SUMMARY

◆ Asserts that typography has not occupied a significant role in discussions of visual rhetoric

◆ Extends those discussions by investigating whether typeface persona shapes readers' interactions with a document

# The Rhetoric of Typography:
# Effects on Reading Time, Reading Comprehension, and Perceptions of Ethos

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## INTRODUCTION

In the recent flurry of activity focused on visual rhetoric in technical communication, discussions of typography have largely been left behind. While we have taken significant steps forward in the ways in which we treat design, with greater attention given to theories of design and models of visual communication, typography occupies an infinitesimal portion of that work. Yet, typography is, in a very real sense, the basic building block on which design of primarily verbal texts relies. It also occupies a place that is simultaneously verbal and visual, functioning at multiple levels within a document. Relying on practitioners' lore and intuition to guide us in our decisions about such a central design element is potentially problematic. This article presents a theoretical and empirical framework for considering the rhetorical role of typography along with the findings of a study that begins to test that framework.

## REVIEW OF THE LITERATURE

### A theoretical framework

Given the unique role typography plays as both a verbal and a visual element in documents, any theoretical framework for a study of the rhetoric of typography must draw on theories of both verbal rhetoric and visual rhetoric—defined by Kostelnick (1989) as "the ability of the writer to achieve the purpose of a document through visual communication" (p. 77). It must also explore intersections between the two. Theories of both verbal and visual rhetoric point clearly to the importance typography may have in conveying rhetorical information to the reader.

**The division between verbal and visual language**
Verbal and visual thinking—and thinking and seeing—have long been considered distinct in western society, in what Horn (1998) refers to as "a great either/or division that we have relied on for millennia" (p. 2). Horn suggests that the split between verbal and visual thinking dates back to the invention of the Phoenician alphabet, when "words and images ... began to take separate routes" (p. 2). Initially, alphabetic symbols provided visual representations of objects and concepts. However, with the development of a phonetic alphabet, that relationship changed and became less clear cut; the correspondence of written symbol to object was replaced by a system far more cognitively complex.

According to Ong (1982), "Though words are grounded in oral speech, writing tyrannically locks them into a visual field" (p. 12). Ong also argues that writing makes possible context-free language—verbal discourse that can be separated from its author, and, by virtue of that separation, can be read in a greater number of ways than can oral language. The development of printing, he argues, extended these changes; for example, the enhanced legibility of printed texts over hand-penned texts allows rapid silent reading, a purely individual interaction with the text (and thereby with the author's message) that did not exist in an oral culture.

McLuhan and Fiore (1967) suggest that fundamental shifts like these in the ways in which people communicate play a greater role in shaping society than does the actual content of their communication. At the individual level, McLuhan (1962) argues, interaction with texts shapes readers' thoughts; that is, readers' thinking and perceptual processes are guided by the ways in which communication is structured. For example, hearing was the primary means of sensory and social orientation before development of the phonetic alphabet; the phonetic alphabet shifted the focus to the eye, and printing extended that shift (McLuhan and Fiore 1967).

Critics of these theories contend that species-wide physiological changes on an evolutionary scale are highly unlikely in such a relatively short time. However, thought and perceptual patterns are not necessarily physiologically "hard-wired," and one can draw a fine line between evolutionary changes and adaptations to new types of stimuli. In this light, it seems not only feasible, but also reasonable, to expect new thought patterns to emerge as the result of such extensive changes in the ways we communicate.

**Theories of visual thinking and visual rhetoric**
Whether or not one accepts that evolutionary changes in thought patterns can result from changes in communication design, these arguments at the very least provide an entry point for thinking about the visual structure of texts as more than simply aesthetic. They suggest that the visual structure of a document contributes to readers' meaning-making, that the design conveys information that is separate from the content of the text itself.

Other theoreticians of visual language certainly support this contention. For example, graphic designers have long contended that design serves a rhetorical purpose. Hurlburt (1981), for example, describes design as having three primary functions: to persuade, to identify, and to inform. In fact, he describes design in terms that clearly mark it as a process comparable to that of writing, the product of which must be appropriate to the purpose and context of the communication.

Similar arguments have been made specifically about typography. Designers such as Gill (1983) and Morison (1983) talk of typeface appropriateness and the importance of matching typeface to document purpose. Others, such as Zapf (1970) and White (1988), stress the importance of designing and choosing type carefully to convey a particular persona and to assure a "unity of content and form" (Zapf p. 59). Even Beatrice Warde (1956a), whose most well-known work emphasizes that type should be invisible—a "crystal goblet" for the verbal text—describes type as analogous to tone of voice, bringing a distinct personality to the text.

