

40.2

VISIBLE LANGUAGE 40.2

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SUSPENSION

University of Hawai'i at Mānoa
Visible Language 40.2
Zuern, 132-154

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ABSTRACT

For the past decade, in addition to her contributions as a design historian, theorist, educator and professional designer, Anne Bush has created works of installation art that engage their viewers in a set of questions about the role of design in the construction of knowledge. *Façade* (1995), *"Type" Specimen* (1998), *Trust* (2002), and *Library/Catalogue* (2003) all fuse typography with a range of materials that have become fundamental to human interactions with each other and the environment—including banknotes and the basic tools of scientific research such as microscope slides, test tubes and books. With these installations, Bush constructs conceptual way-finding systems that operate on both large and intimate scales to orient visitors not only to the specific details of the spaces in which the works are installed, but also to the general systems of demarcation, classification and control that shape our comprehension of our world.

An example of the best design was before my eyes, the design of a seductive unity of person and machine, sensuality and playfulness, beauty of form and aptness of function. A sort of fusion dream, the staging of this dream as reality and, at the same time, the most treacherous delusion.¹

— Gert Selle

System, Suspension, Seduction:

Anne Bush's Critical Design Practice

Seduction

John Zuern

THE "UNTIMELY OPINIONS" GERT SELLE first voiced fifteen years ago in *Design Issues* recapitulate questions that have troubled designers since the consolidation of the modern design professions. From the founding rationales of the Bauhaus to Ken Garland's 1964 "First Things First" manifesto to the reaffirmation of that manifesto in 1999, designers and design theorists have engaged, but have certainly not laid to rest, the set of problems that prompted Selle's rather lugubrious reflections

¹ Selle, Gert. 1995. "Untimely Opinions (An Attempt to Reflect on Design)." John Cullars, translator. In Margolin, Victor and Richard Buchanan, editors. *The Idea of Design: A Design Issues Reader*. Cambridge, MA: MIT Press. Originally published in 1990 in *Design Issues* 6.2, 33-42.

on the state of design in the culture of late capitalism. Of perennial concern has been the relationship between professional design practice, with its ties to industry and commerce, and the hegemonic political, social and cultural regimes in force in the world in which designers must work. How does a designer cope with the apprehension that a successful solution to a design challenge, the kind of felicitous union of formal beauty and intuitive functionality Selle so admires in the Olivetti Divisumma 18 (the tabletop calculator that serves as his double-edged “example of the best design”) may constitute little more than the fulfillment of the designer’s role as an under-sung minion of capitalist technocracy? And if we insist that designers are more than merely window-dressers in the malls of transnational capital, more than merely ushers in the theaters of postindustrial urban space, how do we identify design’s social surplus value, the potential for enlightenment, critique and even resistance and dissent, within design itself? How do we articulate—and, moreover, actualize *in* and *as* design—a critical design practice which “makes visible to perception and thought that which is considered invisible in design so as to understand it,”² or, as more recent formulations of the question have put it, links “the multiple degrees of separation between the everyday notions of meaning making and the specific decisions of designers”³ and effects “a mindshift away from product marketing and toward the exploration and production of a new kind of meaning?”⁴

A critical design practice worth its name would certainly have to be something more than a soy-ink-on-recycled-paper environmentalism and even something more than the outrage and good intentions of the “First Things First” manifestos. It would have to be something more, too, than wishful thinking on the part of theorists of design.

Ideally, the critical insights born of such a design practice would extend beyond auto- and meta-critique within the design community into the community at large, and the designed object or system would comprise, within the parameters of its function, a critical intervention into the larger social-cultural-political systems in which it plays its functional role. Design solutions arrived at through this kind of critical design practice would draw their users into a critical consciousness not merely by delivering a “criticizing” message, in the form of what we call

2 Selle, “Unrimely Opinions,” 243.

3 Storkerson, Peter. 2003. “Designing Theory in Communication.” *Visible Language* 37.1, 19.

4 Barnbrook, Jonathan, et. al. 1999. “First Things First Revisited.” *Émigré* 51. <<http://www.emigre.com/>>. 20 July 2005.

propaganda and “negative” political campaigning, but by affording users, in the course of their very act of making use of the design, a kind of intellectual—and potentially also ethical and political—deliverance.

How might such a design practice be theorized, let alone accomplished? While in the domain of commercial design work such an orientation to practice might well be hampered by market-driven client concerns, other dimensions of design practice, in particular the zone where design crosses into its neighboring territory of fine art in the form of exhibitions and installations, offer avenues along which to explore the critical possibilities of an expanded design sensibility. “In present-day graphic design, is it possible to distinguish between the private and public, the artistic and commercial?” Fedja Vukic asks in the course of his examination of Eduard Cehovin’s public displays. Vukic argues that Cehovin responds to this dilemma “by elevating graphic design works above the realm of the directly usable.”⁵ Moving design into the domain of art does not so much get design off the utility hook as it throws into relief the aesthetic, rhetorical and conceptual functions that figure into the usefulness and the social meaning of any designed object.

The installation projects Anne Bush has pursued over the past ten years form a body of work that fulfills many of the desiderata for such a critical design practice. A professor in the Graphic Design Program at the University of Hawai’i at Mānoa, a theorist and historian of design and a practicing designer, Bush has found in public installations a medium in which to extend her scholarship into “project-oriented research, making the design process a subject of design.”⁶ All of Bush’s installations explore the question of how local, site-specific design solutions intersect with the global, pre-established codes that inflect human perception, knowledge production and social interaction.

Anne Bush’s Installations: Critical Approaches

THIS EXAMINATION OF BUSH’S INSTALLATION PROJECTS takes its analytical cues from two commitments that are clearly central to her design practice. The first is Bush’s keen awareness of design’s *place*—in physical as well as social terms—and the designed object as a kind of “place” users must enter and navigate. Bush’s awareness of the spatiality of design extends from her

5 Vukic, Fedja. 2005. “Re-design in Public Space: The Work of Eduard Cehovin.” *Visible Language* 39.1. 44.

6 Wolfgang Jonas. 2001. “A Scenario for Design.” *Design Issues* 17.2. 79.

typographer's consciousness of letterforms and the disposition of type on the printed surface to an architectural comprehension of the built space of the material systems in which the typography will appear as a component. Additionally, Bush is conscious of the space *through which* readers must pass in their approach to the systems and the texts, the space that comprises the overall environment in which the designed system is situated and that is also the social space in which design operates and realizes its utility.

The smaller-scale, "hand-held" objects Bush has designed, such as books and exhibition catalogues, also embody this commitment to activating the space in and around the object. For example, her catalogue for *Sum of the Parts*, an exhibition in Honolulu in which artists displayed autobiographical work centered on parts of the body, is composed of five unbound signatures to echo the five senses. The 6x6" booklets are printed on transparent paper to emphasize visually the interrelations among the different essays in the catalogue, and each set of signatures is packaged in a plastic sandwich bag, requiring the catalogue to be unpacked—literally and conceptually—rather than merely opened. More recent projects such as her design for the book *Anderson + Anderson: Architecture + Construction*⁷ and the promotional materials for The Contemporary Museum in Honolulu likewise make the fundamental actions of the reader—opening a book or an envelope, turning pages, unfolding a brochure—into integral components of the object's overall message. Bush's installations accomplish an even more dramatic fusion of the reader's physical approach to the design and the critical "approach" she encourages her visitors to take toward the conceptual problems her design is posing.

All of Bush's installations are site-specific; they refer to their immediate locations through the texts they incorporate, their materials, their colors and above all in the concepts they are exploring and inviting their viewers to explore. Like most installations, Bush's environmental works demand a very literal *approach*. We enter the space in which they are installed and must advance toward or into them. More than many artists, however, Bush activates this space of approach. Radical shifts in scale prompt the viewers to move in close to read the printed texts or to inspect the materials, and then a suggestive fine-grained detail compels

⁷ Anderson, Mark and Peter Anderson. 2001. *Anderson + Anderson: Architecture + Construction*. Princeton: Princeton Architectural Press.

them to step back again to reorient themselves within the overall system. In this way, the visitor's physical approach to Bush's work fuses with the critical "approach" she encourages her visitors to take toward the conceptual problems her installations are posing.

The second obvious commitment in Bush's installations is to precisely this conceptualization of space and of conceptualization itself as an ongoing event *in* and *through*—space. Design is in large part the subjection of space to thought. Design turns the spaces of the world into legible, navigable, livable human *places*, but it does so by acting on both the material structures of the world and on the mental structures of the mind. Design functions because it "thinks." It embodies concepts and, through its successive and successful use, reproduces those concepts in the social world. Richard Buchanan has associated design's replication of concepts in society with the "rhetoric" of design: "if design is an architectonic art with respect to things, its efforts and products are guided in turn by another architectonic art that further integrates objects into social activities and even guides the practice of design at every turn. This architectonic art is rhetoric—not simply the old verbal rhetoric but rhetoric as an art of thought."⁸ This conceptual-rhetorical power makes design a preeminent carrier of culture and at the same time predisposes design to the role of collaborator in what Selle calls "the most treacherous delusion."

Bush's installations throw into relief the operation of design as concept-formation. They are a creative response to the call for self-reflection from within the design community as well as an answer to challenges to design practice from philosophy and cultural studies. In their overview of the contemporary "rivals" of philosophy in their last book, *What is Philosophy?* Gilles Deleuze and Félix Guattari complain that,

the most shameful moment came when computer science, marketing, design, and advertising, all the disciplines of communication, seized hold of the word concept and said: "This is our concern, we are the creative ones, we are the *ideas men!* We are the friends of the concept, we put it in our computers." [. . .] Marketing has preserved the idea of a certain relationship between concept and event. But here the concept has become the set of product displays (historical, scientific, artistic, sexual, pragmatic), and the

⁸ Buchanan, Richard. 1995. "Rhetoric, Humanism, and Design." In Buchanan, Richard and Victor Margolin, editors. *Discovering Design: Explorations in Design Studies*. Chicago: University of Chicago Press, 25.

9 Deleuze, Gilles and Félix Guattari. 1994. *What is Philosophy?* Hugh Tomlinson and Graham Burchell, translators. New York: Columbia University Press, 10.

10 Foster, Hal. 2002. *Design and Crime and other Diatribes*. London: Verso, 126.

11 Foster, *Design and Crime*, 130.

event has become the exhibition that sets up various displays and the “exchange of ideas” it is supposed to promote. The only events are exhibitions, and the only concepts are products that can be sold.⁹

Hall Foster has echoed these worries in his critique of contemporary installation art, much of which he sees as capitulating to our “pervasive design-and-display culture” and losing the “productive contradictions” deployed in earlier postmodernist experiments.¹⁰ If we give Bush’s projects the attention they demand—that is, if we succumb to the seductive lure of their beauty and the intellectual fascination of their structural and conceptual complexity—we will find that by way of what Foster describes as “a formal transformation that is also social engagement” her work “helps to restore a mnemonic dimension to contemporary art, and to resist the presentist totality of design in culture today.”¹¹ Moving design into the realm of public art, the experimentation and risk-taking of Bush’s installations point toward a critical design practice through which designers can reach inventive, creative, functional design solutions without suspending their ethical commitments or surrendering their political resolve.

Façade (1995)

FOR THE 1995 INTERIM SITES ART PROJECT each of the participating artists was assigned a space in the mezzanine of the Pauahi Tower in Bishop Center in Honolulu’s financial district; the exhibition’s goal was to have the artwork comment in some way on its immediate context. Bush was given a 40 x 28’ portion of granite wall, for which she created *Façade*, an evenly spaced row of 360 glass test tubes suspended close to the wall on nylon filaments from ceiling to floor. The test tubes hang roughly a foot from the floor and are filled with paint mixed to match the colors in the stone in the wall behind them as well as the flesh tones of the Revlon Liquid Foundation line of women’s makeup. The gently swaying tubes with their subtle differences in color, ranged along the bottom of a shimmering curtain of slender threads, compose a dramatic image, even from a great distance. The large-scale structure of the piece creates a literal *façade*, covering but not fully concealing the wall (see figure 1).

Drawn toward this enigmatic construction, the visitor realizes that each test tube bears a label, a single line of text

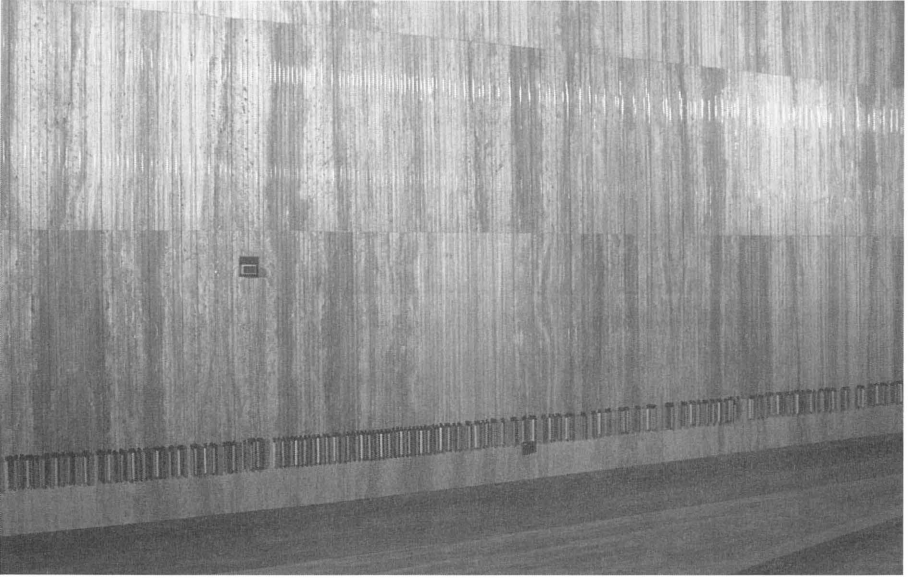


FIGURE 1

Facade, Installation of 360 test tubes, suspended from a 40x28' wall. Mixed Media. Bishop Square, Honolulu, HI, 1995

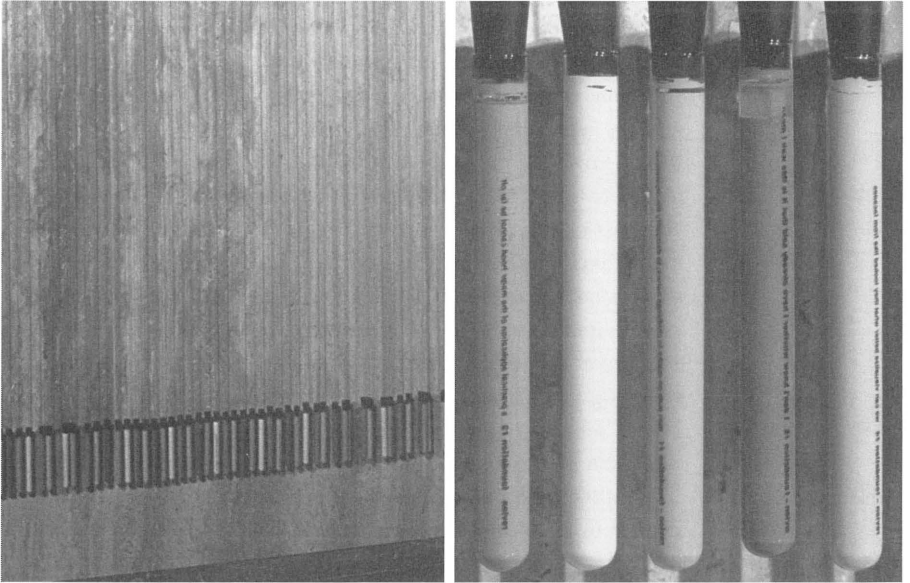


FIGURE 1 (detail)

Facade, Installation of 360 test tubes, suspended from a 40x28' wall. Mixed Media. Bishop Square, Honolulu, HI, 1995

running up the side. The text fragments are drawn from a range of sources, most of which deal with themes of faces, masks, vision and self-reflection. Most of these quotations occur only once, but interspersed throughout the series is the repeating line “I don’t know whether I have already said that it is this wall I mean,” providing on one hand a clue to the color choices, but on another hand adding another level of ambiguity and intrigue: *which wall?* The granite wall, or *Façade’s* own slightly swaying “wall” of filament, glass, words and pigment? This question triggers others: Don’t the colors in the tubes also correspond to pigmentation variations of human skin? Aren’t the words *façade* and *face* connected somehow? What kind of experiment is going on here—for isn’t the test tube a paramount icon of the natural sciences? Wouldn’t the glass tubes shatter on the stone floor if the supporting threads gave way?

A design experiment in its own right, *Façade* draws upon the basic tools of scientific experimentation to call attention to the power and the risk of our society’s faith in the natural sciences, especially when we use science as a “foundation” for our ethical responses to our natural and social worlds. The gleaming row of labeled tubes in variegated colors points to the rigid categories into which science sorts our understanding of reality, yet the precarious suspension of the tubes indicates at the same time the ultimate fragility of the scientific apparatus and the irreducible ambiguity of its labeling systems. As a literal façade covering the stone wall to which it seems to refer, *Façade* also questions the degree to which scientific inquiry can reveal the truth of the world. The colors in the tubes have indeed been “extracted” from the wall, “sampled” as specimens of the stone’s complex, unified reality, but the apparatus that serves to sort and systematize those specimens also serves to *obstruct* our vision of that reality. In this respect Bush is engaging a key insight of theoretical physics, articulated in the Heisenberg principle: as soon as we elect to observe one phenomenon of the physical world, another phenomenon eludes us.

To understand how Bush’s *Façade* connects to its place, we cannot overlook the broader context of Hawai’i, a place that is often held up as an emblem of successful multiculturalism, but that is in reality fraught with ethnic and class tensions stemming from its vexed history of colonization, occupation and

plantation-driven immigration. In this context, Bush's matching of the colors of the paint not only to the stone, but to the shades of a popular brand of cosmetics, links her critique of science to the domain of interpersonal ethics and social justice. In what ways do the categorizations that are essential to scientific inquiry—and that design follows for the essential hierarchies of its systems and displays of science-derived information—inflect and infect our relationships with other human beings? The categories that compose the idea of “racial difference” have been particularly destructive to mutually affirming relations, in Hawai'i as in many other places. Present-day ethical philosophies recognize that the genus-to-species framework that allows biological sciences to systematize other living things makes a poor basis for understanding individual humans and human collectivities, but to what extent do the cultural systems we continue to employ, systems created and sustained by design, reinforce categories that perpetuate the divisions and hierarchies that subordinate some humans to others? In *Façade*, Bush's response to this question is to execute a “formal transformation that is also a social engagement”: the play of revelation and occlusion in her mesmerizing wall of test tubes signals that systems as such, seductive as they may be in their order and their beauty, do not themselves suffice to create a knowledge that is “human” in all respects, or that respects all human beings.

“Type” Specimen (1998)

BUSH RETURNS TO ICONIC TOOLS OF SCIENCE in “Type” *Specimen*, a gallery installation at the University of Hawaii's Windward campus. The piece is displayed on a 4x4' light table and is comprised of a grid of microscope slides to which Bush has affixed strips of newspapers in English, Chinese and Japanese, all of which were printed in Hawai'i in the early twentieth century. Recovered from a dumpster, the newsprint is considerably aged and sometimes stained, and the light renders it translucent, allowing images and text from the reverse side to bleed through. On the glass slides, the printed yellow-brown slips resemble tissue samples, grafts of tattooed skin (*see figure 2*).

As in *Façade*, Bush deploys a dialectics of revelation and/as occlusion to draw the viewer into the process of conceptualization that links the material structures of her work to the cultural formations and structures of thought her work engages and

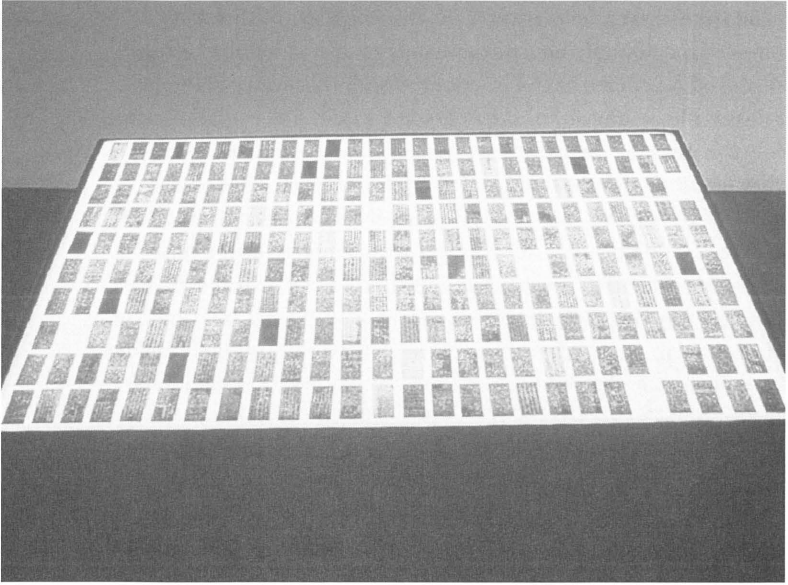


FIGURE 2
 'Type' Specimen, 4 x 4 ft., Mixed Media on a light table, 1998

critiques. In "Type" Specimen, the illuminating force of the back-projected light is checked by an apparently systematic inking-out of individual letters throughout the English texts. On closer consideration, many readers familiar with the Hawaiian context will recognize that the cancelled letters are those that are not included in the set of fourteen Roman characters that make up the Hawaiian-language alphabet. By omitting these common characters—among them B, D, F, G, J, R, S and T—Bush imposes upon the writing system of English an arbitrary systematization akin to the early nineteenth-century missionaries' imposition of the Roman alphabet upon the phonemes of spoken Hawaiian. That the English text is rendered largely illegible points to the cultural occlusions and losses the Hawaiian people sustained in the process of colonization. The strokes of ink on the pages are eerily similar to chromosomes under an electron microscope; her cancellation of the letters enacts a "genotypography" of writing systems and the cultural violence that sometimes accompanies their imposition.

