Design Issues, Volume 17, Number 4 (December 1, 2001)

Introduction

Each issue of the journal tells a quiet story about the development of design thinking in our time. Individual articles stand on their own and explore their own issues and themes, but often there are important themes connecting the articles. Discovering these themes is one of the pleasures of editing, and we often like to share our discoveries with readers so that they, too, may be encouraged to explore in this way, tracing our direction of thinking or exploring other connections This is one of the strategies that we hope makes *Design Issues* valuable for readers with specific interests and at all levels of experience. We also hope it makes *Design Issues* a valuable tool in the studio or classroom, where students may be encouraged to discover not only the important particulars of our field but also the emerging coherence of its discourse.

Richard Buchanan's "Design Research and the New Learning" begins this issue by addressing one of the central problems of design today: the nature and value of design research and design knowledge. Buchanan distinguishes between "old learning" and "new learning," and he argues that design has become the new learning of our time. As this argument unfolds, it also offers four themes that serve to connect the later articles in this volume: research, historical context, the nature and use of definitions in design thinking, and the changing nature of products.

Raimonda Riccini's "Innovation as a Field of Historical Knowledge for Industrial Design" discusses the relationship between design research and historical research. Riccini argues that historical research has played—and continues to play—a critical role in establishing the definition and boundaries of industrial design as well as contributing significantly to design theory. Innovation is a key subject in this discussion, and Riccini argues that the particularity of circumstances and "historical vicissitudes" provide a catalyst to both practice and theory. Readers will also want to consider what kind of history Riccini proposes and contrast this with other kinds of history that are illustrated in this and former issues of the journal.

Tomás Maldonado's "Taking Eyeglasses Seriously" does, indeed, take eyeglasses seriously. He uses this product type to explore the relationship between technology and society, arguing that technology is not something outside of society—and, hence, something "autonomous" and a "cause" of social change—but something inside society that both "pushes" and "pulls" social change. The birth and development of eyeglasses reveals how important historical circumstances are in identifying the moments
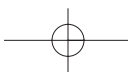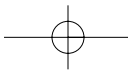
when technology pushes society and, in turn, is pulled by society. This essay reminds us how important the history and philosophy of technology is for the field of design—and, like Riccini's article, how important the circumstances and contingencies of history are for an understanding of design.

Nigel Cross's "Can Machines Design?" presents a personal history of his research into the relationship between humans and computers and his efforts to understand the human ability to design. The title of his essay turns the common question "can a machine think" in a new direction, and the argument ultimately leads back to what we have learned and stand to learn from machines about how people design. One of the most interesting features of this article is the discussion of computer programs to identify "bad" design in the area of graphic design.

Wendy Siuyi Wong's "Detachment and Unification: A Chinese Graphic Design History in Greater China Since 1979" is more than a chronicle of the period. Wong identifies many of the social and organizational influences on the development of graphic design in this complex part of the world. She also points the reader toward the deep issue of finding identity amid ethnic, linguistic, and cultural diversity. This is a useful survey for anyone interested in the problems of design in "Greater China." It once again demonstrates the importance of history for understanding design practice and theory.

The final selection in this issue of the journal is a review article by Carma Gorman on recent feminist scholarship on design and designers. Gorman focuses on Women Designers in the USA, 1900–2000, an exhibition curated by Pat Kirkham, the catalogue of the exhibition, and a special issue growing out of the exhibition that was published in the journal *Studies in the Decorative Arts.* She also discusses Joan Rothchild's *Design and Feminism.* Gorman challenges recent work on women and design on the basis of the definitions of "design" and "designer" that inform the work.

Richard Buchanan
Dennis Doordan
Victor Margolin

The editors want to congratulate Kevin Barnhurst, whose article "Civic Picturing versus Realistic Photojournalism: The Regime of Illustrated News, 1856–1901," received the Covert Award, given each year for the best article in the history of the media. The letter to Kevin included this comment: "We had a number of outstanding entries in this year's competition, and the task of judging was a difficult one. The ground-breaking nature of your scholarship led to our selection of your piece." This article was published in Vol. 16, No. 1 (Spring 2000) of Design Issues.
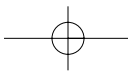
Design Research
and the New Learning
Richard Buchanan

Introduction

The theme of this conference is how we shape and sustain design research programs in our institutions. It is an important theme, and the conference is timely. Despite a growing body of research and published results, there is uncertainty about the value of design research, the nature of design research, the institutional framework within which such research should be supported and evaluated, and who should conduct it. In short, there is uncertainty about whether there is such a thing as design knowledge that merits serious attention. My goal is to address these questions from a personal perspective, recognizing that my individual views may be less important for the goals of the conference than how my views reflect, in subtle or obvious ways, the North American social, cultural, and intellectual environment within which they have formed. The conference is about design research in the United Kingdom, and my role is to provide a contrasting perspective at the outset that may help us understand some of the issues and options that are taking shape in the United Kingdom. My willingness to play this role comes from a belief that we are in the middle of a revolution in design thinking and that events in the United Kingdom, while strongly influenced by issues of national policy, reflect changes in the field of design in many other parts of the world.