According to Zelman (2000), modernist designers op-

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erated under the assumption that the eye will always perceive an object or message the same way, regardless of prior knowledge, expectations, or experience. They held that "our internal makeup does not alter the impressions we receive" (p. 53). Zelman argues that the shift away from this perspective began once designers began relying on the computer for their work; they began to reconceive the viewing process as one in which the reader/viewer is an active participant rather than simply a passive recipient.

Whether or not the change in designers' underlying assumptions grew out of a change in their tools, most contemporary designers now approach design from the perspective that a reader interacts with a document—with both its verbal and its visual content—to make meaning. Such an interactive model complements the notion of audience put forth by Ede and Lunsford (1984), who argue that readers bring their own experiences and expectations to a text, while at the same time being shaped to some extent by that text. Their position serves as a balance point between the notion that writers can simply address a "real" audience and the theories of Ong (1975) and Gibson (1980), who claim that the reader is a "fiction" whose persona shifts with each document that he or she reads.

Arts psychologist Rudolph Arnheim (1969) explores the notion of interactivity as it pertains to visual rhetoric, arguing that perception is a thinking process that is shaped by the viewer's prior experiences, values, and expectations. Just as a reader actively interacts with a verbal text, a viewer actively interacts with a visual text.

Additionally, Arnheim holds that, while verbal thinking and visual thinking are distinct, *thinking* and *seeing* cannot be separated. He suggests that the dividing line between thinking and seeing was drawn—incorrectly—in ancient Greece and the works of Plato. Sensory activities such as seeing were treated with suspicion, and their related disciplines (such as art) were dismissed accordingly, while nonsensory activities and their related disciplines (such as mathematics) were privileged, a hierarchy that continues to the present day in our education system.

Arnheim's argument serves as the backbone for the entire study of visual rhetoric, which discards the idea that seeing and thinking can be neatly separated into distinct

realms and instead argues that they must be conceived of as interconnected processes.

The contention that we can separate verbal and visual thinking, but not thinking and seeing, seems particularly apropos given the dual verbal-visual nature of typography. However, rather than according verbal and visual thinking equal importance, Arnheim takes the rather extreme position that the two are hierarchical, that visual language is "the principal medium of productive thinking," while verbal language is one-dimensional, static, and limiting in contrast (p. 295).

Although our society is certainly moving more and more toward the visual, it seems at the least problematic to dismiss verbal language as inferior, particularly given humanity's linguistic history. A more practical model posits verbal and visual language as complementary, each contributing—though not always equally—to communication.

Kostelnick, in his discussion of the visual rhetoric of printed documents, moves in this direction. Like Arnheim, Kostelnick (1989) argues that ". . . visual processing may be mediated by familiarity, contextual variables, or culturally influenced aesthetic norms" (p. 83), just as we assume verbal processing is mediated. Kostelnick (1994) likewise suggests that the visual rhetoric of a text "can radically transform the message" (p. 112): visual elements of a document affect readers' attitudes toward that document, shape the way in which readers process the information from the document, and affect the value that readers assign to the information. Thus, a document designed in a way consistent with its purpose should enhance the communication value of that document, whereas a poorly designed document may misdirect readers, creating dissonance that counters the author's intent.

Unlike Arnheim, Kostelnick does not suggest that one form of thinking or language is superior to another; instead, he argues for "cognitive interdependence" between visual and verbal thinking (1989). According to Kostelnick, visual and verbal language interact and work together, each contributing to the effectiveness of the communication. This approach offers a productive way to consider both verbal and visual rhetoric and their potential intersections.

Kostelnick proposes a model—the 12-Cell Matrix of Visual Communication—in which he identifies four interdependent levels of visually rhetorical elements in a document. According to Kostelnick (1989), the elements within the matrix comprise "the visual raw materials of the document" (p. 82), all of which communicate with the audience in some way.

In separating visual language into individual components and emphasizing the importance of understanding those components to "exert rhetorical control," Kostelnick asks us to interrogate the visual elements of a document in much the same way that we interrogate its verbal elements when planning, drafting, and revising for a particular rhetorical situation. Kostelnick implies a clear parallel between visual and verbal rhetoric, between the ways visual components and verbal components shape a document. This perspective is crucial to thinking about the rhetorical role of typography.

**Reconnecting verbal and visual language**   Trummel (1988) states explicitly the relationship implied by Kostelnick. That is, he argues that the actions of the designer and the typographer closely parallel (or should closely parallel) the actions of the rhetorician in constructing an argument. For example, the designer must design with the audience in mind, even if, as Ong (1975) contends, that audience is a "fiction" constructed by the writer; the designer must consider emphasis, clarity, tone, ethos, and so on, just as the writer must consider these aspects when constructing a written document.