Working against the dictate that design should render information "transparent," Bush often insists that her readers make

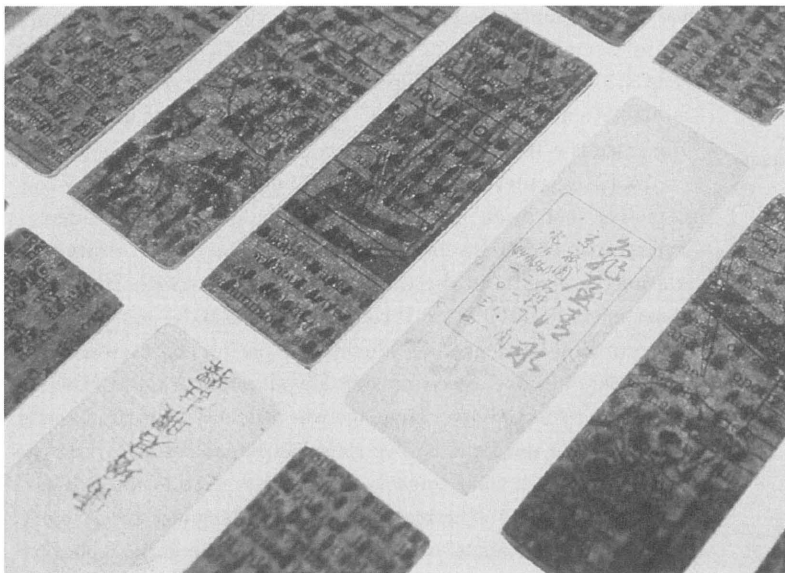


FIGURE 2 detail
 'Type' Specimen, 4 x 4 ft., Mixed Media on a light table, 1998.

an effort to seek out or decipher elements of her designs, to "find their way" into her conceptual way-finding systems. James E. Traue has commented on the use of *blocage* and "masking" to "create suspense" in public exhibitions of materials, like books, that lack a high intrinsic visual appeal. Comparing museum exhibition practices with strategies for merchandizing luxury goods, Traue observes that "What is common to all these techniques—these tricks of the trade, or art of the designer—was the principle of seducing the eye and then proffering a visual reward if the viewer succumbed and moved in the direction indicated by the designer."¹² In the case of Bush's installations, it is not so much a "reward" or a "payoff" of visual delight that viewers receive as a kind of intellectual disturbance, a slight breakdown in the meaning-making apparatus. This moment of crisis, in combination with the very real pleasure derived from the sensuous forms and materials Bush employs, casts viewers into a critical situation that demands a re-vision of the assumptions, predispositions and automatic (hegemonic) responses that accompanied and reinforced their initial seduction.

"Seduction is a key tool for persuasion," Katherine McCoy

12 Traue, James E. 2000. "Seducing the Eye: Contemporary Exhibition Design in France and Italy." *Design Issues* 16.2, 68.

13 McCoy, Katherine. 2000. "Information and Persuasion: Rivals or Partners?" *Design Issues* 16.3, 81.

14 On the role of newspapers in the colonization of Hawai'i and their importance to Native opposition to colonial rule, see Noenoe K. Silva, 2004, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism*. Durham, NC: Duke University Press, especially Chapter 2 "Ka Hoku o ka Pakipika: Emergence of the Native Voice in Print."

has noted. "A graphic design can seduce the reader/viewer into a useful encounter with its message. Seduction initiates the entry step in the communication process, promising a reward for the audience's attention."¹³ If "*Type Specimen* rewards its audience, the prize is a troubling recognition of the cultural and ethical conflicts surrounding print literacy in colonialism. Literacy can certainly "enlighten"—and in fact, by the late nineteenth century Native Hawaiians had become one of the most literate populations per capita in the world, with many Hawaiian-language newspapers in circulation throughout the islands—but it can also be a cultural battleground. During the period represented by the papers in "*Type Specimen*, virtually all publication in Hawaiian ceased and the Hawaiian language was officially banned in island schools.¹⁴ Not until the Native Hawaiian Renaissance of the 1970s did the language start to reclaim a central place in the living culture of Hawai'i. The inclusion of Asian-language newspapers among the "specimens" serves to document the large-scale immigration of Japanese and Chinese workers to the islands' sugar and pineapple plantations, a population shift that paralleled the disenfranchisement and subjugation of the indigenous Hawaiians.

The precise historical and geopolitical specificity of "*Type Specimen* testifies to Bush's awareness of the difficult ethical issues facing designers who work in Hawai'i. Local designers—many of whom are trained in the program in which Bush teaches—have to negotiate their own sensibilities and identities in the face of the tourism industries' demand for sometimes trivializing and demeaning representations of Hawaiian culture. Like *Façade's* engagement with the supposedly empirical data that serves racial categorization and "profiling," "*Type Specimen* alludes to the deep histories that underlie the contemporary cultural stereotypes that commercial design all too often reiterates.

Trust (2002)

TRUST WAS INSTALLED IN THE FIRST HAWAIIAN BANK'S MEZZANINE as part of an exhibition of The Contemporary Museum of Honolulu. Perhaps even more than *Façade*, *Trust* comments directly on its location in a major financial institution. Visitors initially encounter Trust as a billboard-sized rectangular banner suspended in the open atrium of the First Hawaiian Bank Building. The word "TRUST" is emblazoned in sans-serif capitals across the upper third of a richly textured gray-green surface.

A catwalk runs across the well of space in which the piece is mounted and allows visitors to come close enough to touch the work; this use of the existing structures of the bank building to regulate access to *Trust* becomes significant as the visitor comes closer to the banner and the surface reveals itself to be composed entirely of American banknotes—in all, \$5,200 in one-dollar bills.¹⁵

“Is it real?” At the opening of the exhibition in which *Trust* appeared, a number of visitors whispered this question to their companions as they stepped onto the catwalk leading to the work. By then they were well within reach of the money, all crisp new bills, and a whiff of their distinctive inky smell hung in the air, yet they still couldn’t quite trust their senses, stymied, perhaps, by the sheer number of bills and the scale of the 15x25’ work. Once they determined (in some cases by actually stroking the money) that it was, in fact, real money, in a real bank, within easy reach of their fingers, the word “TRUST,” which had first beckoned them to approach what appeared to be a beautifully textured quilt, now loomed over their heads as an admonition (see figure 3).

In one sense, *Trust* reverses the process of reading demanded by *Façade*, in which the text is a fine-grained detail that emerges on closer inspection. Here, the text “TRUST” is the first element to catch the eye, and only as we draw closer to *Trust* do we see that the word is in fact a matrix of smaller elements: one-dollar bills that have been folded to show only the portrait of George Washington. The word “trust” of course echoes the emblem “In God We Trust.” In assembling the word out of the iconic image of a “founding father,” and in a block type that contrasts sharply with the engraved serif fonts that dominate the text on the bills themselves, Bush also calls attention to the often-unexamined iconography of money as a printed document that assumes its power and authority by what amounts to a symbolic fiat.

Slavoj Žizek has identified money as “the sublime object of ideology” *par excellence*: “we know very well that money, like all other material objects, suffers the effects of use, that its material body changes through time,” but we behave, “in the social effectivity of the market,” as though money had an intrinsic, even magical value transcending its materiality.¹⁶ As “the physical representation of a transaction of considerable abstraction and

¹⁵ Correspondence with Anne Bush, 23 May 2005.

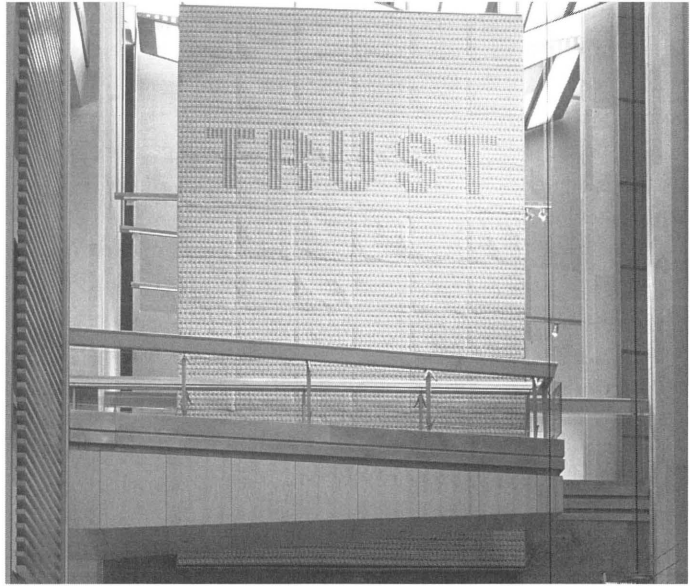


FIGURE 3
Trust, 15 x25 ft. *Mixed media*. The Contemporary Museum at First Hawaiian Bank, Honolulu, HI, Spring 2002

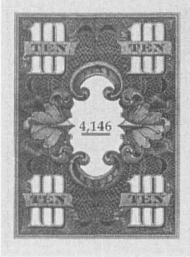


FIGURE 3 details
Trust, 15 x25 ft. *Mixed media*. The Contemporary Museum at First Hawaiian Bank, Honolulu, HI, Spring 2002.

consensus,"¹⁷ the official banknote, "legal tender," exemplifies the role of design in forging concepts that in turn shape social relationships.

This role turns on the analogous functions of currency and sign systems. Like money, "language is an economy of transaction with certain standards based on the context of use. Words are the medium of exchange from which understanding is derived."¹⁸ *Trust* plays out this analogy by accompanying the large banner with a set of six 2.75 x 3" printed cards that visitors may take away with them. Alluding to the functional similarity between ephemera and money, both of which must circulate in society to realize their value, the printing on the front of the cards combines the distinctive typography of American currency with enigmatic numbers and measurements, such as "1/8" and "1,000,000 SF." While *Trust's* large banner of dollar bills clearly comments ironically on the degree to which we think of the cultural value of art in terms of its exchange value in the art market, the information printed on the reverse of these cards extends this commentary to a wider field of social values. The back of the card that reads "1,000,000 SF," for example, bears the message

Between 1992 and 1998 over 1 million square feet of physical plant was added to UH [University of Hawai'i], but no operating support was authorized for new facilities.

EDUCATION - FUTURE PROSPERITY

(think about it in the next election)

With these messages and the direct call to political action, the concept of "trust" expands to include the sense of a "trust fund," a base of support from which individuals and communities can draw, but also a resource that must be protected against mismanagement and misuse. In addition to the funding woes of the University of Hawai'i and the State Department of Education, many local visitors to this exhibition would have had in their minds the scandal over the disastrous management of the Hawai'i-based Kamehameha Schools/Bishop Estates Trust, the largest educational trust in the world, which resulted in the dissolution and reconstitution of the estate's Board of Trustees in 1999. As *Trust's* "collateral," these take-away cards, which also mimic the pamphlets on services the bank offers its customers, are juxtaposed to the fixed banner just as the living values of

16 Slavoj Žižek. 1989. *The Sublime Object of Ideology*. London: Verso, 18.

17 Poggenpohl, Sharon Helmer. 1995. "Between Visual and Digital Tokens: A Look at the Abstraction of Money." *Visible Language* 29:3/4, 266. This issue of *Visible Language* entitled *Money!* is devoted entirely to discussions of design and currency.

18 Poggenpohl, Sharon Helmer, Pragma Chajit Jeamsinkul. 2004. "Language Definition and its Role in Developing a Design Discourse." *Design Studies* 25, 580.

democratic culture, including “trust,” respect, knowledge, literacy and freedom of thought—in short, all the values and skills fostered in a liberal education—are juxtaposed to our society’s foundation on capital. Bush’s exhibit reaffirms the value of that education and at the same time calls into question the sincerity of the lip service our political leaders, and perhaps also many of *Trust*’s visitors, so often give it.

In her critique of the antiquated design of American currency, Sharon Poggenpohl reflects on how “[t]he ideals on which the country imperfectly runs—democracy, free enterprise and equal rights—are visually (and sometimes actually) elusive.”¹⁹ In a sense, the complex system of structures, documents and images that make up *Trust* allows us to visualize that very elusiveness of values: *are they real?* Can they be concretized in physical forms, like money, or do these forms only seduce us into trusting that something of value is “there” when it is not? Do we trust in the surface appearance of tried-and-true symbols before we look more closely to how they have been constructed? In light of such questions, we might imagine other “articles of faith” assembled out of money: the American flag, for example, or the psychoanalyst’s couch, or the Christian cross. In the current American political climate, which combines demands for an unquestioning faith in leadership (and in the power of money to solve problems and resolve conflicts) with widespread illusion and deception in the media, challenges to such blind trust of the sort Bush offers in *Trust* are indispensable.²⁰

Library/Catalogue (2003)

OF ALL HER INSTALLATIONS, *Library/Catalogue*, produced for the Florida State University Art Gallery’s *Design X* exhibition in 2003, speaks most directly to Bush’s commitment to visualizing, spatializing and rendering dynamic the relationships among research, design practice and knowledge production. As one of ten artists invited to contribute work for this retrospective show, Bush choose to display images of her own design projects only in the eight pages she was allotted in the exhibition catalogue and to use the gallery space for a large-scale installation representing the research procedures and thought processes that underlie her final products (see figure 4). As do all of Bush’s installations, *Library/Catalogue* embodies what Foster has described as the “archival impulse” in much contemporary environmental art that

19 Poggenpohl. “Between Visual and Digital Tokens.” 281.

20 In 2003 *Trust* was recognized with awards from the New York Art Director’s Club (Distinctive Merit) and from the American Institute of Graphic Arts’ 365 Annual Competition and Exhibition.

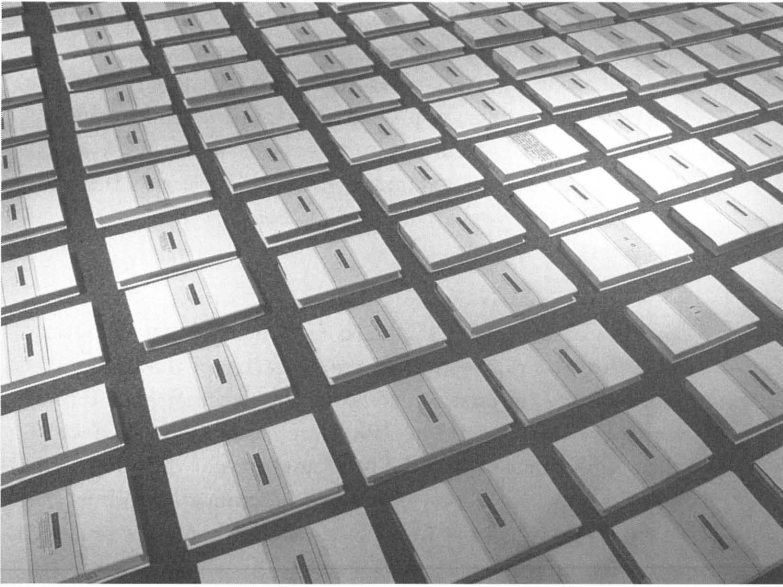


FIGURE 4

Library/Catalogue. *Installation and exhibition catalog pages 20 x 20 ft.*
Mixed media. Florida State University Art Gallery, Tallahassee.

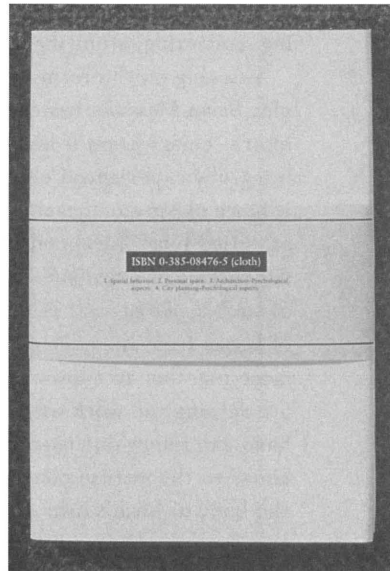
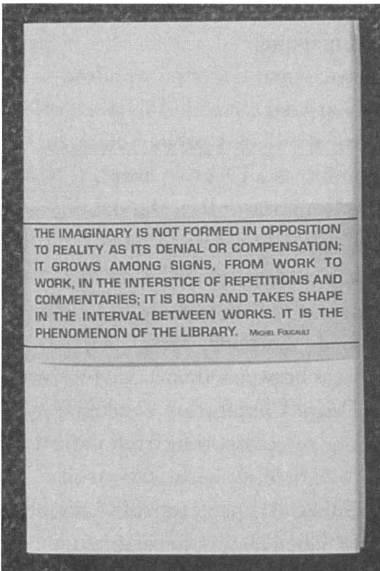


FIGURE 4 detail

Library/Catalogue. *Installation and exhibition catalog pages 20 x 20 ft.*

not only draws on informal archives but produces them as well, and does so in a way that underscores the nature of all archival materials as found yet constructed, factual yet fictive, public yet private. Further, it often arranges these materials according to a quasi-archival logic, a matrix of citation and juxtaposition, and presents them in a quasi-archival architecture, a complex of texts and objects [. . .].²¹

A literal “matrix of citation and juxtaposition,” *Library/Catalogue* is a 20x20’ grid of 430 books from Bush’s personal library which are also represented in the collection of the library at Florida State University. The books are placed directly on the floor. They are covered in plain white paper and labeled with their ISBN numbers and the brief notations of their topic areas derived from the Library of Congress classification system. As in *Façade*, what looks at first like a completely regular sequence is broken up with additional elements. Some of the covers are printed with excerpts from the work of theorists who have been important to Bush’s thinking, such as Michel Foucault, while others offer brief texts that situate Bush’s specific projects within *Library/Catalogue*’s larger constellation of ideas about reading, collecting, archiving and cataloguing.

Drawing on the terms of Deleuze and Guattari’s philosophy, Brian Massumi has recently argued that in effective works of art “composition is less a critical thought project than an integrally experienced emergence. It is a creative event. [...] It is not a closure or framing or subsumption. It is the openness of closed form, form continually running into and out of other dimensions of existence.”²² *Library/Catalogue* provides an example of such a *mise en scène* of a creative event. Surveying this field of books from the edge of the grid (the books are placed too close together to allow any passage between them), visitors who are viewing the work with the *Design X* exhibition catalogue in hand can follow out multiple lines of connection from individual books to theoretical concepts to formal design solutions in the body of Bush’s own work. Unlike the products of academic research, the fruits of designers’ labor almost never include a bibliography of their sources of inspiration; *Library/Catalogue* affords a rare glimpse into a designer’s thought, and the striking size of the exhibit silently but eloquently testifies to the often

21 Foster, Hal. 2004. “An Archival Impulse.” *October* 110, 5.

22 Massumi, Brian. 2002. *Parables for the Virtual: Movement, Affect, Sensation*. Durham, NC: Duke University Press. 174.

unrecognized magnitude of the intellectual effort outstanding design requires. It is significant, too, that this piece appears in an exhibition associated with a university; Bush's commitment to her role as an educator, which was so clear in *Trust*, is reaffirmed in this piece.

Library/Catalogue is also the most personal of Bush's installations; the collection of books represents her own private library. Still, the person is subordinated to the public and the conceptual, in marked contrast with artists' installations that invite intimacy by revealing private details of the artist's life, such as Bob Flanagan's *Visiting Hours* or more recently *My Bed* by British artist Tracy Emin.²³ Bush's work creates intimate spaces by insisting on being read, from up close as well as from a distance; they are the efforts of a critical typographer whose work is grounded in careful research and thoroughgoing critique. *Library/Catalogue*, like all of Bush's installations, is about reading as an act of social as well as personal transformation.

System, Suspension, Seduction

AT FIRST GLANCE, the compelling beauty of Bush's installations derives from their boldly systematic formats: they strike the viewer immediately, even from a significant distance, as stunning grids, series, frameworks, formal arrays. Before the "meaning" of their systems is revealed by a closer inspection of the smaller-scale components, including the incorporated texts, these installations present themselves as systems, as systematic structures. The tension between the large, global frameworks and the small constitutive units creates a space for *suspension*. The viewer is in suspense: the system must mean something, but only by entering it can we understand it. Through the interaction of scales, Bush's work demands not only an approach toward intimacy—this is the condition of its legibility as well as its seduction—but also a stepping-back, a regaining of distance and perspective which constitutes the *critical* moment of their functionality as reflections on design practice.