Design Research in the New University

The origins of modern design research may be traced to the early seventeenth century and the work of Galileo Galilei. Galileo's *Dialogues Concerning Two New Sciences* was the culmination of thirty years of personal research into the motion of bodies, and the book presents his theory of motion. We are well aware that Galileo is considered the father of modern physics, but this is a story told by philosophers and historians who work under certain cultural beliefs that deserve closer examination. *The Two New Sciences* begins not with a discussion of physics but with a discussion of design in the great arsenal of Venice. Salviati says,

> The constant activity which you Venetians display in your famous arsenal suggests to the studious mind a large field for investigation, especially that part of the work which involves mechanics; for in this department all types of

instruments and machines are constantly being constructed by many artisans, among whom there must be some who, partly by inherited experience and partly by their own observations, have become highly expert and clever in explanation.
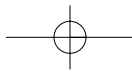
Salgredo replies,

You are quite right. Indeed, I myself, being curious by nature, frequently visit this place for the mere pleasure of observing the work of those who, on account of their superiority over other artisans, we call "first rank men." Conference with them has often helped me in the investigation of certain effects including not only those which are striking, but also those which are recondite and almost incredible.

The present condition of the field of design owes much to this brief discussion and the cultural environment within which it takes place. Instead of turning to investigate the human power or ability that allowed the creation of the instruments and machines of the arsenal of Venice, Galileo turned to an investigation of the two new mathematical sciences of mechanics. This reflects a general tendency following the fifteenth and sixteenth centuries to turn towards theoretical investigations in a variety of subject matters, laying the foundations of the diverse fields of learning that are now institutionalized in our universities.

Galileo's work was published by an English press in 1665, where it entered the tradition begun by Francis Bacon, who was Galileo's contemporary, and subsequently developed in monumental fashion by Newton in the *Principia* in 1686. Francis Bacon, too, plays an important role in the origins of design research, because his project was to begin a Great Instauration of learning that would lead to our ability to command nature in action, where nature would be molded by art and human ministry in the creation of "artificial things." Bacon's project is clearly a design project. And perhaps it is *the* design project, if we allow that the hubris and enthusiasm of Bacon would have been tempered over time if he had been able to witness the many mistakes and tragic failures of the application of knowledge gained in the natural sciences over the centuries. There is a deep humanism in the work of Francis Bacon, borne of his understanding of the role that rhetoric plays in human culture and in the advancement of learning. In truth, we may say that Bacon's project remains with us today, unfinished in its core purpose. After a hiatus of more than three centuries, during which human beings have explored the foundations of matter and natural processes, we are returning to the humanism that is required for a firm understanding of design.

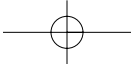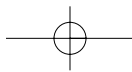Design was not one of the fields institutionalized in our uni-

versities following the work of Galileo, Bacon, Newton, Decartes, and others. The reason is not difficult to discover. As the new liberal arts of western culture took shape in the fourteenth, fifteenth, and sixteenth centuries, design was not included, except in the general work of architecture and the fine arts. Design as we have understood it in the twentieth century was then regarded as a servile activity, practiced by artisans who possessed practical knowledge and intuitive abilities but who did not possess the ability to explain the first principles that guided their work. Newton, for example, distinguishes the mathematical science of mechanics from practical mechanics and the manual arts.

In the Battle of the Books, which is an English characterization of the long struggle between old and new learning in our culture, design was clearly part of the old learning. It was "paleoteric"—the term that was used to name the old learning. The new sciences, which promised to put all human understanding and activity on a firmer footing, were the new learning. They were "neoteric," since they addressed new problems in understanding the world and tended to shape the organization of learning around such problems. The new learning was theoretical and oriented towards subject matters, marked off from each other by principles and causes that were, in a sense, in the nature of Being.

The subsequent unfolding of the new learning is a long and complicated story, but for our purposes we may observe that theory was highly prized in the universities, practice was tolerated, and production or making—the creation of what Bacon calls "artificial things"—was generally ignored as a subject of learning, except to the extent that the design of instruments played a greater and greater role in the investigation of the natural sciences. All that survived of production or making as a subject of study in the universities was captured in the literary and fine arts, which were studied through their results or tangible products as a subject matter for historical inquiry. In the Renaissance formulation, the results of design, to the degree that they merited attention, belonged to "belle lettres and beaux arts." The actual work of fostering natural talent and teaching individuals how to create was relegated to art schools and academies, which were first established in Europe in the sixteenth century, independent of universities. Subsequent art academies, established from the middle of the eighteenth century, show a concern for maintaining or raising the intellectual stature of the visual arts, but the activity remained essentially outside the universities. Even then, as Sir Joshua Reynolds demonstrates in his lectures, design was regarded as needing the guidance of the fine arts of painting and sculpture in order to reach its ends. In his first discourse, delivered at the opening of the Royal Academy of Art in 1769, Reynolds writes:
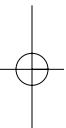
> An institution like this has often been recommended upon
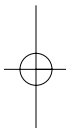> considerations merely mercantile; but an Academy,

founded upon such principles, can never effect even its own narrow purposes. If it has an origin no higher, no taste can ever be formed in manufactures; but if the higher Arts of Design flourish, these inferior ends will be answered of course.