Consequently, the visual form of a document should be no more arbitrary than the words in a text because both contribute to the message the document is intended to express (Trummel 1988, p. 125). Documents thus communicate with readers through their design as well as through their words, and that fact inextricably links visual and verbal rhetoric together. It is exactly this argument that forms the foundation of an exploration of the rhetoric of typography.

Trummel is not alone in asserting that visual rhetoric, including the rhetoric of typography, is analogous to verbal rhetoric. Buchanan and Kinross offer similar perspectives. Buchanan (1989) argues that, like a writer, a designer creates an argument rather than simply creating an object. He states, "The skillful practice of design involves a skillful practice of rhetoric" (p. 109). Kinross (1989) makes a comparable argument when he states that no clear distinction can be drawn between designing for informational purposes and designing for persuasive purposes, when he claims that "nothing is free of rhetoric" (p. 143).

Buchanan and Kinross echo theorists such as Weaver, Kuhn, and Foucault, who hold that all communication is rhetorical and imbued with values. And in fact, "design," whether of textual or graphical elements, by its very name implies not only art, but also artful management and intent—in short, persuasive communication.

As Lanham (1993) suggests: "In the rhetorical tradition, language comes not transparent and neutral but intrinsically colored . . . and inherently nonneutral" (p. 196). This applies not only to verbal language but to visual language as well, and typography is an essential component of that language. It is a means "by which the meanings of a text (or its absence of meaning) can be clarified, honored, and shared, or knowingly disguised" (Bringhurst 1996, p. 17).

Like verbal style, visual style—including typography—fulfills an important purposive function well beyond mere ornamentation.

These arguments take important steps toward dispelling notions of visual language as transparent, providing yet another important parallel to verbal language. Arguments by Miller (1979) and others have already moved the field away from notions of *verbal* language as transparent; theoretical discussions of visual rhetoric are suggesting we must re-think likewise our treatment of *visual* language, including typography.

If visual language parallels verbal language in its functions, then the "crystal goblet" of which Beatrice Warde (1956b) spoke in her well-known essay on typography is a myth; typography serves not as a clear window into the verbal text, but rather as a prism that refracts the verbal message of a document. However, this theoretical perspective remains to be empirically tested.

### A pragmatic and empirical foundation

Practitioners generally support the theoretical stance that the visual attributes of a document may have a subtle and complex impact. For example, Carter, Meggs, and Day (1997) emphasize that typographical choices should be driven by the rhetorical triangle—by purpose, audience, and subject—as well as by context:

> *Just as elocution and diction enhance and clarify the meaning of our spoken words, typographic signs can be manipulated by a designer to achieve a more lucid and expressive typographic communication. (p. 75)*

In addition, type is perceived to reflect the credibility of the writer or designer, even of the organization. Mismatches in typeface and text message may thus decrease credibility and alienate readers (Kostelnick and Roberts 1998). Bringhurst (1996) presents a comparable perspective, suggesting that "When the type is poorly chosen, what the words say linguistically and what the letters imply visually are disharmonious, dishonest, out of tune" (p. 23).

According to White (1988), the effects of these mismatches are likely to be subliminal because most readers are probably unaware of typeface as they read. However, consciously or otherwise, readers may respond to the atmosphere created by the type, suggesting the importance of matching form and content to each other.

The empirical support for both theoretical and pragmatic perspectives on the rhetoric of typography is multidisciplinary, including studies on perception, reading, memory, and affect, as well as on typography itself.

**Perception and reading**  A substantial body of research in psychology has investigated the processes that take place during reading, and this work in turn informs the investigation of the rhetoric of typography. Two dominant models of reading provide an organizing framework for interpreting many of these studies: a feature-driven (bottom-up) model, which stipulates that reading begins with the perception of basic features, such as letters, and ends with comprehension; and a context-driven (top-down) model, which stipulates that readers map information onto a foundation of prior knowledge as they read.

According to the feature-driven model, the reading process is a sequence of eye fixations and saccadic sweeps that culminates in the formation of an "icon" on the retina. Letters are recovered through what is essentially a pattern recognition process, while the effects of context and prior knowledge come into play only after individual letters have been processed (Gough 1972; Kintsch 1988). Various researchers have presented findings that appear to support this theory. For example, Massaro (1973) found that letters are recognized equally well in words and nonwords, a fact that suggests that context does not play a role in initial processing.

Feature-driven processing offers a fairly straightforward way to consider the effects of typography on reading comprehension: if a typeface is not legible, the initial feature recognition stage of processing will be slower and more difficult. Of course, this approach leads to the question of what features constitute a legible typeface, a question that remains to be definitively answered. Even more problematically, though, it does not provide a framework for considering other typographical issues, such as persona and appropriateness, and the ways in which these issues might impact the reading process. Finally, data from several studies suggests that context may, in fact, play an important role in even the initial stages of the reading process.