As a shorthand formula for describing the critical design practice exemplified in Bush's installations, the triad *system-suspension-seduction* does not mark the stages of serial process, the "willing suspension of disbelief"²⁴ that facilitates the reader's seduction by the work of art or, for that matter, the advertisement. For visitors to Bush's installations, system-suspension-

23 Images from Flanagan's 1992 *Visiting Hours* installation at the Santa Monica Museum of Art can be found in the 1995 issue of *Grand Street* 53: *Fetishes*, 65-73. See also Juno, Andrea and V. Vale, editors. 1993. *Bob Flanagan. Supermasochist*. San Francisco: Re/Search Publications. A discussion of Emin's *My Bed*, exhibited in 1998 at the Tate Gallery in London, can be found in Smith, Sidonie and Julia Watson. 2001. "The Rumbled Bed of Autobiography: Extravagant Lives, Extravagant Questions." *Autobiography* 24.1. 1-14.

24 Effective design shares with effective poetry what Samuel Taylor Coleridge famously referred to in his 1817 *Biographia Literaria* as the capacity “to procure for these shadows of imagination that willing suspension of disbelief for the moment, which constitutes poetic faith.”

25 Hansen, Mark. 2004. *New Philosophy for New Media*. Cambridge, MA: MIT Press, 200.

26 Eagleton, Terry. 1991. *Ideology: An Introduction*. London: Verso, 193.

seduction rather graphs an experience of crisis and resolution in which a moment of suspension is *interposed between* their experience of a system and their seduction by that system. Our seduction by the system is itself suspended, and we reflect upon how our knowledge is conditioned by the feature of that system. Each of Bush’s installations “functions by catalyzing a perspectival crisis” of the sort Mark Hansen describes in connection with the sculptural installations of Robert Lazzarini.²⁵ In addition to the embodied, proprioceptive response Hansen privileges in his analysis of new media artworks, however, Bush’s installations continue to engage the viewer’s intellectual capacities at the level of conceptual abstraction: in fact, they *embody*, in their very structures, the processes of abstraction and conceptualization that are at work in the design process, but that are usually hidden in the final product. Moreover, her work interrogates the social and ethical ramifications of design’s abstraction and conceptualization and invites her viewers to join in this interrogation.

“Nobody has ever clapped eyes on an ideological formation,” Terry Eagleton reminds us, “any more than on the Freudian unconscious or a mode of production. The term “ideology” is just a convenient way of categorizing under a single heading a whole lot of different things we do with signs.”²⁶ Occupying a middle register of scale—large enough to contain smaller units, but small enough to stand out as an object unto itself and resist being neutralized within the surrounding environment—Bush’s installations give us a glimpse at least of the processes of systematization that generate ideological formations within culture. As we approach them, we can see their edges, which is not the case with the vast codified systems of communication, transportation and social stratification that shape our lives and to which Bush’s more contained systems allude. These works of design-as-art impose upon the fuzzy but nonetheless powerful systems of race, language, economy and knowledge the same principles of global overview-local detail that designers are called upon to apply to urban transit networks and building floor plans.

The questions Bush’s work stimulates pose themselves in the midst of the “seductive unity of person and machine, sensuality and playfulness, beauty of form and aptness of function” that

facilitates the functionality of design and, at the same time, its capacity to delude and manipulate. Our affective response to beauty-in-utility is an aspect of utility itself, but can also blind us to our own positioning by the design and to the design's structuring of our world so that it—and perhaps also we ourselves—might be *used* in a particular way. "As always," Selle reminds us,

design is the stage and, at the same time, a play within a play that historically is acted on it. The plot is being unfolded constantly in design, with the use of tools and objects as props. The actors on this stage, the prompters, their patrons, and their audience think that they certainly know the roles in this play, but whether they guess what they are playing or what is playing with them seems yet again highly uncertain.²⁷

To break the spell of this seductive, deceptive beauty, it is not enough for a work to announce itself as critical or radical: we have plenty of examples of self-proclaimed radical design. The structure of the work must in some way engage with the conceptual structure of a problem (the problem of design, design as a problem), and its use must trigger a little phenomenological crisis that splits open the experience of use and makes it "critical," reorienting the user to the concept and the problem (the concept as the problem). In each of the four installations discussed above, the dialectical movement from large- to fine-grained perspectives on the total piece directs just such a conceptual reorientation. As we approach any of Bush's installations, we "zoom in" on the details that compose its system and that are in turn organized within the system. Puzzled and intrigued by the ambiguities, contradictions and questions generated by these details, we step back, and the system resolves up through levels of granularity to the stunning global view that first caught our eye, but now we know more about it, and perhaps we "know better."

Poggenpohl, Chayutshakij and Jeamsinkul have recently argued that with the possible exception of architecture the field of design as a whole "does not have a strong tradition of reflective or critical writing, perhaps because much design knowledge is tacit and formalizing this knowledge through language is difficult."²⁸ Without discounting the crucial value of a

27 Selle, "Untimely Opinions," 240-241.

28 Poggenpohl, Sharon, Praima Chayutsahaki and Chujit Jeamsinkul, "Language Definition," 588.

well-developed theoretical discourse on design, we might look to projects such as Bush's to see how, in addition to the verbal meta-discourses of theory and manifestos, designers formalize their profession's "language," its problem-solving processes of abstraction and conceptualization, in *designed things*. In design practice itself, the "native" language of designers, we find a variety of critical design practices that are articulated through design. In finding the words with which to explore this work and rearticulate its critical contributions, design theorists, critics and historians will in turn contribute to the linguistic, rhetorical and conceptual foundation of design theory.

In many respects Bush's pieces are about "finding the words." It is not only that she often plays with dialectics of revelation and concealment, placing the typographic components of her installations in the finer-grained dimensions of the work; it is that in confronting her viewers with complex and dynamic visual and spatial concepts, Bush challenges them to step back and articulate the *meaning* of her installations, to find the words for the intellectual, ethical and political insights that emerge in the experience of viewing. As tangible outcomes of a designer's research as well as occasions for learning and reflection on the part of viewers, initiatives such as Bush's installations—ultimately no freer from the demands of functionality than are commercial projects, but operating according to a different creative brief—afford designers a space for exploring a discourse *within* the visual, spatial, chromatic and typographic vocabularies of design that will allow the wider design community, its critics, theorists, designers and possibly also its clients, to find the words, and, more important, the concepts, for a more productive and progressive critical practice.

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Visible Language 40.2
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Rhode Island School of Design
Providence, Rhode Island 02903

ABSTRACT

Starting with the brush as the common instrument for rendering both word and picture, the paper outlines various visual characteristics of Japanese script. It also demonstrates how combinations of words and pictures have been used interchangeably and occupied the same space in every form of Japanese creative production—from story writing to advertising. These characteristics are shown to have encouraged leading novelists to think graphically and artists to think textually. Finally, it reflects on this Japanese condition to question the commonly held view that there is a clear divide between script and picture.

"Japanese culture is primarily visual, not verbal." — Masao Miyoshi (1974, p. xv)

Between Script and Pictures in Japan

Barrie Shelton and Emiko Okayama

EVER SINCE SAUSSURE AND THE RISE OF MODERN LINGUISTICS, research in the field has emphasized the spoken over the written aspect of language. Viewed mostly as a means of transcribing speech (and therefore as a secondary form of language) the main concerns about writing have been phonological. This approach to language may be the natural outcome of a discipline that arose from within the confines of the Indo-European family of languages—and particularly from within the confines of alphabetic transcription.

It seems far less appropriate to apply this view to those Eastern languages that have shared Chinese characters of pictographic and ideographic origins—*kanji* to the Japanese. In these languages the phonological representation is neither the only, nor primary, function. It is only a *part* of the language and the other aspect, *visual representation*, is also a key component. This is reflected in the ways that the territories of writing and pictures have overlapped in the China-influenced Eastern cultures, having been most pronounced in Japan. Indeed, one might say that word and picture are simply part of a continuum where there are no distinct boundaries.

It would be unfair however to point only to the twentieth century and, even more misleading, to Saussure when commenting on the West's phonocentric bias. It is the view of Hasumi Shigehiko (1980, 138–142) that phonocentrism is but a reflection of a system of thought that has governed Western theological and theoretical history for at least two millennia; and it is in linguistics where this is most apparent. Indeed, for both Plato and Aristotle, writing was just a representation of speech: 'written words are the signs of words spoken' wrote Aristotle (Harris, 1986, 26).

In Japan however, writing and speech enjoyed considerable autonomy until the late nineteenth century "almost to the extent of there being two distinct stages of linguistic development" (Miyoshi, 1974, viii). In such a situation, the idea of writing as being a mere shadow of the spoken word is not applicable. Put simply, people did not write as they spoke. Miyoshi (1974, 10) speculates that written documents were "meant primarily to be read silently, not read aloud or heard." Further, he linked this to the visual nature of Chinese ideograms as a writing system: for "it is quite possible for the speaker of Japanese to recognize the rough meaning of a given ideogram without knowing for certain how to pronounce it" (Miyoshi, 1974, 23). Characters speak to the eye without articulation of sound, similar to pictures. Indeed character recognition precipitates right hemisphere brain activity in the manner of pictures.

In contrast, words and pictures have occupied different territories in the West since antiquity. According to the Bible (Deuteronomy) a man would be cursed if he engraved an image of the Lord, but was able to engrave words *ad infinitum*. Until

Modern times the only significant Western incursion of the picture into writing was in the Early Christian illuminated manuscripts but, as the name implies, it was a mostly a case of pictorial elements illuminating or decorating words. That is, it was more a matter of pictures beautifying the Word than one of words and pictures occupying the very same space on equal terms with true equality of presence and meaning.

It is no coincidence that, in the West, cinematographers were among the first to appreciate the power of Chinese characters to evoke image. Both Sergei Eisenstein and John Sturges were not only acutely aware of the nature of *kanji* but also of Japanese syntax. They likened cinematic representation to ideographic language citing their direct appeal to the eye without the medium of the sound (Yamaguchi, 1987, 111). Eisenstein even attributed his appreciation of montage to the nature of Chinese characters (Schodt, 1986, 25).

It is also no coincidence that a single instrument, namely the brush, has been used for both painting pictures and writing text in the East, whereas two very different instruments (brush and stylus) have been employed for the two forms of expression in the West. It was the (Japanese) brush's perpendicular suspension in the volume of the air and its capacity to 'glide, jump and twist' in any direction for both picture and text that so fascinated Roland Barthes (Jean, 1992, 182). The soft brush with its loose multidirectional capacity stands in marked contrast to the hard stylus or pen that was designed to scratch away repeatedly in lines across the Western page.

In the East, calligraphy and painting hang alongside each other and, as a matter of course, are part of the same graphic compositions. It reflects a cultural eye that does not differentiate sharply between script and picture. And this is nowhere more apparent than in Japan where they are mixed freely and appear commonly in hybrid forms. Further, this is not a modern phenomenon but a centuries-old tradition. Seamless combinations of script and picture have invaded every form of creative production for centuries—poetry, novels, painting, theater, print-making, *manga*, advertising, etc. such that the two rarely exist in what might be termed their pure forms.

This paper will show that novels have been produced to be seen, and pictures to be read. It is an exploration of these

FIGURE 1

Evolution of a compound *Kanji*.

phenomena, and of the characteristics of both *kanji* and Japanese language that suggests that script is much more than phonological representation, and the boundaries between script and picture are far less distinct than many would like us to believe.

Visual Dimensions of Japanese Writing

Kanji—Chinese backcloth

THE FORM OF KANJI AND THEIR COMPONENTS are derived from pictures. They commenced as cartoon-like drawings that captured the essence of an object with minimum structural lines to give realistic representation. Sometimes the drawing was to represent directly the object (pictograph) and sometimes an idea associated with the object (ideograph). Later, these 'graphs' underwent further stylization into squarer forms. Also, two or more were combined with each other to make more complex ideographs: this meant compacting and juxtaposing the originals into the same square area that each of the originals had occupied previously on its own. Further, unlike views were often juxtaposed in the same 'picture.' For instance the character for thunder (雷) combines those for rain (雨) and field (田): the former shows a cloud with raindrops in elevation while the latter shows fields in plan (see figure 1).

It was a process more akin to montage in art than to the stringing together of letters of an alphabet to represent sounds in words. This difference is reinforced by the fact that it is the brain's right hemisphere that is activated for the recognition of *kanji*—the same as for visual and spatial tasks such as picture recognition. For alphabet users it is the left side and language functions that go together.

In addition, each character was conceived within the area of a square and given a balance around an invisible center.

And it had independent meaning. All of these qualities endowed characters with powerful and independent (picto- and ideo-) graphic forms.

However, there were at least two major ways of forming compound characters. One, as already indicated, was to combine two or more existing pictographs or ideographs into more complex ones. In other words each graph would be taken for its semantic value and the new association would generate a new meaning in compound form—as with thunder above (雷). The second was where the semantic value of one character (known as a radical) was combined with the phonetic value of another to give a new character with new meaning. For example, 人, meaning ‘man,’ was combined with 足, pronounced *soku*, to make 促, meaning ‘to urge’ and pronounced *soku* as in the original character: 足 meant ‘foot’ but is not directly related to the new meaning.

It is here that linguists turn to the first comprehensive Chinese dictionary of characters, the *Shuowen jiezi* written by Xu Shen in (A.D.121) to suggest that Chinese (and in turn Japanese) writing is essentially phonetic. For out of 9,353 characters listed in the dictionary, pictographs number only 364 or four percent of the whole. Indeed the majority of *kanji* (eighty-two percent) were shown to be combinations of radical and phonetic parts. This method of generating a new *kanji* revolutionized the Chinese writing system and their number increased dramatically. By 1722, a dictionary commissioned by the Chinese Emperor of the time lists over 42 thousand *kanji*.

As Shirakawa (1999, 13) has noted, the *kanji* system reinvented itself by incorporating previously pictographic elements within new compound characters for phonetic purposes. But far from interpreting this as some kind of conversion to a phonetic system, he viewed it as strengthening the pictographic system by extension into new territory. Clearly, the change was drawn-out and only partial—more partial than most scholars seem willing to recognize. In fact, it is quite misleading to suggest that Chinese is a phonetic language because of the dominance of these radical-phonetic compounds. Even when a character is a radical-phonetic compound, a component of pictographic or ideographic origin remains with a high measure of semantic association—that is, bearing strong pictorial clues to meaning.

Within the so-called radical-phonetic category of compounds, some groups of characters share phonetic components that give them their sounds *and* convey meanings. For example, 包 originally meant *to wrap*: in compounds such as 抱 (to hug) and 胞 (membrane): both are pronounced *hou*: thus 包 has the association with ‘wrapping around’ as well as representing the sound, *hou*.

Distinguished Japanese scholar of Chinese, Todo Akiyasu (1962, 33-36), offers many such examples. Further, he groups his examples according to the meaning of their common phonetic components. For example, *sho* (状), *sho* (将) and *sho* (牆) meaning a long-bodied dog, middle finger and long storehouse respectively, all gain their sound from the phonetic, *sho* (seen consistently as the left-hand component of the three characters). However, this nominal phonetic also attributes a common meaning to all three characters (and others too) for they all fall into the category of long thin things—which is a category related primarily to the object’s visual or physical characteristics.

Thus, to elevate the phonetic value at the expense of the semantic is altogether too hasty and simplistic. Even when components are identified for their phonetic function, they are rarely free from meaning for that was also a factor in their selection and they cannot escape their image-rendering origins.

What was also crucial to Chinese writing was the coexistence of the visual and the verbal in each and every element of the system—namely, in each character. It was made up of autonomous entities of more or less the same value—like a building made entirely out of the same sized blocks. This kind of writing reflected a language (Old Chinese) that was monosyllabic and isolating. The mechanism of allocating one *kanji* for one word was entirely suited to this. Grammatical functions were expressed directly through word order: the same *kanji* could be a noun, verb, adjective or adverb depending simply on its position in a sentence (Sakai, 1991, 227). This was not so in Japan.

Kanji in Japan

ASPECTS OF CHINESE CULTURE, *kanji* included, started to travel via the Korean peninsula to Japan by the Fifth Century. When the Japanese started to write their native language with *kanji* some two hundred years later, writing took another turn, for

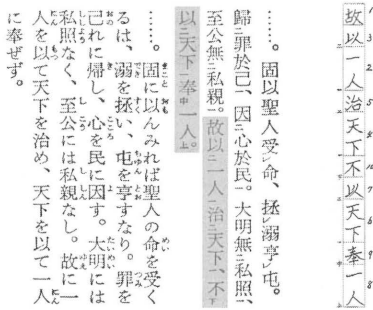


FIGURE 2

An example of Chinese text (center right) and its transcription by the addition of *waku* (left). The far right-hand column shows the non-sequential order by which the Chinese characters within the shaded columns would have been read by the Japanese reader.

Japanese is not monosyllabic. It is inflected and agglutinative. When adapting Chinese writing for the transcription of Japanese, grammatical terms and inflections had to be added to the text.

An important and fascinating aspect of this is that the Chinese word order would remain unchanged on the page, but the words were read in the order of Japanese speech, the two being quite different. This transformation from text to speech was made possible through the use of annotations (or *waku*) that were added to the Chinese text. Of special interest here is the numbering system (*kaeriten*) that indicated reading order. Also Japanese particles (e.g., *te*, *ni*, *o* and *ha*) and auxiliary verbs (e.g., *nari*, *tari* and *keri*) were sometimes added. The Chinese textual structure remained visually unchanged while the *waku* disturbed this linear order the moment the text was vocalized in Japanese. The reader's eye was obliged to hop back and forth amongst the *kanji* irrespective of their order upon the page. Thus 'the given linear order was destroyed' (Sakai, 1991, 227) and the linear synchrony between voice and eye was lost. Not only were there pictographic and ideographic components to look at, but the eye was starting to jump about the page—more in the manner of a picture (see figure 2).

Also, when the particles and auxiliaries were not added, which was often the case, the reader had to insert these as the text was read following the numbering marks. This is in fact a form of translation, as many scholars have noted. It is however not viewed as translation by most Japanese, for the original Chinese text is not altered if one can ignore the small print

FIGURE 3

Origins of Kana.

In modern Japan, *katakana* is used primarily for representing foreign words, while *hiragana* is used for Japanese words not covered by *kanji*, clarifying *kanji* pronunciation where necessary and for certain grammatical functions.

kunten marks added on the either left or right bottom corner of *kanji*: “the foreignness of the Chinese language is disguised by being familiarized into the already established mode of conceptualization” (Sakai, 1991, 227) with Japanese annotations.

It is likely that it was the need for this supplementary annotation that gave rise to Japan’s two phonetic scripts that were well established by the middle of the Tenth Century. Each script consists of fifty-one characters representing the same fifty-one syllabic sounds. While one is a squarish script (*katakana*) derived from fragments of *kanji*, the other is a more curvaceous stylized form (*hiragana*) of *kanji* selected similarly for their sounds. The appearance of these two systems did not however displace *kanji*. To the contrary, *kanji* remained at the core of the writing system, but was supplemented by the two *kana* scripts (see figure 3), each having taken on a niche role within the modern text.¹

Visually, the more angular qualities of *katakana* contrast with the flowing curves of *hiragana*, and as fragments and abstractions of more complex *kanji*, both sit lightly on the page when compared with most *kanji*. Typically the written or printed surface in Japan is a mix of all of three sets of characters—simple square and curvilinear abstractions representing sounds and usually denser characters of pictographic and ideographic origins, sometimes consisting of more than twenty strokes. In effect, it is this *surface of interposed scripts* with different graphic qualities that offer real opportunity for even novelists to think graphically and artists to think textually. It is a situation that seems as natural to a Japanese as it appears strange to most foreigners.

This mix of borrowed and homegrown scripts has led to some intriguing relationships between text and eye—well illustrated

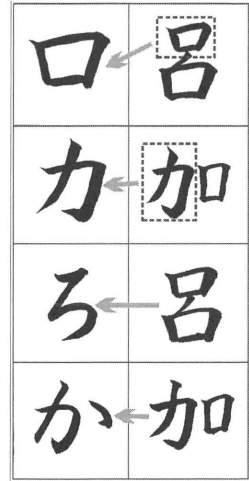




FIGURE 4

Unvoiced communication in *Manga* (Source: *Kiro Densetsu*)

by the common practice of *monzen-yomi* in Eighteenth Century Japan. It was an era when education would have been considered incomplete without the reading of Chinese classics and *monzen-yomi* was a method of reading these. A student was presented with a text written in the original Chinese (entirely *kanji*) script. When reading aloud they read short pieces first in (Chinese) *on* and then repeated these in (Japanese) *kun*. The *on* version would have provided sound but not necessarily meaning. The *kun* version would have given Japanese sound plus substantial though not precise meaning to the listener for the sound alone would have been insufficient to generate clear images without *kanji*.

The example of *monzen-yomi* with its multiple (sound) readings is an indicator of the complexity and distance between written text, sound and meaning. Much contemporary art and literary expression feeds off these rich traditions. For instance, unvoiced communication in *manga* uses geometric symbols (including the underlying geometries of various *kanji*) and unorthodox characters to powerful effect. In the example shown here, there are symbols '○△□!' upon the page (see figure 4) that represent no particular sound but which are nevertheless understood by the reader.

