as a discipline, nor is there a consensus on whether it should. Despite the prevalence of academic settings in design education, it has remained largely non-disciplinary. Some design sub-disciplines have responded to the increasing requirement for design educators to hold PhD degrees, which are distinguished from other degrees by their disciplinary and research focus, by attempting to create PhD's, without the explicit theoretical and analytic content that comprise PhD degrees in other fields.

book reviews



Perhaps, part of the problem for design lies in the broad and holistic way design is thought of, for example, as “problem solving,” “innovation,” “persuasion” or the oft stated “everything is design.” The popular holism that opposes analytic reduction is not necessarily virtuous. One internal contradiction is posed by the necessarily analytic question that so often comes up, “What belongs inside this whole and what belongs outside it?” Broad, holistic statements can be empty or vacuous. They may be not false, but also not useful, and they can mislead. They can be invoked post hoc to explain, but be unable to predict or operationally guide. Among design related fields, some, such as human-computer interaction and human factors have defined their domains more circumspectly as “tasks” or “situations in which judgments must be made or actions must be taken.” This has been to their advantage in developing theories and methods that support research and the accumulation of integrated knowledge. Among the questions posed in this book’s chapters is how to divide design into coherent, manageable chunks that can be recombined to give a broad picture.

Thus, this book does not offer an inclusive definition of design or a solution to the problems of building a design discipline, nor would these be credible if they were offered given the current state of the field. Its goal is process and it lays out arguments and case studies that are often provocative. For example, Kari Kuuti proposes approaching knowledge neither from top down or bottom up, but from self or object out. The emergence and growth of design collaboration parallels recent thinking in the philosophy and sociology of science. Novotny, Scott and Gibbons (2001), for instance, argue that within “type 2,” knowledge based societies, the distinction between scientific or pure knowledge and applied or practical knowledge disappears, resulting in contextual knowledge, which is a mixture of both and the pervasion of contextual knowledge within those societies results in clients and end users who demand recognition as participants and are fully able to collaborate. Judith Gregory’s chapter on international and intercultural collaboration in health information systems indicates the applicability of “type 2 society” across levels of development, cultures and continents.

The chapters on collaboration document the complexity of collaborative design, in which all of the design problems and stakeholders are brought together into an ongoing process of communication and negotiation. They also highlight the ways in which collaborative design can be grasped not as an analytic problem solving process but as a dynamic system of adaptation in the case of a design studio and as a hermeneutic process of learning, both of which are more akin to evolution than problem solving. Collaborative design as shown here, is also driven by the specific

characteristics of individual situations rather than abstract, context free principles. This is a substantive challenge to design's disciplinarity, for while formal thinking always has a role in design processes, collaboration is naturalistic: experience based, intuitive, spontaneous, heuristic, judgment and decision oriented and often tacit. If design is to be a discipline, it will need to include in its studies, explicit study of both contextual knowledge and the naturalistic thinking of users and designers within individual design processes and in collaborations.

This book will be very useful to both design educators and practitioners. The editors' introductions explicate their theses placing them in their operational and historical contexts with documentation. The chapters provide detailed empirical accounts and assessments of representative situations and problems in theory, research and collaboration. The editors and authors have taken pains to write in ways that are concrete, clear and accessible. The deeper questions of disciplinarity call for a conscious effort to think of design in different ways. Such a change of paradigm is a creative act borne out of reflection, and the editors' introductions and the more empirical information of the other chapters provide ample material for reflection.

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The reviewer, Peter Storkerson, has a PhD in Design and is currently in the Human Factors Program, University of Illinois, Champaign-Urbana.

book reviews

Limited Language: Rewriting Design, Responding to a feedback culture

COLIN DAVIES AND MONIKA PARRINDER, EDITORS

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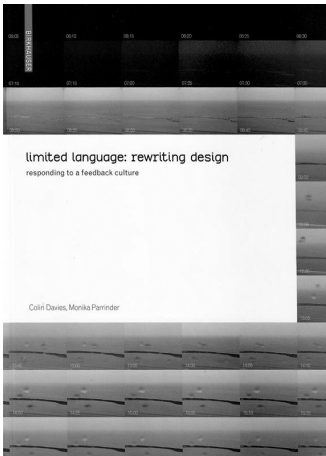
“The multiverse (or meta-universe) is a state of parallel realities. Once confined to the realms of science fiction, as the digital-information world overlays the physical world, the multiverse has become an everyday fact” (p.59).