For example, Johnston and McClelland (1973) presented evidence of a "word-letter phenomenon": each letter of a four-letter word was perceived more accurately than a single letter in isolation. Becker and Killion (1977) found that visual and cognitive effects interact in word recognition, and that context and the expectations resulting

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from that context can compensate for poor stimulus quality. Other researchers have found that forced-choice letter recognition is better and faster for words than nonwords.

In addition, when one is reading for meaning, typographical errors frequently go unnoticed, suggesting that readers are processing at a word (or higher) level, not a letter level (Brewer 1972). The idea that readers normally process text word by word rather than character by character is also supported by the work of Cattell and of Erdmann and Dodge (cited in Spencer 1969).

All of this data supports the notion that readers' prior knowledge and experiences, as well as whatever schemata or genre expectations they bring to the text, shape their reading of a document from the very beginning of the reading process, as Arnheim, Kostelnick, and other have argued. In turn, this idea implies that typography may play a role far beyond legibility and readability. Because readers perceive typefaces to have connotations in much the same way as verbal language often has connotations, the context provided by the particular typeface of a document could have a significant impact on the reading of a text.

**Perception, memory, and affect**    Additional research suggests that perception—conscious and otherwise—impacts both memory and interpretation of affect. Jacoby and Whitehouse (1989) conducted two experiments whose data suggested that memory illusions (that is, falsely remembering the presence of a word on a list) can be produced by unconscious perception. Extending these results to the rhetoric of typography suggests that, if a typeface evokes certain thoughts or emotions that do not match the text it depicts, readers may falsely remember textual material; in other words, their reading comprehension may suffer. Visual tone may mislead readers much as voice tone may mislead listeners.

Goldinger, Kleider, and Shelley (1999) suggest that, rather than attending solely to a speaker's message, "listeners may primarily attend to tone of voice, dialect, and so forth" (p. 328). They draw a parallel between spoken words and written words, suggesting that both voices (spoken words) and font information (written words) are typically remembered. Their argument that spoken words act both "as perceptual objects (with unique voice characteristics) and as gateways to linguistic representations" (p. 328) also suggests a parallel to typography, which is at once visual and verbal and may thus also act as a "perceptual object."

Finally, Massaro and Egan (1973) provide data that implicitly connect these two studies, suggesting that individuals evaluate and integrate information from both visual cues (facial expression) and vocal cues (voice quality) to perceive emotion. Their data suggests that the effectiveness of these paralinguistic cues—cues that accompany linguistic information and assist the communication but do not themselves convey linguistic information—depends on context and on level of ambiguity. The more voice tone is ambiguous, the more we rely on facial expression, and vice versa; reaction time is greater when the stimulus is ambiguous or the cues are contradictory.

Again, a parallel can be drawn to written texts: If the paralinguistic information conveyed by typography is contradictory to the linguistic information conveyed by the text, one would expect reading time to be longer and comprehension degraded. If the text is ambiguous, one would expect readers to rely more heavily on the document's design—its visual rhetoric.

These studies emphasize the importance of both linguistic and paralinguistic information in the perception and interpretation of written and oral communication. They suggest again that typography may play a significant role in text perception and processing because it provides both verbal and visual cues.

**Typeface persona in practice and research**    Interestingly, research in applied psychology that is specific to typography has ignored entirely the issues of paralinguistic information and instead has focused on legibility or readability. A handful of studies have been conducted in other disciplines, and these support the notion that type carries with it a message distinct from that of the verbal text. For example, several researchers have identified personality profiles for specific typefaces (most recently Brumberger 2003a; Bartram 1982; Rowe 1982).

Others have examined the issue of typeface appropriateness (see Brumberger 2003b; Walker, Smith, and Livingston 1986; Haskins 1958; Poffenberger and Franken 1923), determining that readers are aware of mismatches between text and typeface personas. However, none of the research—in technical communication, psychology, graphic design, or other disciplines—has examined the impact of typeface persona on the reading process.

**Summary**
The existing literature, while rich in its perspectives and empirical approaches, only scratches the surface regarding type's rhetorical impact. The strands of the literature begin to converge but have not yet reached a clear nexus: The body of empirical work does not, for the most part, appear to draw on rhetorical theory—either visual or verbal; there are few studies that approach type with the purpose of examining its rhetoric or its contribution to the effectiveness of a text; those studies that do examine typeface personality stop short of investigating the impact of that personality on readers' interactions with the document.

Unfortunately, faced with a lack of empirical guidelines, we typically make design decisions based on per-

sonal preference, intuition, or even the fact that "that's what the company has always used." The designs of the resulting documents often clash with their purpose, content, and readers, a clash that has the potential to be highly problematic in a society comprised increasingly of viewers.