FIGURE 5

This extract from a *Shinwa Shoken* advertisement (1994) shows a pictorial variation on the character *hashiru*, meaning 'to run.'



FIGURE 6

Realism substitutes for abstraction in one component of a compound character in this poster fragment. (Source: *Encyclopedia of the Japanese Language*. Tokyo: Taishukan 1988).



The many characteristics of Japanese script introduced above (and more) facilitate and encourage its easy extension into the pictorial domain and vice-versa. They include the strongly stylized nature of the script's characters and their related pictographic and ideographic origins; their semantic independence; their montage composition; the mixing of phonetic and other types of character on the same page; their graphic power; their geometry and placement within the square (as opposed to on or between lines); and the experience of non-linear and multidirectional arrangements.

When in Japan, the constant 'slipping' between words and pictures is always evident—in paintings and prints, on pottery and lacquer work, in newspapers and magazines, on packaging, in advertising, in poetry, in fact just about everywhere. It is a prominent part of the nation's culture.



FIGURE 7

This 1855 print shows the *kanji*, *Taira*, as the central object of the picture.

Script and Pictures

FOR THE WRITER USING A RANGE OF CHARACTERS whose elements are composed of pictographic components, the temptation to slip into greater realism is always present in a way that escapes the user of McLuhan's (1987, 81) 'semantically meaningless letters' representing 'semantically meaningless sounds.' And conversely, for the artist who has learned the pictographic and ideographic origins of *kanji*, the pull towards stylization when making pictures is likewise strong, and even the inclination to substitute characters for objects in the picture.

In art and advertising, the extension of *kanji* into more realistic forms is commonplace. For instance, the racy character depicted in figure 5 is a transformation of *hashiru* (走) meaning 'to run' in a modern investment advertisement.

Because characters are often in compound montage form, realistic transformations may not always extend to a whole character but for a component only. An example is the 'shell' 貝 component of the word 賞 meaning 'prize' as it appeared in a banking poster designed to attract the attention of inquisitive young minds (see figure 6).

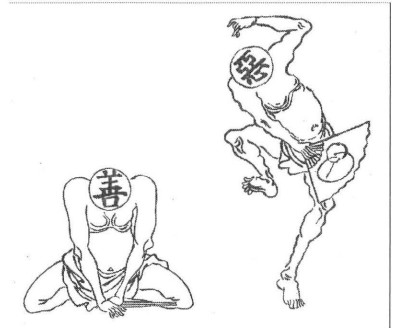
FIGURE 8

Hiroshige's 1857 print of 'Tsukudajima Sumiyoshi Festival' has a script-bearing banner dominating the scene.



FIGURE 9

Figures with *kanji* faces representing good and evil from Santo Kyoden's *Shingaku hayasome kusa*, originally published in 1790.



The Japanese examples are very different from the type of picture substitution for alphabet words we sometimes see in children's English books. In the latter case, replacement is one of kind but in the Japanese case, one of degree. In other words, the original characters and the shell and running figure substitutes are simply variations on a scale of pictorial abstraction.

The next figure shows yet another phenomenon: namely, the introduction of characters into a picture—in this case a singular character as a featured object. In this mid-nineteenth century print, *Taira no tatemai* ('Erecting *taira*'), it is the character for peace 平 (*taira*) that stands boldly as the towering central object of the picture, as humans scramble over and around it in the process of erection (see figure 7).

In Hiroshige's print, 'Sumiyoshi Festival, Tsukudajima' it is a huge banner bearing both ancient and modern text that bisects the picture and steals the show as the main clue to place, event and identity. Without this text-bearing feature, the scene would be ordinary to say the least (*see figure 8*).

In the eighteenth century illustrated story, *Shingaku haya-some kusa* (1790), *kanji* make their appearance in yet another way. Circles containing a single *kanji* indicating the qualities behind 'the masks': 'evil' and 'goodness' represent the faces of the figures. In the story, evil and goodness compete to exert influence upon the story's central character (*see figure 9*).

Displayed in a somber corner of the Tokyo's National Museum is Japan's best-known Maki-e writing box. It bears a poem from which two characters for boat bridge 舟橋 (*funa-bashi*) are omitted: The omission results not from carelessness but from an assumption that the characters are superfluous as the bridge is already present on the lid of the box in pictorial relief. In other words, pictures and words are inter-changeable.

Known for his acute visual sensibility, one of Japan's best-known novelists, Tanizaki Junichiro, wrote about the visual qualities of Japanese writing and applied this appreciation to visual effect. An example is *Mohmoku monogatari* (The story of a blind man) of 1931. For the text depicting the blind man's movement and sensing of the light, the sparser and more abstract *kana* is used: but where objects are encountered and touched to reveal shape, texture and meaning, *kanji* appears on the page. In other words, the text exploits the contrasting visual qualities of the phonetic and pictographic scripts. Where place is indistinct and the experience is essentially that of light, shade and atmosphere, the page is lightly covered (presenting a kind of mistiness), but where there are objects to be encountered, then the more powerfully graphic and usually denser *kanji* appear (introducing a sort of tangibility). It is perhaps slightly ironic that the author's script should drift more into the phonetic mode to enhance the pictographic effect—but it is in such contradictions that the graphic capacity of the script lies. *Kanji* are also used sparingly and at strategic places in *Ashikari* (Reed Harvesting, 1932). And in *Kagi* (The Key, 1956) which consists of the alternating entries of a couple's diary, the husband's are in angular *katakana* and *kanji* while the wife's are in the more rounded

z It is significant that there is a similar sound, *kaku*, for both 'to paint' and 'to write' in Japanese, although the characters are different. Similarly there has been a common instrument, the brush, for both tasks.



FIGURE 10

Calligraphy: toro or mantis by Nishikawa Tasushi (Courtesy: Nishikawa Kyotaro)

hiragana and *kanji*, emphasizing masculine and feminine sensibilities.

Thus Tanizaki was not merely an author, writing texts to be read but also (at one and the same time) to be seen! The writer's eye is not merely scripting the text for the purpose of description but shaping it into abstract pictorial form—an aesthetic-cum-pictorial reinforcement of the text.

Like most educated Japanese of his age, Tanizaki was skilled in the art of calligraphy. And in Japan, unlike China, this is the field in which any distance between word and picture can really disappear.² A painter or calligrapher may freely use words and pictures in the same composition, superimpose one upon the other, or indeed fuse word and picture as one. From a pictorial view (*figure 10*), there is in essence little difference between the levels of abstraction in Nishikawa's calligraphic mantis 螳螂 (*toro*) and say, the line paintings of Paul Klee such as 'Sportswoman' or 'Blue Fruit.' But in the case of the mantis, one can genuinely question whether what we see is a picture or writing and validly answer that it is 'both.' And there is incidentally, even less difference between some of the early versions of Chinese characters and Klee's line figures.

In fact, Japan has a long history of picture novels where words and pictures occupied the same graphic space—not separated by borders as has been usual in the West, but where images as a matter of course combined pictures and words. In late eighteenth and early nineteenth century Edo, literacy levels were high by the standards of the time with booksellers and lenders a common sight across the city. At the time, most reading



FIGURE 11

A typical cover of the children's magazine, *Tanoshii Yochien* (No. 10, 1995).

involved picture novels and stories (or *eiri shosetsu*). According to Nozaki (1927, 146), the common approach to reading these works was to first scan the pictures and so glean the main story: a second reading of the text would follow to elaborate on the first-round of predominantly pictorial interpretation. Indeed, they may be better described as pictures with elaborate annotations where the latter might even form a vital part of the picture—as with the earlier cited bodies sporting good and evil *kanji* faces.

In the early modern period there was a decline of the picture novel. This is mainly attributed to the changing nature of print technology that favored words at the expense of pictures, but this may have also been under the influence of the Western novel. The picture-novel tradition was however too strong to wither, and was sustained in *manga* form. Real revival came with

yet further technological change by way of the computer and digital imaging. The collage, multidirectional, mixed system and related traditions surface in today's stunning graphics that we associate with Japan's *manga* and *anime* productions.

Indeed the graphic diet upon which young Japanese visual sensibilities are nourished is staggering. Pre-school comics such as *Tanoshii Yochien* produce perhaps the most intricate and densest magazine covers found anywhere. Words, pictures and hybrid forms litter their surfaces with no dominant center and no obvious periphery. They exemplify the surface that privileges neither word nor picture within collage forms that embrace mixed texts, multiple directions and so on. They are *read* not by linear progression, but random scanning as in a mixed mosaic or map. They are not completed in one reading, but returned to again and again for more detailed inspection (*see figure 11*), and each time explored by a different route or series of helicopter-like 'landings.'

Conclusion

WRITTEN JAPANESE IS A UNIQUE SCRIPT that results from an unusual history and experience. Consisting of a mix of characters of phonetic and picto-ideo-graphic origins, the further mixing of script and pictures is but a natural extension of the writing system and this has occurred in many and fascinating ways. With elements of montage and collage embedded within individual characters and across the wider script, it seems that there is a readiness by its users to further embrace the mixing of pictures and script and fragments thereof on a grand scale. Further, the distance between writing and speech in Japan has often been wide and always elastic.

In Japan, the boundaries between script and picture are clearly blurred, and the connections between speech, script and meaning are both looser and more complex than in the West. The linguistic history of Japanese reveals an unusual evolution of a script, and an equally unusual relationship between words and pictures that raise a range of important issues and questions.

It is suggested that it may be far more useful to view script and pictures as part of a continuum rather than in some kind of binary opposition. Further, the view that the 'meaning-sound-written word' relationship is a simple linear construct with

script as the subordinate is quite unsatisfactory. The view of the world as seen through the alphabet spectacles of Bloomfield in which written words provide 'mere memory tags which help to capture and record evanescent vocal sounds uttered in human speech' (quoted in Suzuki 1977, 408) does not embrace Japanese. It is a view that is questioned implicitly or explicitly by many Japanese including Hasumi (1980), Miyoshi (1974) and Shirakawa (1999), all quoted here. Such work deserves wider attention, but tends unfortunately to bypass Western readers as comparatively little is written in English or available in translation. Such examples indicate both the distance between sound, meaning and script, and the preoccupation with the visual-aesthetic dimension of writing.

If Shelton's (1999) work on script and built form is any indication, more attention to the spatial and related visual dimensions of writing can open up new avenues for exploration. He suggests that there are consistent spatial patterns and related visual characteristics that cross the boundaries of Japanese script, painting, buildings and even cities. If he is right, it raises the question of whether and how much the visual dimensions of the writing system we learn, influence our wider sensibilities? After all, writing and cities emerged at the same time in history, and are viewed inseparably as hallmarks of civilization. It would seem that the nature of Chinese and particularly Japanese scripts requires both the designer's or artist's eye as well as the linguist's ear to be more fully comprehended and restore a more balanced appreciation.

In the West, Roy Harris is a scholar who has shed a good deal more light on the vexed issue of writing and pictures than most. He has been an arch-critic of the phonological bias in linguistics and champion of a view that shows writing to be independent of, albeit commonly inter-related with speech, and therefore possessing equality with it. He also points out that there are cultures that have had a single word for writing and drawing. Indeed, that writing was originally a term that meant 'the process of scoring or outlining a shape on a surface' (that is, one that could include writing and drawing) and that this definition survived even in English until at least five hundred years ago (Harris, 1986, 29). At the end of his book, *The Origin of Writing*, he says that it would be wrong to

force what he terms a 'Bayeux Tapestry interpretation' (where writing and script are seen to co-exist) upon examples from civilizations that may not have made our distinction between 'the scriptorial and pictorial'—for instance, on the pre- (European) Conquest Mixtec codices of Central America (Harris, 1986, 150).

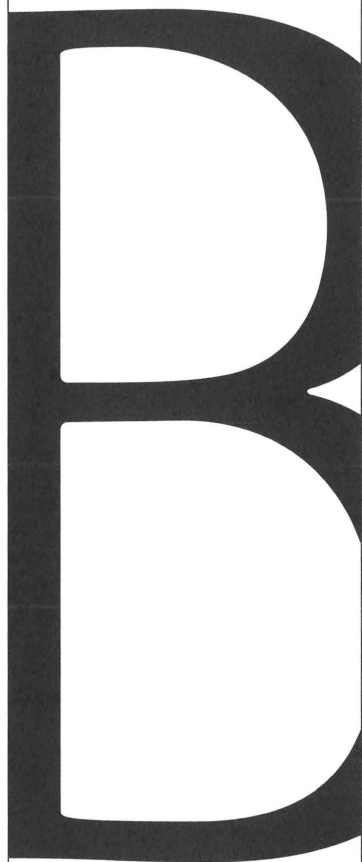
We cannot help but ask if the Western preoccupation with writing as phonetic expression is simply an outcome of a discipline that has grown largely within the confines of alphabetic, that is phonological, transcription? Further, how much does this narrow phonocentric experience hinder the Western eye from appreciating the many pictorial dimensions of a writing system from a 'more visual than verbal' culture with very different word-picture horizons?

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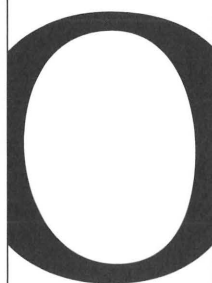
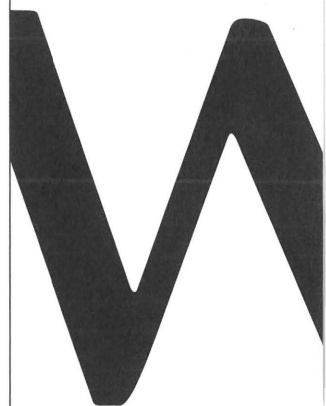
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A large, bold, black letter 'B' is positioned on the left side of the page. It is contained within a vertical line that runs from the top to the bottom of the page. The letter is a classic serif font with a thick stroke.

Advancing
Icon Design
for Global
Non Verbal
Communication:

A large, bold, black letter 'O' is positioned in the middle of the page. It is contained within a vertical line that runs from the top to the bottom of the page. The letter is a classic serif font with a thick stroke.A large, bold, black letter 'W' is positioned on the right side of the page. It is contained within a vertical line that runs from the top to the bottom of the page. The letter is a classic serif font with a thick stroke.

*Or What Does the
Word Bow Mean?*

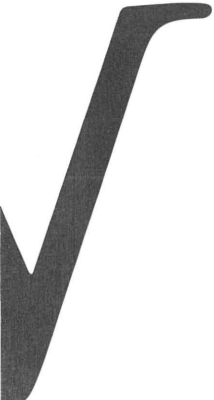
Advancing Icon Design for Global Non Verbal Communication: *Or What Does the Word Bow Mean?*

Mike Zender

ABSTRACT

Written language is limited in effectiveness to those who can read. Verbal language is effective only for those who understand the particular language being spoken. But everyone, except those with obvious visual impairment, can effectively perceive images without regard for literacy or language. For decades these realities have suggested the promise of a universal visual language but with little real result. The occasional Olympic event sign or restroom door sign are state of the art for global non-verbal communication. While icon design has evolved little since the 1970's, the world has moved on. Increasing economic globalization and the expansion of global communication networks have made it easier to deliver messages and more important to do so, while science has advanced understanding of perception and cognition establishing principles only speculated about in the 1970's. The dream of using images to greatly facilitate global communication persists. Unfortunately, image-based communication is not currently well enough informed by principles of effectiveness to attempt such a project.

To address this problem a team of researchers assembled at the University of Cincinnati to explore the development of advanced techniques for global non-verbal or image based communication. The team explored novel approaches and identified several principles designed to expand icon based communication so that it can communicate more complex messages and more abstract concepts with greater specificity than previously.



University of Cincinnati
Visible Language 40.2
Zender, 177-206

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Providence, Rhode Island 02903

bow

What does the word “bow” mean? Several things, but the most accurate answer is it depends on the context.

To illustrate:

shoe | bow

ship | bow

arrow | bow

rain | bow

take a | bow

bow | down

IN EACH OF THE ABOVE PAIRS SOMETHING SPARKS a different meaning for the single typographic sign: “bow.” That something is simply another sign, a context. In some pairs the context sparks a meaning that is only subtly different, no doubt in homage to the vagaries of linguistic etymology, but in other instances the context spotlights a meaning that is a different part of speech altogether, a verb instead of a noun for example. In each case context is what illumines the meaning (Wittgenstein, 1961 [1921]). This is as true for sentences and stories as it is for words (Wright, 1992). Unfortunately, written language though rich in context is limited in effectiveness to those who can read. Even verbal language is effective only for those who understand the particular language being spoken. But everyone, except those with obvious visual impairment, can understand images without regard for literacy or language. Donis A. Dondis even goes so far as to claim “Among illiterate constituencies, visual communication’s effectiveness is undisputed” (Dondis, 1973). From street signs to Olympic venues, images communicate where words fail.

What exactly does the icon of a man mean? Again, it appears to depend in part on the context:

street sign | human icon

park sign | human icon

airport door sign | human icon

(left to right Figure 1 below)

The visual changes in the human icons are minimal and fairly subtle yet, in their context, viewers from all over the world have 'read' these icons as meaning specific and very different things: a crosswalk, a hiking trail, a restroom. In a park context adding two additional strokes to the man icon suggests a backpack and walking stick. The park context combined with two immediate iconic clues redefine the 'crosswalk' icon to a hiking trail icon. Like words, the overall context of the human icon changes its meaning. This is an impressive transformation accomplished with an economy of means.

However, as successful as these icons are in their contexts, they are not as comprehensive or as definitive as words. The system from which the hiking icon came has no icon for 'pleasant hiking trail' or 'difficult hiking trail' or even 'dangerous hiking trail.' Complex messages that include specific modifiers or actions or states of being are not generally communicated in current icon systems. One standard icon system, published by the American Institute of Graphic Arts (AIGA) and United States Department of Transportation (US DOT), consists of fifty icons. That's a good number but it's not enough of a vocabulary for communicating complex messages. More comprehensive attempts at developing universal systems of communication such as Isotype and Esperanto, are widely regarded as having failed (Lupton, 1989). Apparently the sophisticated role context plays



FIGURE 1

in linguistic communication has not been successfully duplicated in visual communication.

How can the inadequacies of communicating with icons be overcome? What role does context play in causing a viewer to read a 'walking man' icon as 'crosswalk' not 'hiking trail?'

Would placing the restroom man icon on the yellow background of a street sign context change the reading (*figure 2*)? How much of any reading change that results from the new context is learned? Is any part of altered meaning, the color yellow for example, a change that is integral to human perception and cognition rather than learned? How do more abstract elements, such as the rectangular containing shape standing on its corner and the linear border, interact with the more literal element of the man icon to suggest meaning? How can the icon be refined to express complex messages such as abstract concepts, states of being or processes? These are some of the questions addressed by the research on which this paper reports.

Context: a Strategy for Building Sophisticated Message

CONTEXT'S ABILITY TO CHANGE THE MEANING OF WORDS made it an attractive field in which to search for answers to visual communication questions. Perceptual psychologist Rudolf Arnheim (1969) affirmed that everything is affected by context, "The mind meets here, at an elementary level, a first instance of the general cognitive problem that arises because everything in this world presents itself in context and is modulated by that context." Arnheim goes on to say that because everything is af-



FIGURE 2

affected by its context, to understand how an object is perceived you can either abstract it by removing it from its context or you can analyze both the object and its context.

The object under consideration must, then, be abstracted from its context. This can be done in two fundamentally different ways. The observer may wish to peel off the context in order to obtain the object as it is and as it behaves by itself, as though it existed in complete isolation. This may seem to be the only possible way of performing an abstraction. However, the observer may wish to find out about the object by observing

all the changes it undergoes and induces because of its place and function in its setting. Here the abstraction, while singling out the object, does not relinquish the effects of the context but relies on them for an indispensable part of the information.

Communication designers in the past have followed the first part of Arnheim's advice and abstracted the object primarily by peeling it from its context. In the AIGA/US DOT symbol/sign system and other similar systems, the context is erased by limiting iconic signs to an object on a plain, unadorned, blank background (see analysis below). This effectively isolates the object from its context. But as Arnheim goes on to say, this is not the only means of abstracting an object. What Arnheim implies above and goes on to say subsequently is that by retaining context additional communication potential is also retained. Designers who wish to develop more robust icons might follow the later part of Arnheim's statement and focus on expanding rather than limiting context as a means to communicate more precisely. This is exactly what is proposed here.

Contextual Complexity

Context is a profound, but not necessarily a simple, concept. In the complex field of exegesis, which develops principles for the accurate interpretation of texts often in ancient languages in Biblical studies, context is a rich principle of interpretation. Exegetes identify multiple levels of context. Each level has a different degree of effect in determining the meaning of a word or text. One illustration given is that of concentric circles of context (Osborne, 1991). Picture concentric circles of contextual influence with the key word at the center and each successive concentric circle representing a different kind of context. In this model each successive circle has less influence on defining the meaning of the core idea. The target word is placed in the center. The most immediate and most influential context surrounding the center is the phrase surrounding the word. The next circle of influence would be the passage, then the chapter, the book, then other works by the same author, other literature in the same genre and historic period, other writings in the same language in different historic periods and so on to the global context. Each circle helps both to clarify and to amplify the word meaning.