The legacy of the art schools of design is with us today in the United Kingdom and in most other parts of the world, though the vision and effectiveness of these schools in teaching design grows fainter every year under the need for young designers to have more knowledge and a broader humanistic point of view in order to deal with the complex problems that they must face in their professional careers. Fragments of the human power or ability to create have, indeed, moved into universities in the past century or more, particularly in the form of engineering, "decision science," and most recently in the form of computer science. Furthermore, design education, too, has begun to find a place in a few universities—and in some of the leading research universities.
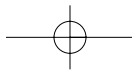
What I want to suggest for this conference is that the discovery of design in the twentieth century is more than a small incremental addition to the tradition of theoretical learning upon which our universities have been based since the Renaissance. True, design and its various branches have entered the universities under this guise, and their practical significance for economic development and the well-being of citizens may help to account for this development in tolerance among those who are committed to the old structure of universities and the old models of research. After all, universities had already found ways to accommodate within their missions the study of Law, Theology and Divinity, and Medicine. However, the discovery of design is more than this. It is a sign, I believe, of a new battle of the books in our time: a new round in the struggle between the old and the new learning in human culture.

The reason for this new battle is evident. While we do not deny the value and the ongoing benefit of theoretical investigations of subject matters in the sciences and arts, we also recognize that the powerful development of this learning has left us in a deeply troubling situation. We possess great knowledge, but the knowledge is fragmented into so great an array of specializations that we cannot find connections and integrations that serve human beings either in their desire to know and understand the world or in their ability to act knowledgeably and responsibly in practical life. While many problems remain to be solved in the fields that currently characterize the old learning—and we must continue to seek better understanding through research in these areas—there are also new problems that are not well addressed by the old structure of learning and the old models of research.

It is a great irony that what was once the new learning is now the old learning, and what was the old learning is now the new
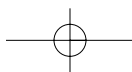
learning. For I believe that is what has happened to design; it has become the new learning of our time, opening a pathway to the neoteric disciplines that we need if we are to connect and integrate knowledge from many specializations into productive results for individual and social life. To be sure, those who practice, study, and investigate design in the contemporary world are themselves divided along paleoteric and neoteric lines. Some see no need for design research, and some see in the problems of design the need for research that is modeled on the natural sciences or the behavioral and social sciences as we have known them in the past and perhaps as they are adjusting to the present. But others see in the problems of design the need for new kinds of research for which there may not be entirely useful models in the past—the possibility of a new kind of knowledge, design knowledge, for which we have no immediate precedents. We face an ongoing debate within our own community about the role of tradition and innovation in design thinking.
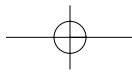
Without developing this theme further at the moment, I want to suggest that our discussions of design research hold open the possibility of a core insight regarding a new kind of university that is in formation today and that will emerge more clearly in the next century. The old, venerable universities will remain with us because they contribute valuable knowledge that must be disseminated through well-educated individuals. But there may be a new kind of university that will also have value. It will be a university that prizes theory but does not disdain practice and does not ignore the distinct problems of, and the need for substantive knowledge about, making or production. Making products—and by "product" I mean a range of phenomena that is very broad, including information, artifacts, activities, services, and policies, as well as systems and environments—is the connective activity that integrates knowledge from many fields for impact on how we live our lives. This new kind of university—and there may be only a few of them in the future—will discover a dynamic balance among theory, practice and production, a balance that we do not now find in the vision of most universities today.

Rather than elaborate these ideas with the results of my work in strategic planning for the institution with which I am associated—an institution that I regard as one of the emerging neoteric universities of the United States—I would like to turn to some of the issues of design research that we are gathered to discuss. In the long run I believe that discussion of these issues will lead us back to the nature of universities in the next century, but for now they are issues within our own community that we must address in order to advance the understanding of design today.

The Role of Definition in Design
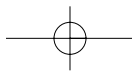Efforts to establish a new field of learning require a definition of the

field, and design is no exception. Unfortunately, our community has often foundered on the problem of definition. The literature is filled with contrasting and sometimes contradictory definitions of design, and efforts to define design have often led to acrimony. I have watched this struggle unfold, and I am grateful that the disputes have tended to die down in recent years. There has been an unfortunate misunderstanding about the nature and use of definitions, and this has caused our discussions to become unproductive and wasteful of time and energy. Frankly, one of the great strengths of design is that we have not settled on a single definition. Fields in which definition is now a settled matter tend to be lethargic, dying, or dead fields, where inquiry no longer provides challenges to what is accepted as truth. However, I believe that definitions are critical for advancing inquiry, and we must face that responsibility regularly in design, even if we discard a definition from time to time and introduce new ones.

Definitions serve strategic and tactical purposes in inquiry. They do not settle matters once and for all, as many people seem to believe they should. Instead, they allow an investigator or a group of individuals to clarify the direction of their work and move ahead. There are many kinds of definition, but for present purposes it is sufficient to identify two kinds: descriptive and formal. Descriptive definitions tend to identify a single important cause of a subject and point towards how that cause may be explored in greater depth and detail, allowing an individual to create connections among matters that are sometimes not easily connected. When Paul Rand says that "Design is the creative principle of all art," he identifies individual creativity as an important or even the essential part of design. When someone else defines design in terms of the materials employed in a specialized branch of design—e.g. "graphic design is the presentation of images and words in print"—he or she also identifies an important or even essential cause of design. Most of the definitions of design are descriptive definitions, and they are frequently metaphoric. They are as varied as the insights of human beings and as varied as the causes that may account for design. Some speak of the power of design; other speak of the material constraints; still others speak of the forms and processes of design and product development; and, finally, some speak of the end or purpose of design—as in Ralph Caplan's definition of design as "making things right." I find them all fascinating and helpful, because they capture different perspectives on what is a very difficult subject.