For decades there has been an ongoing attempt in the US to separate design from art in university organizational structure. The problem is that while design and art share an interest in aesthetics, their purposes are different and the structures in which they work and develop are also different. *Limited Language*'s authors come from the field of visual culture and their provocative book has me wondering if visual culture is the bridge between design and art. Separations in nearly every field are getting fuzzy, practitioners take whatever helps them as it emerges from whatever source. We are adrift on ideas and information both sought for and spontaneously appearing. Designers lean toward social science, marketing or business for example, while some even lean toward art.

The sub-subtitle of this book is its goal “responding to a feedback culture.” The book is connected to a website in an interesting counterintuitive way: the website is text only and the book is text and full color images. The website spawns articles for journals and books (the one under consideration here). The interactivity and feedback that the website supports reveals the feedback culture. Beyond feedback, the take on language is in terms of recycling thoughts, citation, reference and commentary whether pro or con. The idea underscores information exchange based on words and images with words given the academic edge.

According to the editors, language is limited in two respects:

“First, the vocabulary of postmodernism; its flattening of critical positions into an atonal mantra of relativism—where high and low culture lose their magnetic



North and become one and the same. The second is in the visual realm, where increasingly our worlds are shaped by sound bites, lists made up of top tens, anthologies, page layouts—communication concertinaed into byte size representations via SMS messaging, the looped voice mail, a scrolling message board, or the chat room—where text and image are brought together in an online stream of emoticons and fcuk@ing abuse” (p.8).

Limited Language is about creative process—certainly a crossover between design and art.

It recognizes and responds to the ubiquitous change in information and communication structure—nothing is ever finished; we may call something finished but that is our decision and it is somewhat arbitrary. The focus is on process relating to design, visual culture and the everyday. This is an organizational approach to process, media, language, images, and yes, people and their ideas.

The book is structured around themes (critical moments, agency, tactics, topophilia, sensibilities, mediations) with two columns of text, the left column (black) is the author written provocation and the right column (red or blue) is feedback gleaned from the website. Keywords and their google hit rate in relation to design also present context; references and urls complete the entries. So what is in a theme? Take, for example, agency; here the provocations are Modernism 2.0 with a feedback titled Designers of Possibility. Following this is Design Politics with a feedback titled Design and the good cop/bad cop scenario. Images include the famous Obama poster, a biodegradable chair and a map/diagram showing a 17-block section of Brooklyn that has produced prison inmates at a cost of 17 million dollars.

The book is provocative, in a way similar to *In the Bubble* (Thackara, 2005) in that it connects broadly with the changes designers are experiencing and delivers snippets of documentation of ideas and projects from many sources. From another perspective, it is also similar to *World Changing, A User's Guide for the 21st Century* (Steffen, 2006) that is more a citizen awareness and action provocation.

The eighteen participants in this project include artists in various media, writers, an architect, an industrial designer and two professors, one of political aesthetics and the other a cultural theorist. Most reside in the UK with a few from other countries. The overall project opens the door to ongoing participation and

book reviews

is an interesting connection, as mentioned, between the Internet and the book. The sensibility is European, i.e., a bit edgy, contextual and culturally dense.

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Helvetica and the New York City Subway System

PAUL SHAW

Cambridge, MA: MIT Press, 2011

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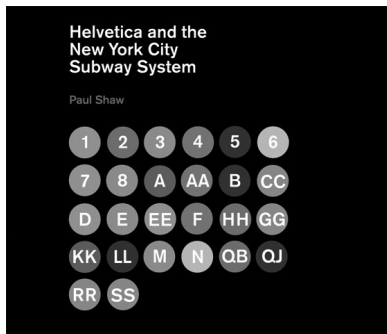
Hardbound, 132 pages, full color illustration, \$39.95

“It took nineteen years for Helvetica to replace Standard as the official typeface of the New York City subway system” (p.115).