This conceptual model has possible parallels with the reading of icons. Images in general, and icons in particular, live in various contexts. As a starting point, it is possible to envision three levels of context for a given icon: the Immediate Context of an individual icon, the Proximate or System Context of an icon in its local or immediate setting with other icons and the Environmental Context of the icon. These three contexts are proposed based on observation of the role of context on existing icon systems (see AIGA analysis below), and concern over adopting the greater number of contextual layers from the field of exegesis in the early phases of such a study.

Environmental Context

The Environmental Context may be defined as the environment in which the images function, not the images themselves.

The importance of environmental context is suggested in existing icon systems. Airport signs are in airports, creating an apt context to promote the reading of an airplane icon as meaning 'departing flights.' What the same airplane icon might mean in a funeral parlor, a museum or a hospital is intriguing to consider, but it almost certainly would not mean 'departing flights.' In the funeral parlor the airplane icon might take on a metaphorical meaning for the movement of the dearly departed, or even as a crude joke sparking offense. In a museum it might offer the promise of an exhibition of historic aircraft. In a hospital it might mean pure confusion or might not be read as an airplane at all. Study should be done, but even this mental experiment suggests the importance of context in general, and of environmental context in particular, in establishing the meaning of icons.

Proximate Context

The Proximate Context might be described as the field of interaction where images in a system interact with other images in the same system. An overarching graphic style is what often creates a proximate context. By definition, no system of images works alone. Image systems frequently employ devices to circumscribe themselves: a bounding box or border, setting themselves off from their environment while defining an internal context for interaction. These 'framing devices' bridge the Proximate and Immediate contexts, often serving to define

individual images while stylistically linking one image in a system to another. These 'framing devices' are seldom neutral. Often they carry a communication message of their own such as the shape of highway signs. Graphic novels, comics, are a well cited example of a highly developed system of supporting images and devices that enhance communication (Ashwin, 1989, 208.) As has been stated previously, the Environmental Context influences the reading of images placed within it. It may be surmised from the 'circles of context' in exegesis that Proximate Context has more influence on meaning than Environmental Context, but that has yet to be established by this study.

Immediate Context

The Immediate Context may be defined as the local space, defined by some boundary, where elements of an image interact with each other to form an integrated message. Rudolf Arnheim in *Visual Thinking*, (1969) quotes Gustaf Britsch as formulating "the earliest condition of visual thinking as follows: 'An intended spot is detached from a nonintended environment by means of a boundary.'" The boundary or containing shape forces objects within it into formal and cognitive association. Through perception and visual thinking, we strive to solve the riddle of association and find meaning. Some form of graphic containment, a frame, often creates an Immediate Context particularly even if that graphic element is a restrictive 'white space.' Within a field of containment, images are not read as solitary, single objects but as associated ones. For example, in Figure 1 the walking man in the middle image is not seen as a man and a rectangle on his back and a line, but is seen and interpreted together as a unit: man | burden on back (backpack) | line (walking stick) = hiking. Another aspect of Immediate Context relevant to this study because of the study's exploration of reading image sequences is the role of focal point in a reading process. Because our eyes have a small field of detailed focus, and because that focus can be directed around the visual field, the immediate context can and does change even within a single image. Immediate context works within the Environmental and Proximate contexts and though influenced by them are still separated from them. Again, based on principles of exegesis, it may be tempting to surmise that Immediate Context is most relevant for reading meaning, but that remains unproven.

Summary

Through our study we hypothesized that manipulating and expanding the context of images would enable the reading of more sophisticated messages from images alone. But before examining the ways context can be used to guide the interpretation of images, a little more needs to be said about the nature of images and how they function in communication.

Images

WE UNDERSTAND MORE OF THE WORLD around us through visual perception than all the other senses combined (Ware, 2004; also Gregory, 1997). Individuals from all over the world, with little or no training, are able to not only understand reality through perception but to identify images and associate them with objects or activities (Ware, 2004). Using images for communication is quite ancient. Tombs in Egypt dating from millennia before Christ contain hieroglyphic symbols describing the life and the after life of the tomb owner. Starting from the Christian era in the West and continuing to today, images and icons were used extensively for communication of spiritual truths regardless of literacy or language. In the twentieth century, icons have been in use for communication in secular environmental graphics. Several of these twentieth century icon systems were designed specifically to communicate across linguistic barriers in international venues through highway signs, airport and transportation signs and Olympic signs.

Images clearly communicate, but exactly how images communicate is still not fully understood even though diverse ways that images might function in communication have been described. In Malcolm Barnard's recent summary, he describes Jacques Aumont as having three image functions: symbolic, epistemic and aesthetic, and others as defining four image functions: Information, Persuasion, Decoration and Magic (Barnard, 2005).

Clive Ashwin, in his 1974 article "Drawing, Design and Semiotics," classifies signs into three groups, saying:

Following Peirce's lead (Charles Sanders Peirce, *Philosophical Writings of Peirce*) signs have traditionally been classified into three groups, each with numerous possible subdivisions. The index is a sign that arises as a result of, or in congruity with, the thing that it signifies. Classic examples are the

foot-print as a sign of an earlier presence at a given spot or smoke as a sign of fire. The icon (from the Greek word for image) is a sign that bears similarity or resemblance to the thing it signifies. Road signs that present a schematic image of, for example, animals or vehicles fall into this category. Finally, the symbol is a sign which bears no apparent resemblance to its related signified, but operates within an agreed set of conventions.

For purposes of this study, we developed a three-fold definition of image function similar to that proposed by Ashwin, but based on the terms used by Rudolf Arnheim in *Visual Thinking*, (Arnheim, 1969) because, quite simply, Arnheim's definitions more closely match the current English usage. We defined three image functions as: picture, symbol and sign. In the usage here, symbol and icon are nearly synonymous.

Image Functions and Degrees of Abstraction

Picture Function

IN COMMUNICATION IMAGES serve different functions. Some images function by representing a literal object while others represent a concept or idea. The range from literal to abstract defines one visual attribute associated with these various image functions (Arnheim, 1969). Arnheim suggests that literal representational images such as pictures or photographs often serve a 'picture' function, that is, they are less literal than what they represent. For example, a photograph of President Kennedy is an abstraction of the living person. A drawing may be even less literal than a photo, yet such a drawing may still function as a picture in so far as it represents the specific individual characteristics of John F. Kennedy while still being an abstraction of him. Literal or representational images present enough essential features of an individual instance to evoke that instance in a viewer's mind. Images serving a picture function abstract only to the point where individual characteristics remain discernable. Pictures evoke an instance of an object.

Symbol / Icon Function

Less representational images such as pictograms, symbols or icons often serve a 'symbolic' or 'iconic' function. Symbols are more literal than what they represent because an image serving a symbol function does not represent a specific object but a category of objects or an object concept. A concept is more abstract than any

particular representative object used to express it. A symbol or icon comes to represent a concept or category through a process of abstraction limiting particular features in favor of those general features shared by an entire class of objects (Dondis, 1972, 71-72). For example, an icon of a man on a restroom door represents the male gender, not an individual or specific man such as Grandpa John. More abstract representational images tend to serve a symbol or icon function. Literal or representational images present enough essential features of an individual to evoke that individual in a viewer's mind. Images serving a symbol function abstract to the point where those features essential to the concept are visualized. Symbols evoke a class or an object concept.

Sign Function

Graphic images such as letterforms serve a 'sign' function. These signs communicate content without reference to any particular visual attribute of the thing being represented. Numerals and letters of the western alphabet are signs. For example, the letters "Grandpa John" function as signs in so far as they represent a particular individual but probably look nothing at all like him. Images that serve a sign function are abstract and not representational.

Evocative?

A fourth image function might be proposed for images that are abstract but not representational. These images communicate but without representing a specific object. For example, an orange glow might suggest heat. In the study described here, these images serve to evoke or modify the meaning of more representational images. Highly abstracted visual forms tend to serve what might be called an evocative function.

Icon Construction

Icons, images that serve a symbolic or iconic function, are created by visualizing the essential features of a class of objects while excluding features inessential to the class. A chair icon might illustrate four legs, a seat and a back while excluding visual forms that illustrate details such as the material of the legs: wood, metal, plastic; the seat: fabric, padding, wood, metal, plastic, etc. The essential features are drawn visually in a simplified, abstracted, form so that only the essence of the

object category is communicated. The ability of simplified icons to suggest the essence of objects has been widely demonstrated in media from posters to computer screens (Meggs, 1992).

Thus far: two basic concepts have been proposed here as means to enhance non-verbal communication: context and image abstractness. As a first step, these will be used to analyze an existing icon system to validate their workableness as theoretical models. Then, these concepts will be used to identify novel creative opportunities to enhance non-verbal communication.

Context and Image Abstraction in Existing Icon Systems

DURING THE TWENTIETH CENTURY several icon-based sign systems were developed with similar themes and approaches. Beginning with the 1936 Olympic games in Berlin, Olympic events through the current day have developed distinctive systems of pictograms to aid communication with participants from various countries who have different languages. Concurrently, transportation hubs such as airports developed pictogram-based signage systems. As these systems developed it became apparent that they shared a common iconic approach with subtle variations. In the 1970's government agencies such as United States Department of Transportation, in conjunction with private organizations such as the American Institute of Graphic Arts, initiated efforts to identify the best icon systems and standardize them in an effort to further facilitate global communication. These efforts produced standards for icons for use in public spaces, particularly transportation related facilities.

AIGA/US DOT Symbol Sign System

Analysis of these icon systems reveals that they are effective at communicating objects at a basic level. For example, of the fifty icons in the AIGA/US DOT Symbol/Sign system published in 1974 and revised in 1979, forty-three are primarily tangible things or physical objects (AIGA/Hora, 2004). Using linguistic terms, these are labeled in Figure 3 as NOUNS. In several cases, the AIGA/DOT system effectively applies the contextual principles described above to clarify the meaning of these objects.

Immediate Context

The AIGA/US DOT system exhibits use of Immediate Context: icons combined in the same space to clarify meaning, as evident by the combination of icons within a single bounding box. For

or something else, but in the context of a man icon it seems to suggest drinking fountain. Each of these seems to clearly suggest a tangible object: Hotel, Drinking Fountain, Waiting Room, Trash Can (litter disposal), and Barber Shop. The closest any of them comes to communicating an action is Litter Disposal and in reality it more precisely indicates the location of a trash can, not the action of disposing.

Proximate Context

Proximate Context, one icon or icon combination in a system relating to another to clarify meaning, is also evident in the AIGA/DOT system from its repetition of icons and overall consistent graphic style. In several of these cases the icon combination relates to a similar icon combination in another symbol to clarify the meanings:

Man + Containing Box = Elevator

Man + Ramp = Escalator

Man + Scissors + Comb = Men's Barber Shop

Woman + Scissors + Comb = Women's Barber Shop

Luggage + Box + Key = Baggage Lockers

Luggage + Open Box = Left Baggage Area

Luggage + Cart = Baggage Cart

Luggage + Man = Arriving Flights

Seeing both the Men's Barber Shop and Women's Barber Shop icons helps clarify the meaning of each. Certainly once one is understood the meaning of the other becomes clear. Comparing the Elevator and Escalator icons similarly helps to clarify their respective meanings. This is an example of the effective use of Proximate Context. However, in the AIGA/DOT system Proximate Context is not always so helpful. Seeing a Luggage icon and a Man + Luggage icon helps guide the interpretation of the Man + Luggage icon toward a meaning which combines man and luggage, but it is far from decisive that the delivered meaning is the 'Arriving Flights / Passenger Pick-up' meaning intended in the AIGA/DOT icon combination. For this author at least, the Arriving Flights icon does not clearly communicate the intended meaning on its own and trying to use proximate context to clarify its meaning could prove disastrous. Used singly, the man icon stands for 'Men's Toilet.' Clearly, this meaning is not to be transferred to the man + luggage icon

combination. Trying to do so would suggest, at best, men's luggage. Apparently social conventions (there is no men's specific luggage) and environmental contextual clues rule out such miscommunication. However, it seems possible to build a system where proximate contextual clues would be meaningful. In such a case icons designed to work together to clarify and reinforce meaning would build consistently upon their individual meanings. The AIGA/DOT system clearly does not always do this. It is unclear how much, if at all, the AIGA/DOT icons were designed to use Proximate Context for proper interpretation.

Environmental Context

The AIGA/DOT system functions in various environments, but based on analysis of the icons themselves, the system has an airport or transportation venue environmental context. Ten of the fifty-plus icons specifically identify transportation types and five are devoted to baggage issues. It appears that the creators of this system conceived of the system in a transportation context and assumed the support of this context for part of the system's success.

Degrees of Abstraction

The overarching visual characteristic of the AIGA/DOT system is a high degree of abstraction. Each image serving a symbol or icon function has been reduced to a very simple but still recognizable visual form. Complexity and detail have been eliminated. Straight lines and arcs and circles dominate. Heads, headlights and coins are all circles. Shoulders are arcs, while arms, legs and bedposts are all straight lines. Lines do not vary in width. Line endings are uniformly flat or semi circular. This degree of simplicity corresponds to the kind of abstraction associated with representational images serving a symbol or icon function as described above. The system is well crafted in its simplicity and its consistency of abstraction. There are however, variations, as noted in Figure 3. The icon for stairs is simplified along the lines of a diagram or cross-section, as are the icons for escalator and luggage storage. In the AIGA system these variations are very minor but they suggest the possibility, perhaps the necessity, of using varying levels of abstraction to communicate varying levels of conceptual complexity.

Accompanying the highly abstracted representational images in the AIGA/DOT system are highly abstract non-representational

images serving a sign function. As stated previously, signs are images that communicate content without reference to any particular visual attribute of an object. One example of a sign is a letterform or punctuation mark. In the AIGA/DOT system, images serving a icon and sign function are combined in several symbols:

Umbrella + Glove (icons) + Question Mark (sign) =
Lost And Found

Man + Bed (icons) + Question Mark (sign) =
Hotel Information.

Steps (icon) + Arrow (sign) = Stairs

Box + Man + Woman (icon) + Arrows (sign) = Elevator

Dog (icon) + Negation Circle (sign) = No Pets

Gun + Knife (icons) + Negation Circle (Sign) = No Weapons

The first two use a letterform sign, the question mark, which is familiar to readers of western alphabets. Two others use a conventional directional sign, an arrow. Others use a more recent convention that represents “do not,” the ‘negation circle.’ In each case, the sign meaning is not self evident but must be learned. The use of these particular signs is apparently widespread enough across cultural and linguistic boundaries to work, though it could be argued that they privilege readers of Western alphabets. Some of these combinations benefit from reading in Proximate Context, the Man + Bed icon mentioned above for Hotel is combined with a question mark sign to communicate Hotel Information.

Whether the images serve a symbol or a sign function, they are highly simplified, one or two flat (no tone) color images on a plain background. There are several possible explanations for the level of abstraction of the AIGA/US DOT system, ranging from prevailing style to a commitment to an international or modernist philosophy. From a range of options at least two seem likely and relevant: the signage function with its environmental context and production techniques associated with signage.

The AIGA/US DOT system is frequently used in signage. Signs, “posted notices bearing a designation, direction, or command” (*American Heritage Dictionary*), serve the function of labeling and instruction in public spaces. As stated earlier, Environmental Context plays a significant, perhaps defining role in the

interpretation of images and therefore in their design. Icons designed for a signage context take a visual form relevant to that context. The visual form of the AIGA/DOT and similar signs may have been even more specifically influenced by their display in transportation environments such as airports, highways and Olympic competitions where movement and traffic flow are important considerations.

In addition, it may be surmised that the simple visual form of these icons was influenced by prevailing production techniques associated with signage. Signage production techniques through this period generally limited signs to simple graphic shapes in one or two flat colors with few or no photographic images. Even if these techniques were not specifically held in mind, there may have been a commitment by the designers to designing these icons so that they would reproduce well using the lowest quality reproduction means imaginable, further limiting complexity.

Whatever the motivation, it's logical that contextual and functional needs have shaped the visual approach of the AIGA/US DOT and similar systems. There is nothing wrong with this approach. But it is reasonable to conclude that in order to advance the development of icons and symbols we might explore possibilities beyond limitations of simplicity imposed by past contexts and technologies. Released from past limitations, new approaches might be less simple but more effective at communicating complex messages.

Summary: as stated previously, the AIGA /US DOT system is effective in many cases at communicating simple messages about basic objects and their relationship to physical things: water fountains, baggage, elevators and the like. However, this is far short of the goal identified in this paper to visually communicate more complex messages and more abstract concepts. In linguistic terms, the AIGA/US DOT system uses mostly nouns. Only seven of the fifty icons attempt to deal with an action or state of being. All seven of these resort to the use of the sign function that is learned and privileges Western alphabets. This means the AIGA/US DOT iconic language is not truly global. It has few verbs, and no systematic allowance for modifiers such as adjectives and adverbs. The AIGA/US DOT images all serve an icon function with very similar degrees of abstraction.

The limitations make it understandable why this system and those like it are unable to communicate complex messages involving not only things, but also processes or states of being. Until these limitations are overcome, the communication of more complex and abstract messages using images alone is likely to remain an unreachable goal.

Applying context and levels of abstraction to the analysis of the AIGA/DOT system demonstrates that these concepts are both suitable and profitable. They are suitable because they help provide insight into how the system works and how it might be made to work better. The role Proximate Context might play in the 'Arriving Flights' icon is an example of an insight that might be used to clarify the system. They are profitable because they suggest that conventions of simplicity might be based on the Environmental Context and past production limitations rather than an essential aspect of iconic communication. If this is true, it suggests that a single, high level of abstraction may not be necessary for an image to function as an icon and that an expanded context and various levels of complexity might be profitably explored as means to enhance nonverbal communication.

Expanding Context: a Strategy to Enhance Non Verbal Communication

AS THE FOREGOING ANALYSIS SUGGESTS, manipulation of context and degrees of abstraction are meaningful theoretical foundations to use to analyze the limitations of existing systems and might provide a meaningful theoretical basis for developing techniques that expand context and therefore overcome limitations in current icon systems. As examples of ways to build on this foundation, three techniques for manipulating context are described below:

- Expand Immediate Context: Icon Combinations through Layering.
- Expand Immediate Conceptual Context: Degrees of Abstraction.
- Expand Proximate Context: Sequence.

Expand Immediate Context through Layering

COMBINING MORE THAN ONE ICON IN A SHARED SPACE is a simple but rational way to expand Immediate Context. The interaction of two icons in a shared space was shown to have created new meaning in the AIGA/DOT system. Where the AIGA/DOT system places icons together but does not touch or overlap them, the UC team

explored overlapping icons in layers and altering their stacking order as a controlled means of modifying meaning. The intention was to add icon to icon to stimulate a new, third meaning that was both different from and more specific than the meaning of the icons seen individually.

For different icons to be read as a unit the team discovered that the icons must be forced into association. The principle applied to accomplish this was called 'icon containment.' In order to encourage that separate layered icons be read and interpreted together the team created a common containing device, in the first cases, a square. A square was selected as being simple in form, neutral in meaning and self-contained. In the square, icons were stacked together on top of each other in various layers. The effect was analyzed.

A demonstration of the efficacy of this approach is shown in Figure 4. A definite shared space was created. In this space two icons, selected in a nearly random fashion from an icon-based font (Zapf Dingbats), were placed so that they were contained at least in part in the same space and in at least some measure overlapped each other. A new meaning seems to be formed. The stacking order was switched and checked for new meaning. A new meaning seems to be formed by the change in the stacking order. A lot of unanswered questions are raised even in this simple study. What role does containing shape play in expressing meaning? What is suggested when one object breaks out of the containing shape to some degree but the other doesn't? For example, does the wholly contained object tend to have a more passive voice than the object that extends beyond the container? What is the role of position and value in affecting the meaning in the stacking order? Answers to these and other questions one might pose regarding this study are unknown. This highlights a key difficulty in researching design and communication: the number of factors and the complexity of interaction among visual attributes that lead to intended meaning. More studies will have to be conducted to examine the relative roles of containing shape, icon position within or outside it, stacking order, value, size and position.

In order to further test the ability of icons to form new meaning through combination, a similar procedure was employed using icons, again selected nearly at random, in this case from

the AIGA/US DOT and related Society of Environmental Graphic Designers (SEGD) systems (see figure 5). The three icons in the first instance are hiking man, stairs and gift shop. These are given immediate context by placing them in a shared space. A new meaning is implied that is different from any of these icons seen individually (see original icons in figures 1 and 3). It does not matter that the original 'meaning' of the icons be recognized, in fact, for the purpose of this study it is significant if the original meaning is not preserved.