## RESEARCH METHODOLOGY

The purpose of this study was to investigate the impact of typeface persona on reading comprehension, on reading time, and on readers' perceptions of the author's ethos. The study addressed the following research questions: If a text and typeface are (in)appropriately matched in persona,

◆ What is the effect on reading time?
◆ What is the effect on reading comprehension?
◆ What is the effect on readers' judgments of the writer's ethos?

Based on theories of visual rhetoric and on related empirical work, one would expect reading comprehension to be poorer and reading time longer if a typeface and a text are incongruent (not appropriately matched to each other). In addition, the ethos of the writer—or the reader's perception of the writer's ethos—should be degraded; that is, the writer should be perceived as less credible or trustworthy.

### Research participants

Participants in this study were undergraduate students enrolled in Introductory Psychology, who were required to participate in four hours of research studies. Because a substantial body of research suggests there are significant differences in the ways males and females use and interpret language (Crawford and Chaffin 1986; Edelsky 1977), gender was a potentially important variable in this project. Thus, half of the participants in the study were male and half were female, allowing statistical analyses to be performed for each group separately and for comparisons to be made between groups.

### Typeface and text selection

The typefaces for the study were TrueType fonts selected based on personas identified in a previous study (see Brumberger 2003a). In that study, three distinct categories of typeface persona were identified by participants from the same general subject pool as the participants in the current study; students who participated in the earlier study were not permitted to participate in the current study. The typefaces in the initial study were chosen to represent a range of physical features, and they ranged from the commonly used to the novel. Participants rated each typeface on a series of attributes. The resulting data revealed that the typefaces separated into three distinct persona categories, identified as "elegant," "direct," and "friendly." The persona

### TABLE 1: TYPEFACE/TEXT PAIRS

| Text Category | Elegant | Direct | Friendly |
|---|---|---|---|
| Professional | *Cognitive psychology* | *Cognitive psychology* | *Cognitive psychology* |
| | *BlackChancery* | Arial | Bauhaus Md BT |
| Violent | *Rainbow six* | *Rainbow six* | *Rainbow six* |
| | *BlackChancery* | Arial | Bauhaus Md BT |
| Friendly | *Newsweek* | *Newsweek* | *Newsweek* |
| | *BlackChancery* | Arial | Bauhaus Md BT |

categories were not determined by physical characteristics of the typefaces (such as the presence or absence of serifs).

The typefaces chosen for the current study were strongly representative of each category. Thus, three typefaces were used in the study: *BlackChancery* ("elegant"), Arial ("direct"), and Bauhaus Md BT ("friendly"). It is important to emphasize that these typefaces were not selected because they are particularly likely to be used in professional documents; rather, they were selected because they were perceived by participants in the earlier study to have very strong personas.

Text passages were selected similarly. A previous study (see Brumberger 2003a) identified three distinct categories of text persona using the same methodology as that for identifying typeface persona. The categories of text persona that were identified were: "professional," "violent," and "friendly." The texts chosen for the current study were the strongest representatives of each category. Thus, three texts were used in the study: a "professional" text (an excerpt from Anderson's *Cognitive psychology* textbook), a "violent" text (an excerpt from the Clancy novel *Rainbow six*), and a "friendly" text (a passage from a *Newsweek* article on snowboarding).

The combination of three typefaces paired with three texts resulted in nine conditions (see Table 1). Each participant received only three of the nine conditions; the text passages were presented in all possible orders. Thus, this was a counterbalanced between subjects design with two independent variables.

The texts were displayed in 11.5–12 point type to control more closely for the variations in size among the typefaces, which could conceivably affect reading speed. Kerning, tracking, and leading were left at Microsoft Word default values; line spacing was set at 1.5, line length at 6.5 inches.

### The Nelson Denny reading comprehension test

Because there may be a correlation between reading ability and the effects of typeface persona on comprehension, reading rate, and perceptions of ethos, I administered part two of the Nelson Denny Reading Test (1993

version, Form H) to all participants. The Nelson Denny is a nationally standardized and normed multiple-choice vocabulary and comprehension test. It was designed to evaluate vocabulary development (part 1), and comprehension and reading rate (part 2) for high school students, college students, and adults. Revised periodically, the Nelson-Denny has been widely used for nearly four decades and is considered a valid and reliable measure of reading ability.

Part two, Reading Comprehension and Rate, is a 20-minute test, the first minute of which is used to determine Reading Rate. This section of the Nelson Denny contains seven reading passages and a total of 38 questions, each with five answer choices. The text passages are selected from current, widely used, high school and college texts. The Nelson Denny was administered after the main task of the study to avoid any confusion regarding timing and instructions.