Paul Shaw has written an historical document of interest to typographers and designers, particularly designers engaged in large systems planning. He brings together the many threads the Metropolitan Transit Authority (MTA) and designers had to disentangle and reweave, among them: the design aesthetics and legibility of typographic elements, variations in production processes and their fidelity; the availability of font variation (size, weight, etc.); the logistics of font access in the United States at that time (1960s); and certainly not least, the economics of New York City during the decades of development. The threads just mentioned were typical design considerations at that time; today issues of collaboration between consultants, in-house managers and production and installation sources would be another consideration, as well as sorting out design decisions based on user testing and system consistency after extensive prototyping. This was after all an early and extensive visual system and it was a product of its time.

The history of the idea of rationalizing signage for passengers in New York began with George Salomon in 1957 with his unsolicited proposal to use standardized signs and color-coding for various transit lines. In 1958 he created a subway map and transit guide that borrowed its structural sense from the London Underground Map (Maxwell, 2005). A chronology at the back of the book takes the reader from 1878, the beginnings of the transit system to 2010. Of interest here is the time span from Salomon’s initial proposal to Unimark’s 1966 contract to study subway signage, to its subsequent contract to create a graphic standards manual, to spotty changes based on the signage system installed in various stations, to Massimo Vignelli’s Beck inspired diagrammatic subway map in 1972, to 1982 when 78 stations were completed, to an extended graphic standards manual in 1988, using the previous signage system, to the 1995 introduction of a new MTA logo and

book reviews



Metrocards. This fifty-three year span saw station renovation, changing transit lines, integration with buses and other passenger amenities. The system design was rife with contingency within the design program and within urban life; transit strikes and fiscal shortfalls plagued the city, while the desire to create a consistent transit environment continued. This is one reading of the history presented.

Another reading is the visual documentation of station signage from the early 20th century, often present as beautiful mosaic letterforms, completely non-standardized except for the materials. Chaos followed as the subway system grew beyond control, including crude typography and production. This morphed into the author's description of typographic competition among available sans serif fonts with Standard being slowly and incompletely replaced by Helvetica. Standard's designer and pedigree is less stable than the well-documented history of Helvetica (Max Miedinger). Akzidenz Grotesk was assembled from various 19th century grotesques "by technical employees (anonymous) at the Berthold type foundry ... "Standard" (approximating regular, medium and bold qualities of today) became the stylistic reference for all additional cuts. This "Standard," not the full Akzidenz-Grotesk font family from Berthold, is considered by Germans, even today, as the *absolute* Grotesk, especially in the shadow of Helvetica's success."¹

Laypeople, then and now, who use typographic language as a way-finding tool to navigate New York City's complex subway system, cannot distinguish among sans serif fonts such as Standard, Univers (Adrian Frutiger) or Folio (Konrad Bauer and Walter Baum), fonts that are Helvetica's primary rivals. Even trained designers have difficulty discriminating categorical difference among fonts (see Dyson's research in this issue). Running through this narrative are other system projects that pre-dated or were contemporaneous to the New York subway system, such as The Oceanaic Terminal at Heathrow (1960s), Milano Metro signage (1962), Schiphol Airport signage (1964), Massachusetts Bay Transportation Authority modernization program (1964), Washington Metro System signage (1970)—it seemed that modernization with its interest in consistency and simplification was taking hold not only abroad but in the US too.

¹ Email correspondence with Dietmar Winkler, June 27, 2011.