In the second example in this series the drinking fountain icon replaced the gift shop icon. A newer, more narrative meaning is the result. This suggests rich story telling possibilities for icon combinations. The narrative in figure 5 suggests action without directly visualizing it: 'a person with a load is climbing stairs past a person drinking at a fountain.' In iconic terms this is an object + object + object narrative: man + stairs + man

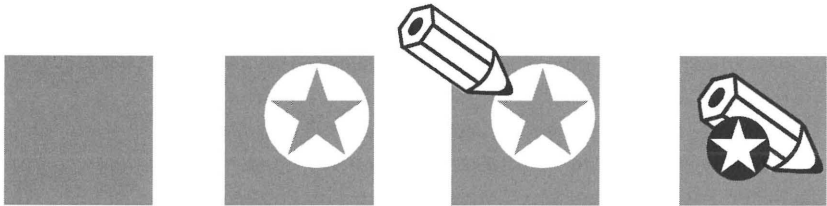


FIGURE 4

Left to right: Containing Shape, Base icon, Secondary icon layered over
Base icon forming a new meaning.

drinking; noun + noun. The action is suggested by the combination of visual nouns, not stated overtly by using an action icon. Though implying an action using only visual nouns is theoretically interesting, the team theorized that the visual equivalent of a verb and a visual modifier will be needed to communicate at a level approximating language.

Expand Immediate Context with Degrees of Abstraction

AS STATED EARLIER, images serve different functions in part due to different degrees of abstraction in representation. The study of icon layering suggested that images serving different functions might combine effectively to clarify meaning. In Figure 4, a pencil and a star were combined. While both images seem to serve an icon function, the pencil is less abstract than the

star icon. The star is nearly a sign: an image that communicates a learned meaning without particular reference to an object, similar to the arrow in the AIGA/USDOT system. What effect, if any, comes from the combination of degrees of abstraction on the communication?

To answer this question an attempt was made to create icon combinations representing more than just objects (a pencil and a star). The team created a modifier image, approximating an



FIGURE 5

Left to right: Hiking man + Stairs + Gift shop.
Hiking man + Stairs + Drinking fountain.

Evocative Function (above), hypothesizing that this kind of expansion might provide more targeted meanings for iconic communication. To test this theory, a more abstract modifier image was designed to relate to the message of the two icons used in Figure 4 (see figure 6). The modifier, a 'scribble,' seems to change the implied message. As in the first test, the stacking order of the three layers was changed to see if a new meaning resulted with the modifying scribble being contained within the star icon to further modify the meaning. The results seemed promising. In this case the modifier changed the meaning enough to warrant further study of the role abstraction might play in modifying context and changing meaning in non-verbal communication.

To explore the opposite end of the continuum from abstract to literal, an icon was combined with a more literal photographic image. A series of wavy lines seen in isolation might be interpreted in various ways (see figure 7). These lines were then placed in a more literal photographic context in order to clarify their meaning (see figure 8). The graphic lines have considerably less detail than the photograph, which has greater line shape and width variance, tonal quality and curve complexity. However,

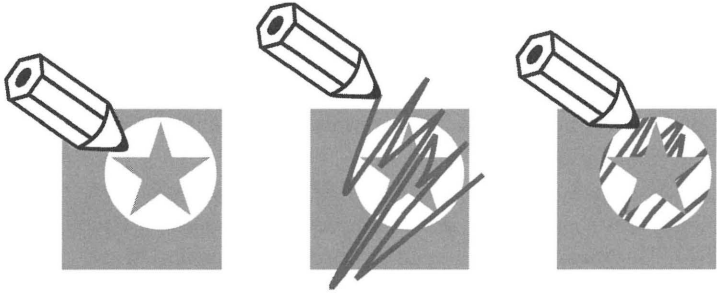


FIGURE 6

the photo still serves something of an iconic function, despite its literalness, because it suggests 'hair' more than a particular individual's hairstyle, color, state, etc. This is arguable and the parameters for how abstract an image must be before it is inevitably read as a concept and not as an instance are not defined. In fact, attempting strict parameters may be misguided given the implications of context proposed in this paper. What may be possible are parameters that describe how images at various levels of abstraction interact to influence each other toward a more conceptual Iconic Function or more individual Picture Function. What was intended in Figure 8 was to combine a less abstract photographic image serving an Icon Function with a more abstract graphic image serving an Icon Function to help clarify the meaning of the combination. To press the meaning to a more complex level, subtle variations in the alignment of the lines were designed to suggest a process of removing tangles. The intended effect was not to communicate, "this individual woman can detangle her hair" but "this is hair detangler." In theory, an image serving a Picture Function plus an icon would do the former while two images both serving an Icon Function would do the latter. Note also that in Figure 8 the photo and icon are forced into association by a surrounding box and therefore are not read as separate, unrelated entities.

Based on this experience, it seems possible to combine images serving different functions in an intentional and systematic way to simulate the way nouns and adjectives, verbs and adverbs, combine in language to modify each other and communicate complex messages.

FIGURE 7

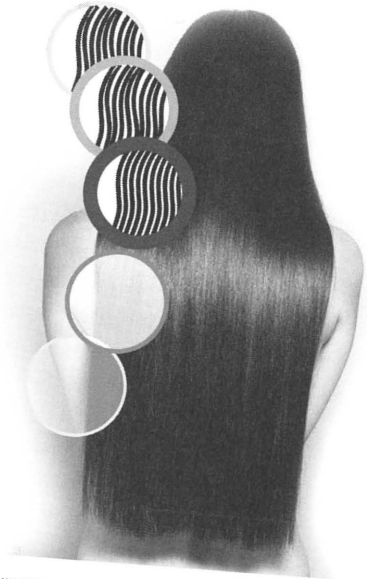
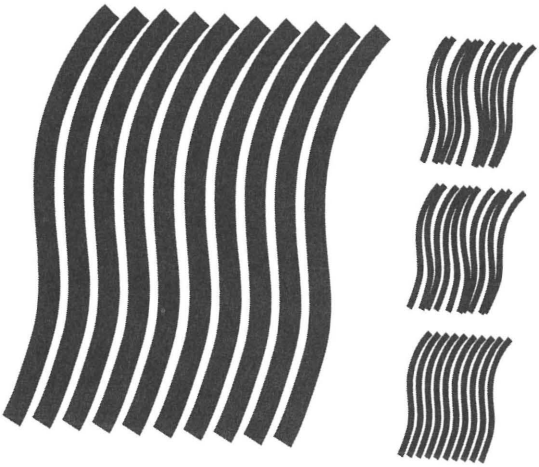


FIGURE 8

Expand Proximate Context by Sequencing

IF COMBINING ICONS IN STACKED LAYERS IS EFFECTIVE, then combining icon stacks in horizontal and vertical relationship seems a rational way to extend that. The team hypothesized that clustering or sequencing groups of contained and layered icons could add context and expand the ability to communicate. Image sequences, associated with time-based media such as film and video, have a proven capacity for communicating narrative forms, actions and states of being. The ability to communicate actions and states of being would be a significant expansion of the object orientation label function of existing global icon systems such as the AIGA symbol/sign system referenced previously. For background, the team examined graphic novels and comic books to analyze how these proven forms work. Graphic novels were selected rather than film or video because they are print media, more akin to the product package context established for this study. The special ability of comics to combine simultaneity, multiple voices and serial images to bridge time and space was described by Muriel Cooper in 1989. The team built upon these observations.

Initially, the team explored clustering groups of icons. Image groupings suggested the possibility of communicating complex concepts such as the state of being lost or confused or the general idea of emotions. Based on this, the team identified several types of comparative images: a pair (one-to-one), a sequence, a group without an ordered sequence and a time or chronological sequence. While each of these possibilities showed promise, a specific case of X / Y arrangement or sequence that establishes a progressive form of context, was explored in greater detail.

A comparison of a single image with a simple two image sequence indicated that while the single image was ambiguous as to meaning, a two image set had much more specific implications. In one example, an image of man holding a cigarette was ambiguous but when coupled with another image of the same man with a cigarette in his mouth the message became 'smoking.' The image pair added context that served to more sharply define the meaning of both images. From these initial studies, the team hypothesized that expanded message complexity might be possible with sequences of icon images that include the techniques of icon layering and levels of abstraction identified

in previous studies. An early study (*figure 9*) shows a left to right sequence combining an icon of a man and a flower. The icons combine different degrees of abstraction: the man more abstract, the flower more literal. The man was kept highly abstract through extreme simplicity to suggest not a specific human but human emotion. The flower was made less abstract to suggest a specific flower and flower character: a daisy-like flower. The changes occur through the addition of the flower and an upturned mouth. The implication seems obvious: the thought of a flower makes a man happy. The change in facial expression reflects the team's discovery of research suggesting that certain human facial expressions are universally interpreted: smiling is a universal sign of happiness.

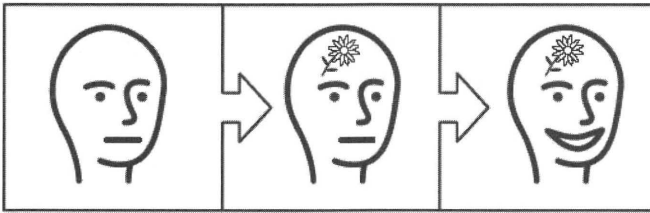


FIGURE 9

Designer: Davis Stanard

Based on experience, the team concluded that to be effective, an icon sequence must be read as a single image made up of one icon following another. Both consistency and change are required for the sequence to read as a unified whole with progressive individual variation. When progressivity breaks down the icons read as an arbitrarily ordered group not a sequence. Based on previous experience with containment the team presumed that some kind of graphic containment would be necessary to accomplish this. From comic analysis the team identified several techniques for building systems of containing shapes: the graphic form of the containing shape of individual images in a sequence, the overall or meta containing shapes for sequential groups and their relationship to the individual framing shapes they contain, objects breaking out of containing shapes, contextual images forming a background for meta and individual containing shapes and the role of connecting graphics in affecting sequence and reading direction. Again, as with nearly every other principle in this study, much more work needs to

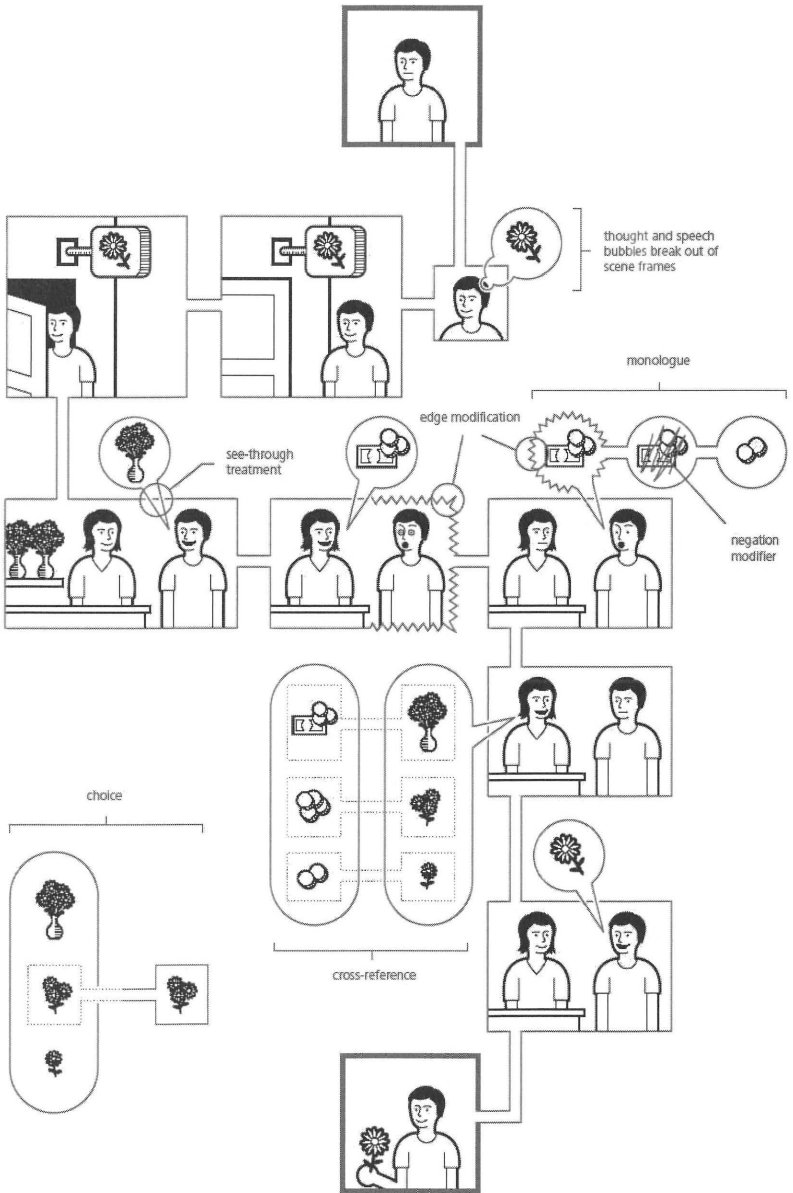


FIGURE 10
Designer: Davis Stanard

be done to qualify the parameters governing containing shapes and image sequences.

Based on this analysis, a more complex story was attempted using a combination of sequential and grouped layered images and variety of containing shape techniques (*figure 10*). People shown this icon composition have generally been successful interpreting the main story as follows: a man wants a flower, goes into a store, is surprised or disturbed at the cost, the clerk explains that various flower quantities cost various amounts, the man selects a quantity he can afford, makes the purchase and goes away pleased or satisfied. This result is promising. Not only have actions been described but also various states of being: surprised/disturbed, pleased/satisfied. There is still a lot of imprecision in the visual story compared to the verbal summary above. The difference between surprised/disturbed is conceptually significant and effectively conveyed by words but respondents to the visual icons have given various answers ranging across these verbal concepts. Even so, the message is significantly more complex and precise than messages communicated with existing icon systems, sufficiently so to warrant further investigation of these techniques.

Sequential icons certainly seem to have the possibility of expressing action, verbs in language analogy. It is certainly possible to envision individual icons which perform a verb or action function. Animation is a largely unexplored possibility of iconic communication. Animation was not used for this study. However, the author has participated in separate studies that have explored animated icons that give every indication of expressing verbal concepts effectively. As with nearly every aspect of the studies in this paper, more work needs to be done.

Conclusion

IN A VERY REAL SENSE this paper describes nothing new. Icons have been used successfully for millennia. They are used successfully today. More than that, this paper fails to provide scientific validation of the proposed theories. The only testing to date has been unstructured and informal. What this paper does describe are some potentially interesting ways of thinking about icons and icon systems: expanding context through layering, degrees of abstraction and sequence. There is ample room to debate where the lines should be drawn around these

concepts, what constitutes degrees of abstraction for example, but the concept this paper proposes to advance is that the extremely reductive approach generally taken is not necessary. These concepts have been raised here partially as an invitation to further definition and greater validation.

As has been discussed in this paper, existing icon systems are generally limited and do not address complex messages involving not only things but also processes or states of being. Since the advent of standardized international symbols and icons in the 1960's and 1970's systems of symbols and icons have evolved little.

While icon systems have evolved little, significant advances have been made that deepen our understanding of the mechanisms underlying visual perception, human cognition and linguistics. One example of this type of advance is made in brain imaging. Advances in non-invasive techniques such as optical spectroscopy, positron emission tomography (PET), single photon emission computed tomography (SPECT) and magnetic resonance imaging (MRI), allow medical researchers to monitor activity in the brain as it processes information or responds to stimulation through the skull, revealing the human brain at work (Mathias, 1996). Some of this work is being incorporated in the science of visual perception which in turn is being applied to the design of scientific visualizations (Ware, 2004). However, to date little of this literature has been applied to the design of picture, icon or sign systems. This seems a serious oversight given that human perceptual processes promise to transcend cultural and linguistic boundaries, an essential for global communication.

The time seems ripe for design researchers to examine recent developments in science and design, including the work reported in this paper, to identify and define theoretical constructs for testing, to conduct tests validating and refuting these theories and positing new questions for further study. The results of such a research program may define principles of design upon which to base design research and practice. Consider this paper an invitation to move forward aggressively.

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Also

AIGA, Symbol/Signs.

<http://www.aiga.org/content.cfm?ContentAlias=symbolsigns>

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Mike Zender is a third generation designer, following in the footsteps of his grandfather, father and now teaching and working with his son Micah. Mike founded the firm Zender + Associates Inc. after attending the University of Cincinnati and Yale University. Mike has written two books on design and contributed to several others. He has lectured internationally at both university and professional venues. He currently teaches digital design at the University of Cincinnati with research emphasis in information design, visualization and informatics, including recent studies in icon systems.

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ABSTRACT

Design education encompasses various teaching strategies with classes typically evaluated by students at the end of the term. This evaluation is often perfunctory; in contrast, the observational research presented in this paper examines a variety of design classes as they are taught, then analyzes the observations through three perspectives: across instructor comparisons, comparisons across class activities with regard to student behavior and the relationship between manual skill and reflective practice in studio work. While the study has a limited scope, the methods and analytical perspectives suggest new ways to improve teaching and learning in design programs.

Teaching Design:

Analysis from Three Different Analytical Perspectives

Eric Swanson, Stacie Sabady and Chris Yin

Introduction: A Unique Opportunity

AS PART OF A TEACHING SEMINAR taught at the Institute of Design, IIT, seven students in the master and doctoral programs were given the same assignment: observe a design class, using video observation and a standard framework to be developed in the seminar and write an analytical paper based on their observations. Instructors were selected from the Institute of Design and at the Illinois Institute of Technology. All agreed to be observed during their teaching activities.

Because all seven observers of the classes used the same methods and worked with the same framework, the structure of this assignment lent itself to comparative analyses across all of the instructors:

- All observers had been trained in some form of video ethnography, typically used as a tool for user research in design.
- All observers worked on the frameworks used for logging data from the observations, increasing the cross-observer commonality.
- All observers filled out the same set of worksheets, in the same manner, with one student responsible for ensuring that all students filled out forms for all activities.
- All observers were available to the authors of this paper (who were also observers) to answer questions about their observation data and to ensure validity across responses.

Three authors—three perspectives

THE THREE AUTHORS OF THIS PAPER approached the data from three analytical perspectives, from the broadest to the narrowest:

Perspective 1: Across-Instructor comparison, using the 'Overall Observation' worksheets, some of the data from the more specific 'activity analysis' worksheets, as well as additional information from the prior year's student evaluations of instructors.

Perspective 2: Across-Learning-Activity comparison of overall student experience, primarily using the 'activity analysis' and 'aeiou' worksheets (activity, environment, interaction, object, use), that researchers filled in once during class activity.

Perspective 3: Across-Student comparison within the individual studio learning activity, using protocol analysis of the source video recordings and some data from the 'timeline' worksheets.

Observees

THE INSTRUCTORS REPRESENTED vary in age and teaching experience. Some of these instructors are seasoned professors with many years of experience as teachers and practitioners. Some are adjunct professors teaching on a part-time basis with jobs as consultants or with their own practices. Others are novice teachers, teaching for the first time at the college or graduate level.

All the instructors observed taught some form of design, but the specific topics ranged widely within the design field, including product design studio workshops, systems analysis classes, introductory classes covering design as a topic and human factors classes. The students were mostly graduate students, but they could also be in different levels of their studies. Some of the courses were for the Foundation year students admitted to the program without a prior design background. Other students, who had an undergraduate background in design and a few years of working experience, were in their first and second year of a two-year graduate design program. Ph.D. students and students with six years or more professional experience pursuing a one-year masters degree were less common. Students also came from different cultural, ethnic and academic backgrounds, and varied significantly in their abilities to speak and write in English, in which all classes were taught.

Methods

ALL INSTRUCTORS WERE OBSERVED UNDER CLASS SITUATIONS, with observers taking notes and using video ethnography to allow review of the class sessions afterwards. As mentioned, a set of frameworks ensured that uniform data was captured for analysis. The basic framework included forms to be filled out by the observer that included analysis based on the use of semantic differentials, timelines and questionnaires. The observation focused on the instructor as well as student reactions based on various activities including lectures, presentations and studio activity. The framework provided two levels of analysis: overall analysis of instructor and course, and a more detailed analysis broken down by individual learning activities within the class.

Aspects of instructional delivery included adaptability to events happening during class, adherence to a script and how structured the overall class was. Class preparation and the degree of structure in the use of time and content were also captured along with tools and supporting materials. The student experience was also recorded to reflect student participation in class activity. Interaction among students, attention and engagement in class, enjoyment of the material and whether there was any confusion with the course material was noted.

Instructor Biographies and Course Descriptions

Instructor A (System Evaluation) Instructor A is a professor at the Institute of Design whose emphasis is on teaching design planning and methodology. An expert with significant research and professional experience in the areas of structured planning and development of computer-assisted design support systems, he teaches System Evaluation, a course that introduces methods for evaluating complex systems. Methods are introduced to describe systems generally in terms of the policy requirements they should follow, the functions they should perform and the particular forms they have assumed as instantiations of the models. Techniques for evaluating individual system performance are used to measure performance.

Instructor B (Introduction to Product Design) Instructor B is a Ph.D. candidate at the Institute of Design, teaching students in the Foundation year studies. He worked previously as a furniture designer and has a Master of Arts in Design. The Introduction to Product Design for Foundation-year students, covers basic product design skills such as drawing, prototyping and establishing criteria for design. The course develops product design knowledge, the ability to understand products and the methods by which they are designed.

Instructor C (Design Planning) Instructor C is an adjunct professor at the Institute of Design with a focus on Design Planning and Strategy. He frequently lectures and teaches on innovation and strategy and is president of a consultancy that focuses on innovation strategy. Design Planning develops understanding of the basic ideas, frameworks and capabilities that innovation planning demands and connects ideas ranging from business planning fundamentals, to modern frontiers of design and innovation planning.