### Reading comprehension, reading rate, and perception of ethos

For each text passage, reading comprehension and perception of ethos were measured through a series of 11 multiple choice questions, each with four answer choices. In each series of questions, four items assessed surface feature comprehension (for example, remembering a specific fact stated in the text passage), four assessed inferential comprehension (the ability to make an inference based on the information presented in the text passage), and three assessed perception of ethos. I tested the reading comprehension questions with 30 participants (15 male, 15 female) before the study to ensure their appropriateness. Accuracy rates on the surface and inference questions averaged 62–75% during piloting.

Reading time during the study was recorded with a stopwatch accurate to one-hundredth of a second; this provided the most accurate measure available without running the study on a computer, which would have introduced an entirely new reading environment. Participants timed themselves on each text passage. Prior to beginning the actual study, participants practiced the timing process with additional text passages.

### Predicted effects

Effects were predicted based on previously obtained appropriateness ratings for the text/typeface pairs (see Brumberger 2003b). The largest effects on comprehension, reading rate, and perception of ethos were expected for the conditions in which the text and typeface persona were seen as most inappropriately matched; the smallest effects were expected for conditions in which the pairing was most appropriate. Thus, the largest effects were expected for the friendly and violent texts presented in the elegant typeface (*BlackChancery*). The smallest effects were expected for all

texts presented in the direct typeface (Arial) and for the friendly text in the friendly typeface (Bauhaus Md BT).

### Materials and procedure

Seventy-two participants (36 male, 36 female) were given two packets: the first included a demographic data form, instructions, three passages of text as described above, and a series of 11 comprehension and judgment questions for each passage. There was only one passage of text per page; the questions for each passage were on the page immediately following (not facing) the text. Participants read each passage, timing themselves with a stopwatch; they then turned the page and responded to the questions without looking back at the text. The instructions for part 1 of the study were typical of a reading comprehension test:

> *In this booklet are three brief text passages, each followed by eleven questions. Please read each text carefully, timing yourself with the stopwatch provided. Once you have finished reading a text passage, record your reading time in the space provided, then turn the page and answer the questions for that text passage. Please do not look back at the text passage while completing the questions.*

Once participants read the instructions, I reiterated the instructions orally, emphasizing that they needed to read carefully enough to be able to answer questions without looking back at the text passages.

Following completion of this first portion of the study, I administered the Reading Comprehension portion of the Nelson Denny test. The entire study took approximately 45 minutes for each participant to complete and was administered to participant groups of up to four people. All participants were seated at a conference table that allowed ample space while permitting me to monitor each participant, thereby reducing the possibility of anyone following instructions incorrectly.

### Methods of analysis

I conducted an analysis of variance (ANOVA) to determine the effects of typeface persona on reading time and comprehension. To measure the effect on reading comprehension, the number of correct responses was tallied for each question category (surface and inference), and the ANOVA was conducted on these totals.

A chi square was used rather than an analysis of variance to determine the effect of typeface on perception of ethos since the responses could not be categorized as "correct" or "incorrect." There were three ethos questions for each text passage, each with four possible responses. A typical ethos question was as follows:

> The author of this selection seems to be
> a. very knowledgeable
> b. somewhat knowledgeable
> c. a little knowledgeable
> d. not at all knowledgeable

The responses corresponded to four levels of perceived ethos (high to low). Thus, responses to the ethos questions could be sorted into four categories. Because there were no "correct" and "incorrect" responses to the ethos questions, it was not feasible to predict with certainty the distribution of responses. The chi square was deemed the appropriate analysis because it provides an alternate method of determining whether two variables—in this case, typeface and perception of ethos—are independent of one another. It does so by comparing the observed frequency of a response to the expected frequency, the latter being the frequency that would be observed if the two variables were independent of one another.

Thus, if the response to a particular ethos question is not affected by the typeface, then there should be no significant difference between the observed frequency and the expected frequency for that response. The expected frequency is derived mathematically, based on the total number of responses for each item and the overall total number of responses. I tallied the observed frequency of each response to each ethos question. I then calculated the chi square based on the observed and expected frequencies. Finally, I also analyzed the ethos data for effects linked to gender.

## RESULTS

### Reading time

An ANOVA revealed no significant differences in reading time. There were no significant main effects of text or typeface, nor were there text by typeface interactions. In short, dissonance in typeface/text persona did not significantly affect reading time; it did not slow readers down as I had expected. It is possible that differences in reading time would appear with a more precise timing method such as a keystroke on the computer, but, as mentioned previously, use of the computer would introduce a new reading environment.