Formal definitions are somewhat different. They tend to identify several causes and bring them all together in a single balanced formulation. There are fewer formal definitions of design than descriptive definitions, but formal definitions are also useful. In *Industrial Design,* John Heskett provides this formal definition: "…industrial design is a process of creation, invention and definition separated from the means of production, involving an eventu-
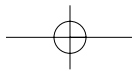
al synthesis of contributory and often conflicting factors into a concept of three-dimensional form, and its material reality, capable of multiple reproduction by mechanical means." This definition does not have the clean simplicity and emotional force of a descriptive definition such as Paul Rand's—and Heskett is no longer entirely satisfied with it, I am sure. But it served to bring together the several causes that he wished to investigate in his history of industrial design. In this sense, a definition, whether formal or descriptive, is like a hypothesis in research: it gathers together what will be investigated and sets the relation of causes that will become the themes of subsequent inquiry.

In my own work I have used both descriptive and formal definitions, as the problem and the occasion have warranted. For this meeting I would like to present a formal definition of design, because I am interested in advancing discussion in a field where there are several important and interconnected causes that are the focus of diverse kinds of research. I want a balanced formulation that expresses the functional relationships of the many causes that contribute to design. For this purpose I offer the following definition: "Design is the human power of conceiving, planning, and making products that serve human beings in the accomplishment of their individual and collective purposes." Those who are interested in what are the causes I have identified and seek to relate in this definition may find it useful to place the separate elements in the context of Aristotelian causes.[1] I suggest this not because I am particularly attracted to Aristotelian philosophy, but because Aristotle's investigation of formal definitions has had great influence throughout history in establishing the boundaries of fields and relating many otherwise separate lines of research. "Power" is the efficient cause or agency of action in design, comparable to Rand's concern for creativity. It resides in human beings as a natural talent that may be cultivated and enhanced through education. "Conceiving, planning, and making" is the final cause, in the sense that it identifies the sequence of goals towards which design thinking and practice move. "Products" represent the formal cause, in the sense of the formal outcome of the design process that serves human beings. And "in the accomplishment of their individual and collective purposes" represents the material cause of design, in the sense that the subject matter or scope of application of design is found in the activities, needs, and aspirations of human beings. The definition suggests that design is an art of invention and disposition, whose scope is universal, in the sense that it may be applied for the creation of any human-made product.

Whether this definition is amicably received—it certainly does not serve the purposes of communication with the general public, and I present it here only for those who have practiced and studied design for a long time—it provides a beginning for understanding design research. I think it provides a way to connect an

1   For a comparison of this definition with the four causes in the context of Aristotle's *Rhetoric,* See R. Buchanan, Design and the New Rhetoric: Productive Arts in the Philosophy of Culture," *Philosophy and Rhetoric,* forthcoming, 20001.
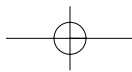
exceptionally wide array of design research that is now ongoing in the United Kingdom and in many other parts of the world. While we investigate design from many perspectives, we are also aware of the need to integrate our diverse results into a comprehensive framework that explains the pluralism of inquiry.
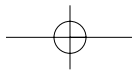
However, my goal is not to survey the range or substance of design research. Instead, I want to focus on one aspect of our field that I believe has become critical to our explorations of design in practice and theory. This concerns the nature of a "product." For the general public and for many of our colleagues in other fields, a product is usually understood to be a physical object—the result of industrial design. In contrast, I believe we should regard the changing meaning of "product" as one of the important features of the revolution in design that we are now witnessing.

What is a Product?

To understand the changing meaning of "product" in design and the consequent problems and issues of design practice, design education, and design research, I have suggested that there are four orders of design in the twentieth century. Each order is a place for rethinking and reconceiving the nature of design. The orders are "places" in the sense of topics for discovery, rather than categories of fixed meaning. The distinction between a place and a category may appear subtle, but it is profound. It illustrates what I regard as a fundamental shift in the intellectual arts that we employ to explore design in practice and research—a shift from grammar and logic in the early part of the twentieth century to rhetoric and dialectic. Our early theories of design found expression in grammars and logics of design thinking, but the new design finds expression in rhetoric and dialectic. We will not elaborate this distinction further at present, but its import will soon become apparent.

The first and second orders of design were central in the establishment of the professions of graphic and industrial design. Graphic design grew out of a concern for visual *symbols*, the communication of information in words and images. That the name of this profession or area of study has changed over the years only serves to emphasize the focus: it has evolved from graphic design, to visual communication, to communication design. Initially named by the medium of print or graphical representation, the introduction of new media and tools, such as photography, film, television, sound, motion, and digital expression, has gradually helped us to recognize that communication is the essence of this branch of design, independent of the medium in which communication is presented. There is no comparable evolution in the naming of industrial design, except that some people refer to "product design" when they mean the special segment of industrial design concerned explicitly with the creation of mass-produced consumer goods. However, industrial design grew out of a concern for tangible, phys-

ical artifacts—for material *things.* In this sense, *symbols* and *things* are what I mean by the focus of first- and second-order design in the twentieth century.