Ending in 2010, the author observes that technology is changing the nature of systems and our expectations for them. For example, some transit information is stable, i.e., names of stations, while other information is changeable, i.e., train arrival or cancellation. This suggests a categorical change within the system, much like a recent article in *Visible Language* (McDonald, 2010) that explored inability to deal with rapid change with regard to lower level, less complex signage. Systems are not only subject to unforeseen circumstance, they need to change to accommodate new opportunity. Here, LED signage renders Helvetica and/or Standard obsolete.

The idea of a signage system for the New York subway system was a winner, but those involved, not just the designers, but the client too, didn't find a sensible way to scale-up the system—maybe this was inevitable, given its complex and dynamic nature. Now, while technology offers new opportunity, stations return to mosaic signage, coming full circle in the development of station identity—old technology meets new as the system continues to evolve. Can an historical sensibility coexist with technological dynamism?

The book design facilitates taking different paths through the material, the visual examples tell their own story. Look carefully at the dates, when something was created and whether it lasted. The running narrative is straightforward, while the footnotes go into historical detail and the timeline at the end of the book presents a complete context. This is excellent design history—contextualized, presenting the facts, well documented—it is readable, viewable and researchable.

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book reviews

Open Design Now: Why Design Cannot Remain Exclusive

BAS VAN ABEL, LUCUS EVERS, ROEL KLAASSEN AND PETER TROXLER

Amsterdam, NL: BIS Publishers, 2011

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“Open design is rooted in information and communication technology, giving us all the instruments to become the one-man factory, the world player operating from a small back room” (p.17).

Peppered with words like *amateurissimo*, hyper-craft, co-creation, social design, remix, open source and crowd-sourcing, this book examines the freeing aspects of technology and what pursuit of them might mean today. It runs counter to our conservative expectations for the future that usually look a lot like an expanded present. The book is very much a Dutch production based on the collaborative effort of Creative Commons (Netherlands), Premsel and the Waag Society’s Open Design Lab. Creative Commons is a different take on copyright fostering more openness, while Premsel promotes design and fashion in The Netherlands from a cultural perspective and the Waag Society is a foundation interested in developing creative technology for social innovation.

Taking its cue from technology, the feature articles forming the bulk of the book and case studies delivering a smaller portion push on possibilities for culture production rather than culture consumption by ordinary citizens. It takes Norbert Wiener’s 1950 book, *The Human Use of Human Beings*, seriously. Wiener, the father of cybernetics, was ahead of his time, both his book and this one share a utopian perspective. But this book gives credence and a practical viewpoint to releasing people to be creative and celebrate human inventiveness, sharing and community.

The book also contains a visual index that covers 32 concepts dealt with in the book. Each concept is visually documented by grassroot or designer applications. These sometimes show the breadth of application and make the conceptual idea real. Some individual images are tied back to discussion in an article or case study. The



images demonstrate creative possibility with a technological backdrop. The case studies discuss specific projects and most have a url attached for further investigation. The range of case ideas is impressive.

There has been much talk of the democratization of media and information; this book takes democratization into the world of object design; it challenges copyright along with patent, production and distribution as well. While user-centered and co-design practices have developed and taken hold, this variation on thinking about design goes further proposing

the development of a post-professional design world, citing, as examples, the changes to journalism, photography and graphic design that technology has effected through putting hardware and software into the hands of amateurs. One key to the open design initiative is the 60 Fab Labs distributed globally. Fab is short for fabrication; these labs use 3D technology to generate objects for a limited run and are available to amateurs. It supports personal design and one-off creations.

What does this mean for designers and their process, even what they design, if they are no longer designing for mass production or even customization within the frame of mass production? In his article, Paul Atkinson suggests that designers create generative software, templates and systems that can morph giving the amateur a base from which to create. This could facilitate the sharing of knowledge between professional designer and amateur. Sharing knowledge is a critical idea to open design—how to identify what knowledge is needed and how to effectively share it. The limited number of case studies (21) and their brief presentations suggest that this is a design change in the early stages. Clearly there is much thinking, investigation and development yet to do.