Instructor D (Product Design Workshop) Instructor D is an associate professor and head of the Human-Centered Product Design track. With a Master of Science in Design degree and an undergraduate engineering degree, he has over twelve years of experience in product design, user experience research and their implications for business strategy; he also is a partner in a research and development consulting firm. The Product Design Workshop focuses on the use of prototyping within

the context of a design project that includes contextual research, conceptualization, testing and refinement. Students are expected to develop an appreciation for using prototypes throughout the design process to understand, explore and develop a new product.

Instructor E (Introduction to Design) Instructor E is an adjunct professor at the Institute of Design, teaching students in the Foundation studies. Trained as a graphic designer, she has a Master of Design in Design Planning and is a consultant for design firms and major corporations in the Chicago area. The Introduction to Design course helps to establish a context for design for Foundation students. The course surveys design history with emphasis on design movements from the Industrial Revolution up to the present, to establish an understanding of change in professional practices in design as well as learning how to present ideas and work in teams.

Instructor F (Design in Context of a Business) Instructor F is an adjunct professor at the Illinois Institute of Technology teaching students in the undergraduate business program. She works as a design researcher and has a Master of Design degree. Design in the Context of a Business is a course that focuses on the role of design in business. The course is taught with case studies related to both design planning and human-centered design. Students learn how design interacts with other forces including competition, technology, channels of information and distribution. Particular attention is paid to how, within the context of all of these forces, design can benefit and bring value to organizations.

Instructor G (Physical Human Factors) Instructor G is an adjunct professor at the Institute of Design. Instructor G is an interaction designer, human-factors engineer and visiting scholar with a background in mechanical engineering and product design. Physical Human Factors is an overview of physical human factors covering size, work, performance and sensation. The class focuses on hands-on learning with do-it-yourself methods for understanding concepts and issues.

Analytical Perspective 1: Across-Instructor Comparisons

IN GENERAL, FEW DIFFERENCES AMONG INSTRUCTORS EMERGED directly from the numerical data. This supports the correlations

in the next section: among this limited group of instructors, the greatest differences in student experience and instruction technique occurred between types of activities rather than between individual instructors. When analyzed instructor-by-instructor, the values tend to cluster on the same side of average for all instructors.

Structure vs. Engagement

The primary pattern that emerges from the data relates to the instructors as a group. All instructors fall in the “Students Involved/Structured” quadrant, suggesting both that the classes are well-organized and that the students generally engage with, participate in and enjoy the classes (*figure 1*).

Class Structure Use of time (average 4.1)	Composite Student Involvement Participation (average 3.9)
Unstructured ○ ○ ○ ● ○ Structured	Inactive ○ ○ ○ ● ○ Active
Content (average 3.8)	Attention (average 4)
Unstructured ○ ○ ○ ● ○ Structured	Not engaged ○ ○ ○ ● ○ Engaged
Syllabus (average 3.6)	Enjoyment (average 3.3)
Unstructured ○ ○ ○ ● ○ Structured	Unhappy ○ ○ ● ○ ○ Happy

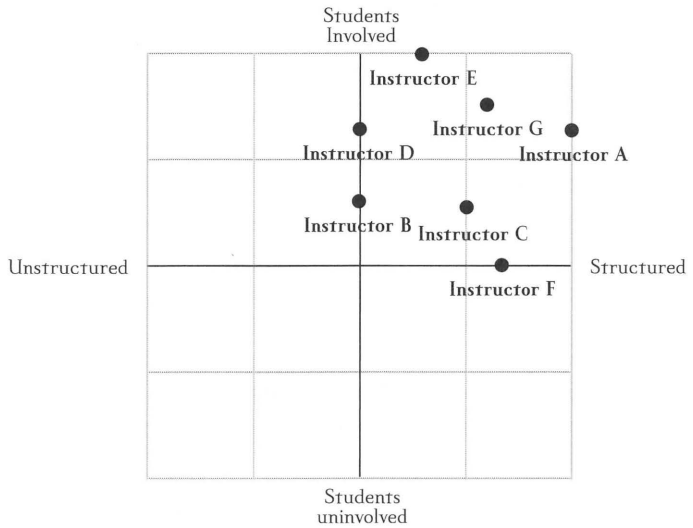


FIGURE 1
Student involvement and class structure

Reflection vs. Concreteness

Here, composite values are averaged for all 'reflective' scales (Class-time, Assignments, and Class objectives), and compared to 'content abstractness.' Once again, instructors fall within a narrow range; all classes involved an above-middle to much above-middle 'Reflective Practice' activities (as described by Schön, 1982). This correlates nicely with the concept of design as a reflective practice (*figure 2*).

Content Abstractness

This varies significantly. At the 'concrete' extreme, we find classes that are information-rich: Instructor C's class during the observation was discussion of a collection of frameworks; Instructor G's class explored physical factors. At the 'abstract' end, Instructor A's class introduced concepts of system evaluation (still early in the session, Instructor A may have been focusing on concepts), while Instructor D's product design workshop was split between a very concrete tutorial and more abstract one-on-one studio sessions (*figure 2*).

As in prior diagrams, this tells us more about the institution than the instructors: as a school of design, it deals in reflection; as an analysis-heavy design program, the abstractness of studio activity is contrasted with the concreteness of analytical processes.

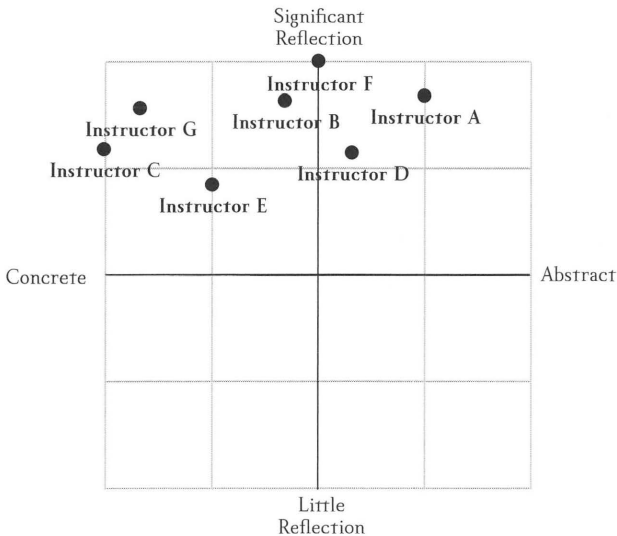


FIGURE 2

Nature of class material and reflective activity

What is a guru? When students within in the school discuss instructors, however, they differentiate sharply between most of the instructors and Instructor C, who is often called a ‘guru.’ The other instructors with significant experience, Instructors D, G and A are also generally described by students as knowledgeable and skillful, but more different from Instructor C than from each other.

To examine this phenomenon, we turned to another set of quantitative data: teacher evaluation survey results, filled out online by students after the completion of the course. All four long-term instructors taught the same course in the prior semester. We specifically looked at two questions: “The instructor makes students feel free to ask questions” and “The instructor treats students with respect.” Three of four instructors differ by less than 0.1 points (out of 10 possible; 1% of the entire scale); Instructor C differs from that group by 1.8 points (18%). Yet, despite this difference, Instructor C still groups with the other instructors on the scale of engagement. The students may not feel as comfortable with Instructor C, but they still pay attention.

Analytical Perspective 2: across activities

Introduction

WHEN ARE STUDENTS PARTICIPATING? WHEN ARE STUDENTS ENGAGED? If we restrict our field of vision to comparisons between instructors, our data tells us that there is very little difference. Instead of looking solely at individual instructors (where the difference was so small it could be entirely based on the differences between observers), we looked at the breakdown of student’s experience across different instances of the same teaching activities. The goal was to find patterns that would help us answer these questions and tell us in what situations these positive results were achieved. To understand when and why engagement and participation occurs, we looked at two more questions: Are the students confused? Are they enjoying themselves? This would hopefully show us why the students are, or are not, engaged and participating.

Research Observers were asked to rate the level of Participation, Engagement, Enjoyment, and Confusion the students had during each observed activity. The overall class time was divided into activities by the observers depending on what the instructor was doing. Observers used the criteria below when assigning a rating to a specific activity on a scale of 0-4, where 0 is none and 4 is the highest value (see tables 1-4).

PARTICIPATION

By Class	Avg.	By Activity	Avg.	By Observer Rating
B-Lecture	2	Group-Pres-E	4 4	4 Group-Pres-E
B-Studio	4	Lecture 1-D	3	4 Lecture-A
B-Stu-Present	4 3.3	Lecture 2-D	3	4 Lecture-B
A-Lecture	4	Lecture-F	2	4 Studio-B
A-Stu-Present	2	Lecture-B	2	4 Stu-Pres-B
A-Team Meetings	3 3	Lecture-A	4	4 Team Activity 1-G
D-Lecture 1	3	Lecture-C	1	4 Team Activity 2-G
D-Lecture 2	3 3	Lecture-G	4	3 Lecture 1-D
C-Lecture	1 1	Lecture-E	3 2.8	3 Lecture 2-D
F-Lecture	2 2	Q&A-E	3 3	3 Lecture-E
G-Lecture	4	Studio-B	4 4	3 Q&A-E
G-Team Activity 1	4	Stu-Pres-B	4	3 Team Meetings-A
G-Team Activity 2	4 4	Stu-Pres-A	2 3	2 Lecture-F
E-Stu-Present	4	Team Activity 1-G	4	2 Lecture-B
E-Lecture	3	Team Activity 2-G	4 4	2 Stu-Pres-A
E-Q&A	3 3.3	Team Meetings-A	3 3	1 Lecture-C

TABLE 1
Scoring for Participation

ENGAGEMENT

By Class	Avg.	By Activity	Avg.	By Observer Rating
B-Lecture	2	Group-Pres-E	4 4	4 Group-Pres-E
B-Studio	4	Lecture 1-D	3	4 Lecture 2-D
B-Stu-Present	3 3	Lecture 2-D	4	4 Lecture-E
A-Lecture	3	Lecture-F	3	4 Studio-B
A-Stu-Present	2	Lecture-B	2	4 Team Activity 1-G
A-Team Meetings	3 2.7	Lecture-A	3	4 Team Activity 2-G
D-Lecture 1	3	Lecture-C	3	3 Lecture-F
D-Lecture 2	4 3.5	Lecture-G	3	3 Lecture 1-D
C-Lecture	3 3	Lecture-E	4 3.1	3 Lecture-A
F-Lecture	3 3	Q&A-E	2 2	3 Lecture-C
G-Lecture	3	Studio-B	4 4	3 Lecture-G
G-Team Activity 1	4	Stu-Pres-B	3	3 Stu-Pres-B
G-Team Activity 2	4 3.7	Stu-Pres-A	2 2.5	3 Team Meetings-A
E-Stu-Present	4	Team Activity 1-G	4	2 Lecture-B
E-Lecture	4	Team Activity 2-G	4 4	2 Q&A-E
E-Q&A	2 3.3	Team Meetings-A	3 3	2 Stu-Pres-A

TABLE 2
Scoring for Engagement

ENJOYMENT

By Class		Avg.	By Activity		Avg.	By Observer Rating
B-Lecture	3		Group-Pres-E	4	4	4 Team Activity-G
B-Studio	0		Lecture 1-D	4		4 Team Activity 2-G
B-Stu-Pres	2	1.7	Lecture 2-D	3		4 Group-Pres-E
G-Lecture	2		All-Disc-F	1		4 Lecture-E
G-Team Activity 1	1		Lecture-B	1		4 Lecture 1-D
G-Team Activity 2	4	2.93	Lecture-A	3		3 Lecture-A
A-Lecture	3		Lecture-C	3		3 Q&A-E
A-Stu-Pres	2		Lecture-G	2		3 Lecture 2-D
A-Team Meetings	2	2.3	Lecture-E	4	2.6	3 Lecture-C
E-Group-Pres	4		Q&A-E	3	1.5	2 Studio-B
E-Lecture	4		Studio-B	2	2	2 Lecture-G
E-Q&A	3	3.7	Stu-Pres-B	3		2 Stu-Pres-A
D-Lecture 1	4		Stu-Pres-A	2	2.5	2 Team Meetings-B
D-Lecture 2	3	3.5	Team Activity-G	4		1 Lecture-B
C-Lecture	3	3	Team Activity 2-G	4	4	1 Lecture-F
F-Lecture	1	1	Team Meetings-A	2	2	

TABLE 3
Scoring for Enjoyment

CONFUSION

By Class		Avg.	By Activity		Avg.	By Observer Rating
B-Lecture	2		Group-Pres-E	1	1	4 Team Activity 2-G
B-Studio	0		Lecture 1-D	1		4 Lecture-E
B-Stu-Pres	2	1.9	Lecture 2-D	2		3 Lecture-G
G-Lecture	3		All-Disc-F	3		3 Team Activity-G
G-Team Activity 1	2		Lecture-B	0		3 Q&A-E
G-Team Activity 2	4	3	Lecture-C	1		3 Lecture-F
E-Group-Pres	4		Lecture-G	3		2 Stu-Pres-B
E-Lecture	4		Lecture-E	4	2	2 Studio-B
E-Q&A	3	3.7	Q&A-E	3	3	2 Lecture 2-D
D-Lecture 1	1		Studio-B	2	2	1 Group-Pres-E
D-Lecture 2	2	1.5	Stu-Pres-B	2	2	1 Lecture 1-D
C-Lecture	1	1	Team Activity-G	3		1 Lecture-C
F-Lecture	3	3	Team Activity 2-G	4	3.5	0 Lecture-B

TABLE 4
Scoring for Confusion

PARTICIPATION

- o Students fail to participate when given the opportunity
- 4 Students actively participate

ENGAGEMENT

How much do the students seem engaged in the class activity?
Were they focused? Did they follow along?

- o Not engaged
- 4 Highly engaged

ENJOYMENT

Did the students seem to have fun, or were they uncomfortable
or unhappy?

- o Students show little enjoyment
- 4 Students show great enjoyment

CONFUSION

Did they appear confused about the class content, the class
process (e.g. assignments), or the teacher's expectations?

- o Students show much confusion
- 4 Students show little confusion

Assumptions

Before looking at the data, we found we had made some
'common sense' assumptions:

- 1) If participation is high, engagement will be high as well.
- 2) Any class with high confusion will also have low enjoyment.
- 3) Design students will not engage as readily in lectures as in
other classroom activities.

Analysis

Observation ratings were compared in the following ways:

Engagement to Participation
Engagement to Enjoyment
Engagement to Confusion
Enjoyment to Confusion
Enjoyment to Participation
Participation to Confusion

Data were grouped in the following ways:

Within each area of interest (e.g., Engagement, Participation),
ratings were grouped and ordered by Class, by Activity and
by the Observer Rating (the number the observer assigned the
activity in regard to area of interest).

*Correlations (Behavior)**1) Engagement vs. Participation (-)*

The majority of the time, the ratings for these two matched each other. Participation may be a rough measure of engagement, since the physical behavior of participation is more easily observed than engagement. It is much easier to judge if a student is participating (they raise their hand, ask questions, etc.), than if they are engaged. A student may be engaged but look as if they are not paying attention at all, because this is a more personal, and sometimes internal, behavior. So, the pre-analysis assumption that if participation was high, then engagement would be high was correct.

When there were differences in scores, they usually were not very pronounced. There was one instance of an activity (Lecture) where the level of engagement was markedly higher (2 points) than the level of participation. The class was taught by Instructor C who has 'guru' status at the school and in his professional work outside the school. Students want to impress this teacher, and this teacher seeks to impress the students with his knowledge. This can lead to an intimidating situation; by maintaining his status, the instructor can appear unreachable and not at all like a peer. Intimidation, either student or teacher initiated, can reduce the student's comfort to participate even if the engagement level is high.

Engagement vs. Enjoyment (-)

Similar to Engagement vs. Participation, the pattern that arose in this pairing was not that one was higher than the other, but that they mimicked each other. If one was high, then the other would be high. In this situation, however, these two are more alike than in the previous pairing where the existence of one (participation) could indicate the existence of another (engagement). Here, the two behaviors are similar in that if a student exhibits one (enjoyed) then they also exhibit the other (engaged). Yet, it still may be easier to judge if students are enjoying themselves rather than if they are engaged. So enjoyment may, in addition to participation, be a measure of engagement.

In a couple of cases where this pattern was not found, it could be argued that this was due to the nature of the activity itself not being enjoyable. In the first situation where engagement was higher than the level of enjoyment, the activity was Studio time in Instructor B's class. This type of activity is significant and involving for students. They are committed to it and it is very personal

for them. They are not exactly enjoying themselves, but rather their level of engagement overpowers their level of enjoyment because they are concentrating so hard on the task at hand. The second time Engagement and Enjoyment diverged was in Instructor F's Lecture where students 'seemed mostly bored' according to the observer. Since the average enjoyment rating for Lecture was about two points higher than in this particular class, this situation is probably more about the style of the teacher than the nature of the activity, although the topic of the lecture may also have some effect in this case.

Engagement vs. Confusion ($e > c$)

In most activities, the level of engagement was higher than the level of confusion. This makes sense. So, just as participation and enjoyment may be a measure of engagement, the level of a student's confusion may be as well.

In a few classes, however, the level of engagement equaled the student's confusion. The main activity where this was the case was in Lectures. The average for all Lectures follows the pattern of engagement being higher than confusion. As in the case where engagement is higher than enjoyment in the Lectures, this disparity may be due to either the teacher's style or the lecture topic. For whatever reason, it is positive that some confusion did not cause the students to disengage. As long as the course material was not too far over their heads, a little confusion may be okay for the students and actually keep them interested.

Enjoyment vs. Confusion ($e > c + e ? C$)

In comparing specific activity types against themselves (Instructor A's Lecture vs. Instructor B's Lecture), enjoyment ratings were higher than confusion ratings. In looking at the enjoyment level and the confusion level within a particular class (Instructor G's Lecture vs. Instructor G's Team Activity), there was less of a consensus. Some classes had a high level of enjoyment and a lower level of confusion whereas other classes had a low level of enjoyment and a higher level of confusion.

In a way, this makes sense. If the level of material matches the comprehension level of the students, enjoyment ratings would presumably be higher than confusion ratings within each activity. However, when considering the class as a whole instead

of in its parts, there is more opportunity for confusion to arise. The change from activity to activity creates an opportunity for confusion to occur regardless of material being taught. It is in this change from activity to activity where real teaching can happen. Moving from activity to activity is like moving from step-to-step in the learning/teaching process. Here it is not the nature of the activity, but rather the inherent nature of teaching and learning that creates the confusion.

So, the second pre-analysis assumption was proved to be incorrect, when comparing activity to activity across different classrooms, but correct when looking at the individual class as a whole. Just as a little confusion might not affect a student's engagement, a little confusion might not hurt their enjoyment.

Enjoyment vs. Participation ($e < p$)

Most classes had a higher level of participation than enjoyment, but the difference was small. While it is good the students participated, they may not do it very enthusiastically if the level of enjoyment is not there. Quantity may be overtaking quality. When comparing activities, the average level of enjoyment for Lectures was 2.6, and the average level of participation for Lectures was 2.8. This was a surprising and hopeful find, since lectures are sometimes considered a necessary evil. They are a useful tool in relaying information to students, but are not always the most active of methods. In the classes observed, the teachers were doing something right if the students were both participating and enjoying themselves.

The two cases where participation was lower than enjoyment might relate to the personality of the teachers. Spoken highly of within the school, students seem to enjoy Instructor D's way of interacting with them (humorously, gregariously). Instructor C is the 'guru' who students look up to, and who also delivers dynamic lectures. Whether because the students are enjoying the 'show' put on by the teacher, or are intimidated into silence, the students are not participating but they are enjoying themselves. This may not be bad if they are learning something in the process, but since we have suggested that participation may be a measure of engagement, this could be a problem if engagement is the desired behavior.

Participation vs. Confusion ($p > c$)

Generally the level of participation was higher than the level

of confusion. Again, this is not a surprising find. This can mean a few different things depending on the degree of difference. It could mean that the student level of comprehension was higher than what they were learning, and were participating out of boredom. The material may have been just right for the students, and they were comfortably learning. If the students were really confused because the material was too tough for them, then at least they did not have a problem speaking up.

In both the first and third situations, care should be taken. If a student is bored, then it is unlikely that learning is taking place. Also it is not good if the student is overwhelmed by the material, even if they are participating, because not all students speak up when they are confused. A few students voicing their confusion may represent the entire confused population, but they may just be more vocal than the rest. Either way, the level of participation should be paid attention to as it is a good, if inconsistent and subjective, indicator of confusion.

Position Map (Activities and Correlations)

ACTIVITIES ARE GENERALLY SHORT AND SIMPLE (straightforward one- or two-week assignments) or long and wicked (half- or full-semester long and complex). The exception is the philosophical discussion (Lecture). The philosophical element brings complexity to an otherwise simple problem for the student.

The symbols in Figure 3 (next page) refer to the analysis of the next several pages.

Using average numbers gathered from the findings, the following correlations were made in terms of class activity.