The process of ordering, disordering, and reordering design is revolutionary, and I believe we are now in the midst of such a revolution. Instead of focusing on symbols and things, designers have turned to two quite different places to create new products and to reflect on the value of design in our lives. They have turned to *action* and *environment.* The argument for the reordering of design is simple and clear. It is certainly important that designers know how to create visual symbols for communication and how to construct physical artifacts, but unless these become part of the living experience of human beings, sustaining them in the perfor- mance of their own actions and experiences, visual symbols and things have no value or significant meaning. Therefore, we should consciously consider the possibility that our communications and constructions are, in some sense, forms of action. This does not deny the importance of information and physical embodiment, but makes us more sensitive to how human beings select and use products in daily life. In fact, from this point of view we may discover aspects and features of successful products that have eluded us in the past.

Out of such concerns has emerged a new domain of design thinking and new directions of professional practice. We call this domain "interaction design" because we are focusing on how human beings relate to other human beings through the mediating influence of products. And the products are more than physical objects. They are experiences or activities or services, all of which are integrated into a new understanding of what a product is or could be.

There is a common misunderstanding that interaction design is concerned fundamentally with the digital medium. It is true that the new digital products have helped designers focus on interaction and the experience of human beings as they use products. However, the concepts of interaction have deep roots in twentieth-century design thinking and have only recently emerged from the shadow of our preoccupation with "visual symbols" and "things." As they have become a growing focus of attention in the design community, the implications have emerged with force, changing many features of design practice and design education. This is arguably the center of design research in the United States today, taking a variety of forms but always turning toward questions of action. How do we plan an action, how do we create the concrete form of experience, and how do we evaluate the consequences of action?

I have also suggested that there is a fourth order of design, focused on environments and systems. Of course, systems thinking is nothing new today. Systems have played an important role in engineering design at least from the nineteenth century—and earlier in design thinking, if we remember, for example, that the third book
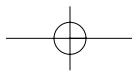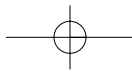
of the *Principia* concerned the "System of the World" and Newton's views on "universal design." There are important works in more recent design theory that address problems of systems. What has changed today is what we mean by a system. The focus is no longer on material systems—systems of "things"—but on human systems, the integration of information, physical artifacts, and interactions in environments of living, working, playing, and learning. I believe that one of the most significant developments in systems thinking is the recognition that human beings can never see or experience a system, yet we know that our lives are strongly influenced by systems and environments of our own making and by those that nature provides. By definition, a system is the totality of all that is contained, has been contained, and may yet be contained within it. We can never see or experience this totality. We can only experience our personal pathway through a system. And in our effort to navigate the systems and environments that affect our lives, we create symbols or representations that attempt to express the idea or thought that is the organizing principle. The idea or thought that organizes a system or environment is the focus of fourth-order design. Like interaction, a new focus on environments and systems —which are where interactions take place—has strongly affected design thinking and design research in the United States and in many other parts of the world.

We are now in the early formative stage of understanding how third–and fourth–order design will transform the design professions and design education, but the beginning has been made. It is difficult to see how design thinking can go back to its earlier centers of attention without a sustained period of exploration of interactions and environments.

Figure 1
Four Orders of Design

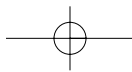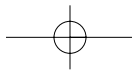|	Symbols	Things	Action	Thought
Symbols	**Graphic Design**			
Things		**Industrial Design**		
Action			**Interaction Design**	
Thought				**Environmental Design**

To summarize the key point in our changing conception of products, it is useful to consider what the old and the new approaches to design thinking offer us. In design theory of the early and middle decades of the twentieth century, products were often understood from an external perspective. By this I mean that the focus of attention was on the form, function, materials, and manner of production and use of products. This is why form and function loomed so large in theoretical discussions of both graphic and industrial design, and why materials, tools, and techniques figured so prominently in the early phases of design education, as in the "preliminary" or "foundation" courses of the Bauhaus and the New Bauhaus. With the move away from visual symbols and things as the focus of attention, designers and design theorists have tried to understand products from the inside—not physically inside, but inside the experience of the human beings that make and use them in situated social and cultural environments. While form, function, materials and manner of production continue to be significant, we have an opportunity for new understanding through an investigation of what makes a product *useful, usable*, and *desirable.*

Only a moment is required to realize that from an interior perspective of the experience of human beings, products reveal many new features and properties that are, at present, only partly and inadequately understood. Indeed, this change of perspective also has important consequences for design education, as we turn away from the "foundation" course and create new introductory courses that cultivate the new perspective among students. For example, the school of design of which I am Head abandoned the "foundation" course nearly ten years ago, in favor of a "first-year" course that is centered on the human experience in design. Instead of teaching the materials, tools, and techniques of design as the primary subject matter, the new course focuses on projects and problems that are situated within the experience and motivation of students. Having a reason to design gives focus and purpose to student development. When a purpose exists, we find it easier then to introduce materials, tools, and techniques. The "first-year" course at Carnegie Mellon is grounded in rhetorical purpose, while the "foundation" course was grounded in the grammar of design. The relationship of these two approaches is perhaps evident if one observes that the last chapter of a school grammar book is usually a chapter devoted to "how to write an essay." In contrast, the last chapter of a school rhetoric book is a chapter on grammar and style. The analogy is significant for design education.