### Reading comprehension

Although the text passages were normed for reading difficulty and coherence, an ANOVA still revealed significant differences in reading comprehension between texts (with a statistical significance level of $p = 0.0001$—in other words, there is one chance in 10,000 that the differences in reading comprehension were due to chance). There were significant main effects of text on both surface and inference comprehension questions (at the same level of statistical significance, $p = 0.0001$).

## TABLE 2: COMPARISON OF COMPREHENSION SCORES

| Text Passage | Pilot Results (% correct) | Study Results (% correct) |
|---|---|---|
| **Professional** (*Cognitive psychology*) | 62% | 43% |
| **Violent** (*Rainbow six*) | 75% | 57% |
| **Friendly** (*Newsweek*) | 70% | 51% |

Interestingly, the reading comprehension scores for the study were considerably lower than those obtained when piloting the questions (see Table 2). These lower comprehension scores may be due to participants timing themselves as they read, although the written directions they received explicitly stated that they should read each text passage carefully, and these directions were supplemented by oral instructions to read carefully enough to be able to answer questions about the texts.

None of the significant effects on reading comprehension were due to typeface persona, nor were there any significant typeface by text interactions. Thus, the differences observed in comprehension were due solely to text differences; dissonance in typeface/text persona did not significantly affect reading comprehension.

### Perception of ethos

A chi square revealed a main effect of text (at a statistical significance level of $p < 0.001$), but no main effect of typeface using significance levels of $p < 0.01$. In other words, readers perceived substantial differences in ethos between the three texts, but they did not perceive the different typefaces in and of themselves to convey differing levels of ethos. That is, no one particular typeface consistently improved or lowered text passage ethos.

However, there was a significant typeface by text interaction (at a statistical significance level of $p < 0.001$), meaning that the persona of the typeface and the persona of the text passage interacted to shape the ethos of the text passage. For the "professional" text (*Cognitive psychology*), ethos was slightly higher with the "friendly" typeface (Bauhaus Md BT) than with either the "direct" (Arial) or "elegant" (BlackChancery) typeface. Interestingly, the pairing of professional text with friendly typeface is neither strongly appropriate nor strongly inappropriate. No comparable patterns were observed for either the "violent" or the "friendly" text (see Figure 1), nor did male
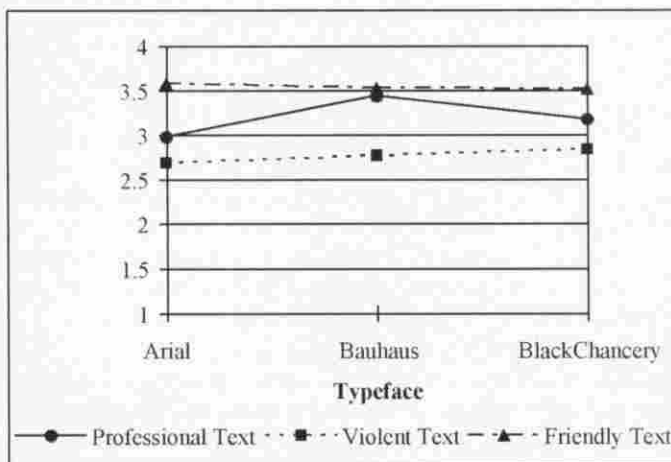
**Figure 1.** Text Interactions (ethos). The lines illustrate patterns of ethos ratings; note the different pattern exhibited by the "professional" text.

and female participants differ substantially in their ethos judgments of any of the text/typeface pairs.

## DISCUSSION

For the texts, typefaces, and participants in this study, typeface persona did not have a significant impact on reading comprehension or reading time. The data revealed no significant differences in comprehension or reading time resulting from typeface or typeface by text interactions. Although readers do perceive typefaces and texts to have personality attributes, and although they also perceive certain typefaces as (in)appropriate for certain texts, participants' comprehension of a text was not substantially affected by typeface persona or dissonance in typeface/text persona. The same was true for reading time.

There are several possible explanations for these results. All of the texts in this study exhibited strong personas, which may override the impact of typeface persona. That is, if the verbal persona of a document is very strong, readers may not be influenced by its visual persona. It is possible that effects on reading comprehension and reading time may appear in situations in which the text is neutral or ambiguous in persona.

A second possibility is that the dissonance in typeface/text persona was not pronounced enough to affect comprehension or time. That is, effects may appear only in situations in which there is a dramatic and obvious conflict between the text and typeface persona. The identification of typefaces and texts with strongly opposing personalities would allow further investigation of the impact of dissonance on the reading process.

Yet another possibility is that the text passages were so brief (only 375 words each) that comprehension and reading time were unaffected by typeface/text dissonance; significant differences in comprehension and reading time may be observed with longer and more complex text passages, in more typical reading situations, or with texts on different topics (highly technical material, for example).