Jos de Mul offers an article from a more critical perspective, briefly discussing four problems inherent in the development of open design. First, he mentions the cost of making physical objects and the competition that is part of being first to market; competition thwarts openness. Second, he mentions that not many people may take advantage of open design due to lack of time, skills or interest. Third, he mentions that not everyone can design and the results may not be functional, attractive, safe, ecologically sound or any of the other many criteria that can be brought to design. Fourth, he mentions the inescapable fact that what is made

book reviews

may be detrimental to our wellbeing; not only positive, life-enhancing things are possible. These are important concerns, perhaps amplified by the technology at play.

Musing from my own perspective brings me to how technology has facilitated changes in location and connection and institutional change. Regarding location and connection, I have long thought the computer and internet would allow many people, not just those in the tech industry, to live where they wanted—not just in big cities; to work from home or a satellite location. But while this possibility has existed for at least 2 decades, I don't see many people taking advantage of this opportunity. I know a few people who have tried it and returned to big city/suburban life. While I imagined a redistribution of people across the landscape, there must be other factors beyond technology that fail to be satisfying, or perhaps the lifestyle adaptation was too much, or the dream of living on the island or coast, in the forest or mountains, didn't match up with its reality. Living in the mountains, I skype with research students in Hong Kong, connect with Providence, Rhode Island regarding the journal and stay in touch with authors, colleagues and friends globally—I know it is possible, yet only a minority of people make this move. This causes me to wonder how many ordinary people would embrace open design.

Regarding institutional change, libraries like nearly all institutions face a digital future with most patrons expecting more of the same. Old ideas about the library as an institution and librarians as fusty helpers remain. Yet the library is changing its role in the community and faces significant financial problems with a decreasing tax base. The American Library Association (Levien, 2011) has created scenarios to help communities and libraries consider how they want to position themselves in the future. They offer four continuums as a useful way of thinking about where a library currently is and where it desires to go. The continuums are: the totally physical versus the totally virtual; individual versus community focus; collection versus creation library; and portal versus archive. Open design falls under the creation library. Libraries, like so many other institutions, will have to reinvent themselves for the future in response to changing technology and the desires of the communities they serve.

Is open design a reinvention of design or a reinvention of the cottage industry using new technological means?

What I find troublesome in the book is the context and its development. Clever and positive aspects of technology are the focus. Nature never appears directly, but has a brief curtain call as recycling, repair and repurposing are presented either in a case study or less typically in an article. The economy driven by large corporations, their power and media connections are center stage in some discussions, countered

by small and medium size enterprise using technology to design, produce and distribute their wares. This is certainly a David and Goliath situation that has existed for some time. Open design participants in their excitement for the idea, gloss over the problems of competing values whether aesthetic, ecological, ethical or other complex value concerns that cause friction. Collaboration across disciplines or with users is not as easy as portrayed because of embedded values and processes. Nature, the economics of design, varieties of values and collaboration loom as large context concerns for design action.

Yes, some non-designers tinker and will take advantage of open design, but most people are conservative, resist DIY projects if possible, like products made appropriately for them, lack a critical/questioning attitude and resist change. Decades of consumption will not disappear quickly. Open design is not for every one, in fact it may be mostly for designers.

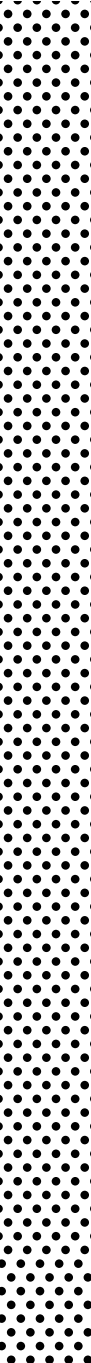
That said, the writing is energetic; this is a book to think with. Directed to innovators, designers and others with a reasonable grounding in technology who want to consider where technology is headed. Open Design stimulates a reconsideration of design practice and educational needs. Is this the future of design? Some will find it promising, some will not appreciate it, few will be unmoved by it, but all will find it provocative.