The Problem of Design Knowledge

To carry this line of thinking one step further, I would like to turn to the problem of design knowledge and how design research today is directed towards new issues and employs new methods. In the traditional model of design knowledge, there are both analytic and

synthetic aspects. The grammar and logic of inquiry focused on an analysis of the elements of form, function, materials, and manner of designing, producing, and using—and then on the synthesis of these elements in the work of the practicing designer. An excellent example of the sophistication of this approach is Moholy-Nagy's "Design Potentialities," where he discusses both the analytic and synthetic dimensions of design, as they were understood in the 1940s.[2] For Moholy-Nagy, nature and society provided the surrounding context for design thinking on each element, and he sketches the areas where further knowledge may contribute to improved design practice. For example, he discusses how form, function, and materials imitate or mimic natural processes, with manner serving as the distinctively human efficient cause that separates artificial products from natural products. As brief as his paper is, it is a valuable sketch of the problems of design research and how they bear on design practice.

What I believe has changed in our understanding of the problem of design knowledge is greater recognition of the extent to which products are situated in the lives of individuals and in society and culture. This has given us two areas of exploration that are, in a sense, mirror images of the same problem. On the one hand, we are concerned to place products in their situations of use. The product then is a negotiation of the intent of the designer and manufacturer and the expectations of communities of use. The product is, in essence, a mediating middle between two complex interests, and the processes of new product development are explicitly the negotiation between those interests. Clearly, issues of strategic planning, collaborative design, participatory design, and, above all, human-centered design rise to a new level of intensity, requiring new kinds of knowledge to effect successful solutions. On the other hand, we are concerned with the experience that human beings have of products—how they interact with products and how they use products as a mediating influence in their interactions with other people and their social and natural environments. This is the interior perspective on products that I discussed a moment ago. As the following diagram suggests, the new perspective on products deepens our concern for, and understanding of, the nature of form.

Rather than investigate form from an external perspective as shape or visual pattern, we regard form as a synthesis of what is useful, usable, and desirable—that is, the content and structure of performance, human affordances, and product voice. In essence, form becomes a temporal phenomenon of communication and persuasion, as human beings engage with products. Time is clearly one of the most important features of the new understanding of products. However, this is such a vast subject that we cannot dwell on the implications at the moment. Instead, we should consider what kinds of knowledge bear on the creation of products that are useful,

2   Laszlo Moholy-Nagy, "Design Potentialities," *Moholy-Nagy: An Anthology*, Richard Kostelanetz , ed. (New York: Da Capo Press, Inc., 1991), 81–89.
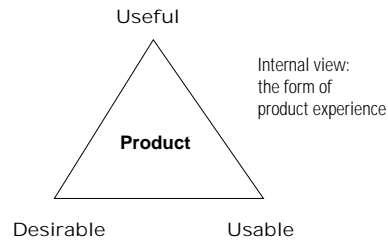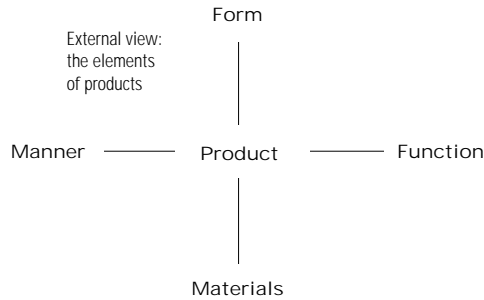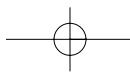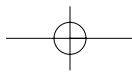
Figure 2
Perspectives on products.

Form

External view:
the elements
of products

Manner —— **Product** —— **Function**

Materials

Useful

Internal view:
the form of
product experience

Product

Desirable   **Usable**

Product

Intent   Expectation

Design

Manufacturer   **Community of Use**

Natural, Social and Cultural Environment

usable, and desirable, because these are the areas of the most intense design research today in the United States and in other parts of the world.

Investigation of the useful clearly takes us to problems of the deepest content and structure of product experience. To be useful, a product must meet a basic criterion: it must work. "Working" is partly a problem of engineering or computer science, or a combination of both, and in this respect designers continue to explore their relationships with the disciplines that bear on engineering. However, "working" is more complex in products today, for it is not only engineering that plays a role but the natural sciences as well. Indeed, in the new information products there are also many issues of content that force us to consult with content specialists in many other fields, including the social sciences, the humanities, and the arts. Wherever intellectual content is an issue in a product, design-

ers must understand how to work with content specialists. In the past, designers have tended to deny explicit responsibility for content in their products. Quietly, they have often affected content in significant ways. In the new circumstances of design, content and structure have become intertwined in ways that are puzzling and troubling, requiring further research.

Investigation of the usability of products clearly takes us to human and cultural factors. In essence, it is not enough that a product works; it must also fit the hand and mind of the person who uses it. Issues of usability are exceptionally complex, and they have taken designers and design researchers into the behavioral and social sciences in ways that are unprecedented in our field. What is perhaps most important to remember as designers move deeper into the human sciences is that the universal propositions of the behavioral and social sciences do not lead directly to the specific, particular features of successful products. There is a profound, irreducible gap between scientific understanding in this area and the task of the designer. This does not mean that designers may escape their responsibility of understanding the contributions of the human sciences to their work. Instead, it focuses one of the problems of design research: how do designers employ knowledge from the human sciences to discover specific features of products. In the past, there was some confidence that the discipline of marketing could provide the connective link. However, it is increasingly evident that marketing has been asked to carry too great a burden in the product development process—a burden beyond the limits of the marketing discipline. For this reason, the relationship of design and the human sciences has become a new focus of research and exploration.