Team Activity

(High Enjoyment, Participation, Confusion, and Engagement)

Due to the game-like nature of the activity, the class taught by Instructor G had high enjoyment, high participation, high confusion and high engagement. In this class, competition between teams was an impetus for learning, rather than an ego-based competition where victors would be declared 'better' than losers. This is a competitive school and Instructor G found a way to get that to work to the advantage of the students. In general, this activity took a little time and presented a relatively simple problem for the students to solve. Specifically, it was highly interactive between students. Students had to come to a consensus intellectually to solve a problem, and also had to

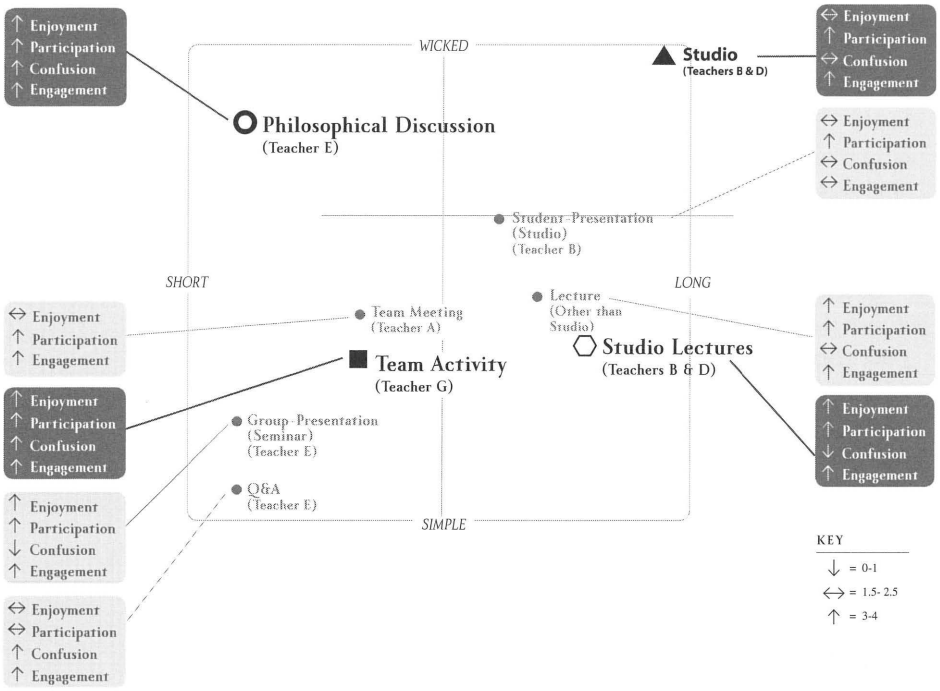


FIGURE 3
 Problem complexity vs. length of project
 (from student's perspective)

work together physically. This varied work requirement leads to the high level of confusion amongst the students.

Studio Lectures

(High Enjoyment, Participation, Engagement and Low Confusion)
 For this activity, the Lectures that took place in the Studio classes were analyzed. They are similar to the Team Activity in three areas. The Studio Lectures given by Instructors B and D had high enjoyment, high participation and high engagement. Students needed to listen and pay attention since this activity relates to the Studio that students take seriously. What makes this different from the Team Activity is the low confusion level. This is because the lectures themselves represent a rather simple problem for students to navigate. The studio lectures address problems that cover longer periods of time than a single week

or class. This may be due to the fact that they are connected to the Studio that is in itself a rather lengthy process.

Studio Time

(High Participation & Engagement, Medium Enjoyment & Confusion)

As has already been mentioned, Studio work is a serious endeavor for the students. This is reflected in the high levels of participation and engagement among students. They need to pay attention if they are to follow along and do what will be asked of them—or even to comprehend what will be asked of them. As with the Studio Lectures, these activities were taught by Instructors B and D.

In the transition from Studio Lectures to Individual Studio Instruction, there is a drop-off in enjoyment for the students and an increase in confusion. This could be because in the Lecture portion of the Studio, the teacher may discuss theory; but in the Studio, the students must put that theory into action. Confusion thus increases because they are learning how to solve the kinds of ambiguous and interrelated problems typical of design. Enjoyment decreases because they are more focused and they are ‘doing’ instead of more passively (and more publicly) listening. The type of performance anxiety present in Studio is likely to decrease student enjoyment level. In addition, the problems typically last eight or sixteen weeks, so a more serious and thoughtful approach is needed from the students than for the Lecture.

Philosophical Discussion

(High Enjoyment, Participation, Confusion & Engagement)

This activity in Instructor E’s class had the same ratings for behavior as the Team Activity. All observed ratings were high. The Team Activity was more physical than this discussion; but both held the interest of the students, as reflected in the high levels of enjoyment, engagement and participation. A possible reason for students finding this activity captivating was the philosophical nature of the discussion.

Many people like to share their opinions. Philosophical debates lend themselves to such opinion giving and, being philosophical, are full of abstraction and ambiguity that brings them closer to the wicked end of the problem spectrum. Also, participants used several modes of communication methods: story telling, argumentation, conversation, summary, questions and humor. This rich environment encourages high levels of enjoyment, participation and engagement. The high confusion level appears additionally to

be partly a result of the situation getting out of Instructor E's control. Enjoyment was also enhanced by the low stakes situation; unlike studio, a philosophical discussion is a challenge lasting merely an hour or two.

Analytical perspective 3: Across Students – How closely tied do the teaching of manual design skills and reflective practice need to be?

WITHIN THE SEVEN OBSERVATIONS are two studio classes: a Foundation level three-dimensional design class taught to students entering the masters program without prior design experience, and a Product Design Workshop consisting of first- and second-year graduate students. Videotaped observations of the student/ instructor studio interactions total five and one half hours, covering twenty different students. Given the small size of the sample, this paper is about presenting provocative ideas.

In the prior sections' analysis, the studio portions of these classes were the only learning activity that did not earn the highest rating for student enjoyment. Also, both studio classes in the observation contained a lecture portion; in both instances, the studio lecture generated frequent laughter. The instructor-student studio work that followed, however, generated little laughter. Studio, it would seem, is serious business. And, the worse a student does, the more serious it becomes. In the words of one of the original observers, "Students [who] perform [poorly] would be discouraged from design activity."

Two very different sets of skills

In an institution that accepts students without a prior design background, studio-based classes serve two purposes (*see table 5*): 1) to train students to be good designers by engaging them in reflective practice, and 2) to train students to be skillful in design ideation and use of communication tools (once called 'hand skills,' but which now includes abilities in using design visualization software).

Hypotheses

- 1) Students with poor manual skills will generally be at a disadvantage in learning reflective practice skills as they will have fewer documents or materials to use in student-instructor discussion.
- 2) Students with poor manual skills may fall into a cycle of

	Displayed little reflective move-making	Displayed multiple reflective moves and evaluations
Displayed poor manual skills	Mark Foundation	Terry Foundation
Displayed notable manual skills	David Foundation	Charlie Foundation

TABLE 5
Manual and Reflective Skills

- using their manual skills solely in attempts to produce enough quantity of material to meet class requirements, missing entirely the reflective practice aspects of design.
- 3) Manual skills and reflective practice skills are different enough that they can be learned somewhat independently of each other.

This paper examines the differences in student's studio experiences based on their observed abilities or inabilities within each skill set. Due to the small sample size, we identified students at the extremes of both skills in various combinations. For assessment of manual skills, we found several instances in which instructors commented on student skills (if the student did not assess themselves).

For reflective skills, we looked for the reflective cycles described by Schön (1982):

In this reflective conversation, the practitioner's effort to solve the reframed problem yields new discoveries which call for new reflection-in-action. The process spirals through stages of appreciation, action and re-appreciation. The unique and uncertain situation comes to be understood through the attempt to change it, and changed through the attempt to understand it. (p. 132)

The practitioners' moves also function as exploratory probes of their situation. Their moves stimulate the situation's backtalk, which causes them to appreciate things in the situation that go beyond their initial perceptions of the problem... In both cases, further, the practitioner's reframing of the problem of the situation carries with it a hypothesis about the situation. He surfaces the model of the phenomena associated with his student's

framing of the problem, which he rejects. He proposes a new problem and with it, a new model of the phenomena, which he proceeds to treat as a hypothesis to be tested. (p. 148)

Based on Schön's descriptions, the elements of reflective practice watched for included: 1) student-generated plans for using design media to experiment; 2) student evaluation of their own work outside of issues of build quality; 3) the use of terms that imply an ongoing process of experimentation, such as 'play with [something].'

Using these criteria, students were identified who fit all four quadrants of the original 2 x 2 grid, although the final quadrant - notable manual skills and strong reflective moves and evaluations - was filled with a Foundation student, so the student's

Example student	Hand skills	Reflective move-making
Mark Foundation	Poor	None observed

TABLE 6
Observation

manual skills are relative to other Foundation students. (Of course, names of all the students have been changed.)¹

¹ The data set is small and homogenous.

Observations

Mark struggled mightily with his work, and frequently expressed frustration (*table 6*).

Mark: "I tried to [create] this shape... no no I have no idea. I tried to five times but I couldn't figure it out. I can imagine that kind of shape, but when I try to sketch it, I dunno"

Instructor: "Can you visualize it on paper?"

Mark: "I dunno some kind of line like image but I can't imagine"

Instructor: "Sometimes we can imagine some shape, but it's hard to articulate it. ... If you cannot visualize by sketch or computer tools or anything, it's very hard to communicate with other people."

Mark: "I can visualize it, on this paper, but not to mark it."

The instructor begins to sense the student's frustration and

respond to that – much like the interaction between David (another student who displayed little reflective move-making) and his instructor.

Instructor (later, after examining some of Mark's model-related sketches)
 "You need to calm [come?] down. You need to calm down. You got a lot of design... You need to calm down."

Mark is in a very unhappy place. Instead of being able to use his manual skills to explore and experiment with design ideas, his evaluation skills have slipped in to self-criticism. There is no energy in this struggle to evaluate the design hypotheses

Example student	Hand skills	Reflective move-making
Terry Foundation	Good	Observed

TABLE 7
 Observation

themselves; instead, Mark's critical and evaluative skills are targeted to the quest of figuring out what is going wrong with his own technique.

Unlike several of the other Foundation students, Terry responded energetically when the instructor asked which of her models she likes best (*table 7*). She both answers the question and engages in spontaneous evaluation of her own designs. While she is not as articulate in her judgments as Charlie (who appears later), the student with better hand skills who also displayed reflective evaluations, she is able to make qualitative judgments and re-evaluate her own designs once they are in the world.

Terry: "My favorite is this one"

Instructor: "Can you tell me why?"

Terry: "Um I dunno I mean I guess I just sort of like the overall shape. I mean I guess its I like this part of it. I mean, so it does need something. Like looking at it again, it needs something at the bottom."

Instructor: "What about this?"

Terry: "I hate that one."

Instructor: "You hate that one? Why?"

Terry: "I dunno it's just it's like so boring and like I don't know."

While discussing one model, the foam breaks in two in the instructor's hands.

Terry: "Uh oh"

Instructor: (Holding one half of the broken model) "This one might be good. Design by accident."

Terry: "Yeah that one would be a little bit better if my craft was better. That was my experimentation with the wire cutter. Didn't come out so well."

Later, they discuss another model.

Terry: "The thing I don't like about this one, though is it's very like one-sided. And so like outside there's nothing. So but like I wasn't really sure how to reconcile that without sort of ruining what I have."

Instructor: "Because if this model is not precise that's why it's a little you know weird or something."

Terry: "I just feel like that one's so boring. It looks like a monument anyone can make."

Example student	Hand skills	Reflective move-making
David Master of Design	Good	Not well demonstrated

TABLE 8
Observation

One stark contrast stands between Mark, the student with neither the hand skills nor reflective technique, and Terry, who even while struggling with craft, directs her critical thinking to the outcomes of the design moves.

David came to class prepared with a collection of vivid quick sketches, rendered in pencil and marker - the most vivid sketches seen in the videotapes of both studio classes (*table 8*). However, instead of exploring other alternatives or evaluating his design moves, David spends his time describing his concept

at length, and responds quizzically to the instructor's design process suggestions. (Note: David spoke quietly, so not all of his utterances could be decoded).

Instructor: (after several minutes of discussion about the technology offering behind the design idea). "I want you to stay with the concept - and design it."

(David starts describing the object depicted in the sketches, then returns to describing the technology elements of the solution).

David seems to be responding to the instructor's design practice suggestions by trying to identify specific homework assignments. He takes audible mental notes of any mention of assignments by the instructor.

Instructor: "Can you do a few more versions of this? This idea is that the form is very musical. Is that the idea? ... Can you do a few more language concepts?"

David: "Language concepts. Sure."

Instructor: "Because I think this is definitely one direction, but it's a little too funky... And I don't want you to refine this; I want you to do things like this (gesturing at sketches) in a couple of different. Cause we'll start developing a language. Right now it's a very quick concept, which is great to see... But we really want to more..."

Instructor: "I love the concept."

David: "do more alternatives."

As the instructor talks about what kinds of alternatives to explore, such as the ergonomics for a scanner, David jumps to a quick suggestion for a gun.

Instructor: "Well, you don't want a gun. That's too literal. Right?"

Much like Mark, the other student who did not display much reflective evaluation, David finds himself bewildered and at a loss for how to conceive of what to do next.²

David: "There's no criterion. It's just like..."

Instructor: "What do you mean by that? 'There's no criteria.'"

David: "I dunno. Now I pretty much got the idea down I need to know how..."

² The students who are easiest to study using protocol analysis are the most talkative ones—predominantly American students whose native language is English. Two of the four observed students do not speak English as their native language, but were fluent and talkative during the observation. Unfortunately, both non-native speakers (one from Korea and one from China) fell on the 'reflective practice skills not observed' side of the matrix. No accounting has been made for cultural differences.

Instructor: "Design it. You just have a concept, and you haven't designed it."

David: "What do you mean by design it?"

Instructor: "I mean, not just do a quick—for me this is like a placeholder, right, its like your first draft."

David: "You want like materials and things."

Instructor: "Form, details, relationships among things, a physical model ... it's just doing it at enough depth that it's not at a concept stage."

Instructor: "Either developing that language or other languages. Is what it means to kind of design through a product."

David: "And later how do you choose one?"

Instructor: "You choose by saying 'it should be like this.'"

Instructor: "It's just working through some of the implications of

Example student	Hand skills	Reflective move-making
Charlie Foundation	Above average	Significant demonstration

TABLE 9
Observation

what your concept suggests to see whether it's a viable direction or not. You will have criteria to evaluate. It's not just it's not arbitrary."

Instructor: "You're very good at quick visual sketches, but I want to get deeper."

The final quadrant in the grid is occupied by Charlie, whose hand skills were above average within the Foundation class, based on the quality of the models he brought to the discussion with the instructor (*table 9*). The reflective assessments of his work are particularly dense and descriptive, suggesting that his hand skills have provided him with more to speak about design—or, perhaps, his aesthetic vocabulary has enhanced his ability to engage in craft.

Charlie: "You seem to feel the strongest about that one. I think it probably is the most strong. I was afraid to do it because it

was hard to do. I was pleased with the proportions in terms of the response I get from that.”

Charlie: “I think the overall idea of the concept of this stays intact. Sharpening the diamond-shaped object articulating that more. And playing with this possibly to do that on the other ones. I can even see a circle or a button here or just tighten up. Something to” (gesture of closing or tightening)

Discussion

Based on these observations, we can revisit the hypothesis.

- 1) *Students with poor manual skills will generally be at a disadvantage in learning reflective practice skills as they will have fewer documents or materials to use in student-instructor discussion.*

In the observations, the students who did not engage in reflective activity still had sufficient materials to engage in discussion with their instructors. The missing resource for these students was design-centered evaluation. The student with poor manual skills focused all of his evaluation on his own inabilities, apparently unable to separate evaluation of his design moves from critical personal evaluation of his skills. The student with high-level manual skills did not view design ideation and communication techniques as a way of exploring a design, but rather as a way of precisely representing a specific final idea.

- 2) *Students with poor manual skills may fall into a cycle of using their manual skills solely in attempts to produce enough quantity of material to meet class requirements, missing entirely the reflective practice aspects of design.*

While the data set is too small to draw firm conclusions, obsession about producing enough ‘stuff’ – or the correct ‘stuff’ – appeared only in the two students who did not engage in reflective practice. In the absence of a strategy for making design moves, perhaps these individuals are at a loss as to what kind of moves to make at all.

- 3) *Manual skills and reflective practice skills are different enough that they can be learned somewhat independently of each other.*

The observations do support this, given that the problems with reflective practice occurred in both the student with the worst manual skills and the student with the best.

The A-student trap There is one speculative, but tantalizing, possible explanation for the struggles of the non-reflective students: they are struggling so much because they are doing everything they know to succeed.

The methods that excellent students use to succeed in non-design programs can turn disastrous when trying to learn reflective practice. One path to excellence is to 1) understand exactly what the instructor expects for an assignment, and do that precisely; 2) draft, edit and refine repeatedly; 3) listen to the instructor's evaluation and use that as a guide for correcting one's work.

This pattern backfires when attempting to become expert at reflective practice. Assignments have deliverables, but the deliverables are an outcome of the strategy of reflective practice. Attempting to create the precise deliverables won't meet the instructor's requirements. The draft-edit-refine metaphor isn't reflective practice, but it looks a bit like it. Both draft-edit-refine and reflective practice involve creating materials that are sketchy, discarding intermediate work products and moving eventually to something refined and final. But draft-edit-refine follows a narrow path to a roughly known solution; reflective practice follows an improvisational path where both solution and problem are explored simultaneously. And, when it comes to using the instructor's evaluation, no matter how hard the student attempts to correct their 'errors,' there are always new ones. The evaluation part of reflective practice looks like criticism.

In struggling, the draft-edit-refine student is likely to work even harder on those techniques that have worked in the past. Unlike in the past, however, working harder doesn't help. This could be quite frightening—at the very worst, they may wonder if they are even fundamentally capable of success.

To become successful reflective practitioners, 'A' students must come to the understanding that student Terry has: evaluation is not criticism, but the core of design. Problems with craft are problems when they interfere with the ability to evaluate.

Suggestions for training reflective practice for students without a design foundation

STUDENTS IN FOUNDATION CLASSES are particularly vulnerable to Mark's predicament: struggling so much with their manual production skills that they are unable to engage in reflective

practice. There are several possible consequences of this struggle:

- 1) Lacking confidence in their own actions, including work they have completed, the students are reluctant to present work to their instructors.
- 2) The pace at which they produce deliverables is slowed to the point where they miss the opportunities to discuss the materials.
- 3) Their lack of opportunity to explore the concepts of design practice may blind them to understanding the purposes of their assignments and class activities, making them seem arbitrary.
- 4) Their lack of success in producing material can result in an emphasis on production—“what do you want me to do?”—over utilizing the method as part of design practice.
- 5) The instructor is stuck at cross-purposes when a student is not productive; they need to help the student out of the self-inflicted hole yet resist down-playing the importance of completing assignments on time to an expected quality.

With all these contradictory goals, the Foundation students who most need to spend studio time with the instructor are the ones who look forward to it the least.

Come back, clumsy student

HOW CAN DESIGN STUDIO be made welcoming to the Foundation student whose manual skills are not yet developed? For non-designers, studio is a learning experience much closer to learning in childhood than anything they've faced in their adult lives. For many, it's the first time in years—if ever—that they've been bad at something they're trying to learn. Both manual design production and reflective design practice are new skills that they must learn simultaneously.

Studio materials can be inherently intimidating. There is a tendency to show materials created only by people with significant manual skills—people who have already spent years mastering the craft behind design ideation (sketching, drawing, creating diagrams). After all, the people teaching design have generally been engaged in the craft perhaps decades prior to their work as an instructor. When they create new materials, they create the mate-

rials to their own skill level—a level students may try to mimic, but which is unattainable in a single year of studio work.

What can be done to make studio inviting for the klutz, while still fulfilling the fundamental purpose of developing non-designers into design students?

- 1) Expressly describe the qualities of a good designer; inform students of what the goal state for 'thinking like a designer' is, even if they cannot yet comprehend what that experience feels like. One of the first things new design students will notice about every good designer they meet will be the production skills those designers have developed over the years.
- 2) Illustrate reflective practice using materials deliberately selected (or created) for their un-extraordinary hand skills. The work of prior foundation students could be vital.
- 3) Explicitly separate instruction of reflective practice from manual skills and exaggerate their differences. Make this difference an explicit topic of discussion within early studio classes.
- 4) Create some assignments that de-emphasize the result over the process of achieving that result. A parallel here is in the teaching of math; instructors will ask students to 'show their work' so they can verify the student's conceptual understanding. For math students who occasionally make simple errors—dropping a minus sign, for example—showing their work lets the teacher grade them on conceptual knowledge rather than the accuracy of their answer.
- 5) Permit or even challenge students to engage in reflective design activities using poor hand skills.
- 6) Teach methods to improve a weak manual skill product into one that is good enough to serve a reflective design purpose alongside the skill to produce great design. Would Mark have been so stuck if he knew how to make his stuff a little better even a little bit at a time?
- 7) Offer a remedial skills path for those who show promise without style.

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