A final explanation may lie in the participants themselves. Like many studies in the social sciences, this project relied on students from an introductory psychology course as its participants. Essentially, these students are a "captive audience," in that they are required to participate in four hours of research to pass the course. Ideological issues aside, this is potentially problematic from a practical standpoint. Some students participate only with great reluctance, and this attitude may well affect their performance on experimental tasks. Participants' reading comprehension scores and Nelson Denny scores suggest they are weak readers. Whether this is the case or simply a by-product of the situation, it may be that careless readers interact less closely with a text. Thus, a comparable study with readers of different levels may have different results.

The most interesting finding of the study involved readers' judgments of the writer's ethos. The data revealed a significant typeface by text interaction on ethos judgments, suggesting that a reader's perception of the writer's ethos may be sensitive to the interactions between verbal and visual rhetoric. This result suggests that typeface and text personas do interact and that readers' perceptions of a document and author are shaped to some extent by these interactions. The data supports theoretical perspectives that suggest that we cannot separate thinking and seeing—that visual and verbal thinking work together to "shape the rhetoric of the message" (Kostelnick 1990, p. 198).

At the same time, the data clearly counters the idea that we can build and use a selection chart for typefaces based on persona. The findings emphasize the problems inherent in a prescriptive approach that involves making blanket judgments about typeface usage, as there were no significant main effects of typeface, but only significant typeface by text interactions. For example, although Bauhaus Md BT is perceived to be a very "friendly" typeface, it does not follow that using Bauhaus Md BT will encourage the readers to perceive a given document as "friendlier" or that use of Bauhaus Md BT will affect each document in the same way; the impact of the typeface clearly depends on the rhetorical context.

This finding directly contradicts practitioners' lore, which suggests that a particular typeface will color any document in the same way. Thus, the data reminds us again that practitioners' lore often falls short of the mark because it typically ignores the interactions between visual and verbal rhetoric.

Finally, it is interesting to note the lack of significant differences between male and female participants. Studies of gender and language suggest that males and females differ in their interpretation of language (see Crawford and Chaffin 1986; Edelsky 1977); however, the results of this study do not support that contention with regard to visual language. This point certainly bears further investigation.

## IMPLICATIONS AND CONCLUSIONS

The results of this study, while far from conclusive, do indicate that typography does play a role in shaping readers' interactions with a document—a role that extends beyond legibility and readability. In turn, the study provides tangible support for the argument that we must approach technical communication as more than writing and then formatting, that we must make design an integral part of the rhetorical process rather than an afterthought slapped on to dress up the product.

Perhaps more importantly, though, the study foregrounds the importance of abandoning a prescriptive or formulaic approach to teaching and practicing document design. The data emphasizes that typefaces and texts *interact* during the reading process, countering the notion that a typeface with a particular persona will lend that persona to any document. Although a group of readers may consistently assign particular personality attributes to a particular typeface, that typeface may not consistently color every text they read in the same way. Thus, the project reinforces the notion of technical communication as rhetorical problem solving (Flower 1989), in which context is crucial and each communication situation requires a carefully considered and appropriately tailored solution. The data makes clear that this argument applies not only to verbal rhetoric but also to visual rhetoric.

Finally, this project highlights several connections between technical communication and other related fields, including classical rhetoric, applied psychology, and graphic design, connections that are often overlooked in both the classroom and the workplace. Drawing on these connections can provide us with a cross-disciplinary perspective on technical communication, which is likely to serve us well in our careers, whether as educators or practitioners.

One of the opinions often expressed about technical communication is that it is a field devoid of theoretical foundations. In academe, this translates into the viewpoint that we teach job skills and technical tools, rather than more highly valued intellectual material. Courses in document design, in particular, are typically viewed as "production" courses, even by people within the field of technical communication. Yet, as this article demonstrates, design itself is a discipline rich in theory, as is writing.

Exploring connections between these theoretical perspectives and drawing on empirical work that builds bridges between them can lead to document design courses that focus on the intellectual as well as the pragmatic, that teach the theory and practice of visual communication, not simply software and production skills. And, in turn, this approach may inform the teaching of other courses within technical communication programs.

In the workplace, the notion that technical communication is a field without theoretical or intellectual content leads to the idea of the technical communicator as a "manual writer," or even a glorified typist, with a very narrow field of expertise. It further marginalizes document design, defining it as decoration, as taking a product and making it "pretty." Although the field has made significant progress in this regard, emphasizing cross-disciplinary theoretical and empirical perspectives like those presented in this article may help to further dispel such misconceptions; it may in turn enable technical communicators to have a greater impact on workplace practices and products. **TC**

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