Investigation of the desirability of products takes some researchers back to the fine arts for insights into aesthetic form and style. However, the desirability of products has proven to be more complex than it was thought to be in earlier design theory. Aesthetics plays a role, but the deeper problem seems to be one of "identification." What is there in a product that leads someone to identify with it and want it to be part of his or her life? This is surely one of the most puzzling and intriguing aspects of design today. Recent interest in "branding" or product brand identity—the new effort at transforming the "brand" of the United Kingdom may be an example of such interest carried to a new level of marketing!—is a sign of how some researchers and practicing designers are exploring the issue of desirability. However, this area remains one of the weakest topics of design research today. Clearly, there is a need for more serious consideration of persuasive communication—what is properly the issue of "ethos" in classical rhetoric—in successful products. This is one area where design practice remains far ahead of design research.

Above all, the investigation of what makes a product useful, usable, and desirable points toward one final issue that is perhaps
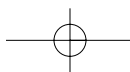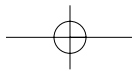
the central dilemma of the new design research. What is the nature of a discipline that brings together knowledge from so many other disciplines and integrates it for the creation of successful products that have impact on human life and serve human beings in the accomplishment of their individual and collective goals? Those involved in design research are easily drawn into research in other fields. Indeed, it is tempting to evaluate design research by its contributions to other fields. In design research, however, the central challenge is to understand how designers may move into other fields for productive work and then return with results that bear on the problems of design practice. Design knowledge, it seems to me, lies in our grasp of the principles and methods of design that allow this activity to take place and lead to effective products. The alternative, common among some design theorists and researchers, is to believe that design must ultimately be reduced to one or another of the other disciplines—i.e. cognitive science, engineering, fine art, anthropology, marketing, and so forth.

Kinds of Design Research

A young field suffers many misunderstandings on the way to intellectual and practical strength. One of these misunderstanding in the design community is a tendency to think that research means a single kind of activity. There are, in fact, many kinds of research, some of which are very familiar to every designer and others of which are rare and unfamiliar. Since many faculty members in design schools are wrestling with the problem and are under institutional pressure to demonstrate that they are "researchers," it may be useful to review an important distinction that is employed by universities as well as corporate and governmental funding agencies. From the perspective of the type of problem addressed, research may be *clinical, applied*, or *basic*.

Clinical research is, as the name suggests, directed toward an individual case. Many forms of clinical research are common in the design community and they play an important part in design practice as well as in design education. For example, when a designer must conceive a new identity for an institution, the search for information about the organization is clinical research. Clinical research focuses on the problem for action that the designer faces. To solve a particular, individual design problem, it is essential to gather whatever information or understanding may be relevant in its solution. Educators teach their students how to find such information and how to organize it as part of the design process, leading to a particular design solution suited to an imaginary or real client.
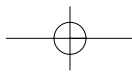
Clinical research also plays an important role in organized research activities and programs. In a field such as medicine, clinical research is the investigation of the effects and consequences of a particular course of treatment. In business, clinical research often emerges in case studies, where an investigator attempts to observe

and record all of the relevant events that have shaped a course of action or a business decision. Design, too, uses the case study method, and there are organizations in the United States that promote the creation and dissemination of case studies as a basis for understanding a wide range of issues, ranging from branding and identity systems to new product development. A couple of years ago, an organization reported that in the Harvard Business School catalogue of case studies there were fewer than twenty studies of design in business, among the ten thousand published case studies. The numbers have changed since then, but there are still very few case studies of design in the business literature. In contrast, case studies are more common in design literature. They range in quality from stories in popular design magazines to serious and methodical reports in some of the better academic design journals. The common trait of case studies is that they assemble information or data that may give insight into problems that reach beyond the individual case.

In contrast, applied research is directed towards problems that are discovered in a general class of products or situations. The goal is not necessarily to discover *first* principles of explanation but to discover some principles or even rules-of-thumb that account for a class of phenomena. For example, Edward Tufte's interesting and popular books on information design provide rules-of-thumb for the designer faced with problems of information design—they do not provide clear principles. Applied research is more common in design today than it was even thirty years ago. And, of course, applied research tends to be well-funded and common in disciplines such as engineering and computer science. The common trait of applied research in design is the attempt to gather from many individual cases a hypothesis or several hypotheses that may explain how the design of a class of products takes place, the kind of reasoning that is effective in design for that class, and so forth. It is systematic in its procedures and certainly more rigorous than case studies. In addition, because applied research lies between clinical research and basic research, those engaged in applied research are often conscious of the application of more fundamental principles to investigate a class of products or activities. The application of a general principle is seldom an easy matter, because many other factors, governed by other principles, may enter into the class of products or activities that one wishes to study. The kind of understanding that designers must have in order to work most effectively in concrete situations usually requires qualification and refinement through applied research—of the type provided by academic research or of the type that comes with extensive practical experience gained in working on many individual design problems.

The third type of research is basic. It is research directed towards fundamental problems in understanding the principles— and sometimes the *first* principles—which govern and explain phe-
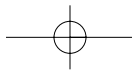
nomena. This is a rare form of research in the design community, but some does exist as systematic speculation on the nature of design or as empirical investigation, where the hypothesis is particularly significant and far-reaching in its implications. In general, this type of research is associated with design theory, which provides a foundation for all other activities in design. Furthermore, the development of basic research often suggests bridges to other disciplines, as the problems unfold and become more focused. We suggested earlier that the origins of modern design research could be traced to Galileo and Francis Bacon. Galileo's discovery of a theory of motion from observations of particular cases of design and machine operations as well as observations of natural phenomena is a demonstration of how basic research may connect phenomena and fields. We may well wonder how many other discoveries in the natural and human sciences emerged from observations of design phenomena. And we may further wonder why it has taken so long to focus attention on the nature of design as a discipline that integrates knowledge for practical action.