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index for volume 45

BY AUTHOR

- Baron**, Naomi S. and Rich Ling, Necessary Smileys & Useless Periods: Redefining Punctuation in Electronically-Mediated Communication, 45–68.
- Blackburn**, Nick, Early-Modern “Speech” Marks, 93–120.
- Brown**, Monica, Teresa Dobson, Piotr Michura, Omar Rodriguez, Stan Ruecker, Interactive Visualizations of Plot in Fiction, 169–191.
- Dobson**, Teresa, Monica Brown, Piotr Michura, Omar Rodriguez, Stan Ruecker, Interactive Visualizations of Plot in Fiction, 169–191.
- Dürrenmatt**, Jacques, From Invisibility to Visibility and Backwards: Punctuation in Comics, 21–44.
- Dyson**, Mary C. Do Designers Show Categorical Perception of Typefaces? 193–220.
- Hall**, Nigel and Sue Sing, Seven- to Nine-year-olds’ Understandings of Speech Marks: Some issues and problems, 69–92.
- Lennard**, John, In/visible Punctuation, 121–138.
- Ling**, Rich and Naomi S. Baron, Necessary Smileys & Useless Periods: Redefining Punctuation in Electronically-Mediated Communication, 45–68.
- Luna**, Paul, Marks, Spaces and Boundaries: Punctuation (and other effects) in the typography of dictionaries, 139–160.
- Michura**, Piotr, Monica Brown, Teresa Dobson, Omar Rodriguez, Stan Ruecker, Interactive Visualizations of Plot in Fiction, 169–191.
- Rodriguez**, Omar, Monica Brown, Teresa Dobson, Piotr Michura, Stan Ruecker, Interactive Visualizations of Plot in Fiction, 169–191.
- Ruecker**, Stan, Monica Brown, Teresa Dobson, Piotr Michura, Omar Rodriguez, Interactive Visualizations of Plot in Fiction, 169–191.
- Sing**, Sue and Nigel Hall, Seven- to Nine-year-olds’ Understandings of Speech Marks: Some issues and problems, 69–92.
- Toner**, Anne, guest editor, Special Issue: Punctuation, 5–160.
- Toner**, Anne, Seeing Punctuation, 5–20.
- Wong**, Ho Lan Helena, Critique: A Communicative Event in Design Education, 221–247.

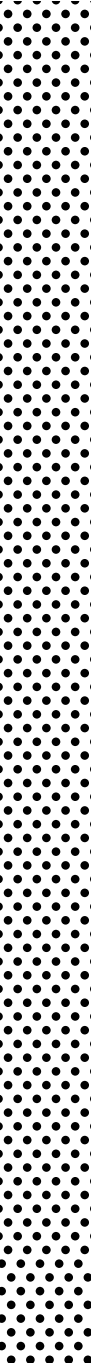
index for volume 45

BY TITLE

- Critique: A Communicative Event in Design Education**, Ho Lan Helena Wong, 221-247.
- Do Designers Show Categorical Perception of Typefaces?** Mary C. Dyson, 193-220.
- Early-Modern "Speech" Marks**, Nick Blackburn, 93-120.
- From Invisibility to Visibility and Backwards: Punctuation in Comics**, Jacques Dürrenmatt, 21-44.
- Interactive Visualizations of Plot in Fiction**, Monica Brown, Teresa Dobson, Piotr Michura, Omar Rodriguez, Stan Ruecker, 169-191.
- In/visible Punctuation**, John Lennard, 121-138.
- Marks, Spaces and Boundaries: Punctuation (and other effects) in the typography of dictionaries**, Paul Luna, 139-160.
- Necessary Smileys & Useless Periods: Redefining Punctuation in Electronically-Mediated Communication**, Naomi S. Baron and Rich Ling, 45-68.
- Seeing Punctuation**, Anne Toner, 5-20.
- Seven- to Nine-year-olds' Understandings of Speech Marks: Some issues and problems**, Nigel Hall and Sue Sing, 69-92.
- Special Issue: Punctuation**, Anne Toner, Guest Editor, 5-160.

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- 45.3**, 161-272



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