To summarize, there are many kinds of research in the design community today. It is often difficult for designers and design educators to distinguish these kinds, and this has led to some confusion about how we should evaluate progress in the field and uncertainty about how to present our proposals to funding agencies. Designers are correct in believing that they are quite familiar with research and that research is an essential part of the design process. However, the type of research that designers and design educators recognize is usually a form of clinical research, often cut off from more fundamental applied and basic research. We will do well to recognize that gathering data and assembling facts is only a small part of the challenge of research to advance the understanding of design. Applied research is critical to this task, since it seeks to establish connections among many individual cases. And basic research is the most difficult and critical to the future of the field, because it seeks to establish which are the significant facts and connections in our experience of design.

An Example of Design Research

I would like to conclude with a concrete example of design research in the United States that may signal the changes that are taking place in the field of design. My objective is not to report results in any detail but to point toward the kind of problem and the kind of institutional arrangements that are emerging. I hope this will have some relevance to the conference as we discuss experiences in the United Kingdom.

The example I have selected is a three-year project to investigate "customer-valued quality" in the product development process. This work was supported by the National Science Foundation in the Transformation to Quality Organizations (TQO) Program. The

TQO program is particularly interesting because it represents a significant investment of private funding along with governmental funding. In fact, the TQO program is funded more by private industry than by the government—a sure sign of the perceived potential value of the results. I was a co-principal investigator on this project, working with colleagues in three other institutions in the United States.

We were puzzled by the problem of what constitutes value for the customer when selecting a product and, particularly, how customer values enter into the product development process. To address this issue, we investigated a variety of products and, with the cooperation of several corporate partners and design consultancies, looked closely at the working relationships of industrial designers and engineers, with some attention to the collaboration of these groups of professionals with experts in marketing. In the initial phase of this work we produced a number of case studies of different kinds of products—in this work, my colleagues in business schools were invaluable in directing our work and writing the studies in accord with the standards of business school case studies. With these results in hand, we then set about the task of inductive inquiry, seeking common threads in successful product development work in each corporation.

The case studies gave us insight into how customer-valued quality entered into the product development process through collaborations among engineers and industrial designers, with evidence of a new approach to user observation and user experience. At first, it was unclear how the new approach was different from the more traditional influence of marketing in suggesting desirable product functions and, overall, setting product criteria for the development process. We began to observe, however, that marketing played a somewhat smaller role than we expected. Indeed, we found that engineers and, particularly, industrial designers went directly to user observation and interviews with potential users. The technique was not the classic form of focus group discussion—though some use of focus groups was made in some cases. Instead, there were conversations with potential users and, sometimes, the conversations were shaped around modest product prototypes that elicited comments and observations.

As we looked at the case studies more closely and discussed the matter in follow-up conversations, we began to detect a new stream of thinking and influence in the product development process. The source appeared to be some form of social science methodology or methodologies—concepts and methods drawn from the social sciences, but adapted to the work of product development. This attracted our attention and we began to look for more systematic efforts to introduce this stream into organizations. The significance of this became quite evident in the second annual conference that we held in cooperation with our industrial partners
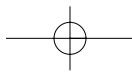
and with our collaborating design firms. The focus of this conference was the "user experience in product development." The presenters from our partners in industry spoke explicitly about the development of new "usability testing" facilities and contributions from anthropologists, social psychologists, and others educated in the social sciences. Indeed, we had begun to anticipate this theme by inviting representatives from three small design consultancies that have made "user experience" the focus of their business. These were consultancies that were, and still are, employed by our major industrial partners.

It quickly became apparent that we had framed our work precisely on what is an emerging trend in industrial organizations. One sign of the timeliness of the meeting was the number of other corporations that requested permission to send representatives to the conference—purposely to discuss concepts and methods of exploring "user experience." From the perspective of our work on the project at Carnegie Mellon University, the most significant outcome of the conference was an overview of what appear to be three major approaches to bringing social science insights to bear in developing new products. Each approach was represented in sharp profile by one of the small design consultancies that participated in our conference. Furthermore, these approaches had their counterparts within the large corporations, in new or relatively new "user testing," "usability testing," or "user experience" groups comprised primarily of social scientists.

The second significant outcome of the conference was the identification of a distinct "gap" between the general insights of social scientists and the specific work of designers (engineering and industrial). As our discussions at the conference and in subsequent interviews revealed, the emerging problem is how to transfer or translate the general insights of social science into product features. The gap is large, and all parties were exploring different methods for bringing the insights to bear in actual product development.

Thus, our work on the grant focused on these two points: alternative approaches to exploring "user experience" and alternative methods or techniques of crossing the gap. We developed a conceptual framework for the alternative approaches. Then, we began a series of interviews with individuals in corporations and the new design consultancies, with the goal of characterizing and assessing different approaches. For example, we interviewed Gary Waymire from GVO, Mark Dawson from Hauser, Gianfranco Zacchai from Design Continuum, Rick Robinson from e-Lab, and Christine Riley from Intel. Our interviews followed a pre-determined set of questions, intended to draw out both conceptual and practical features of the new dimension in product development.
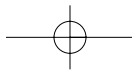
This work has formed the core of a master's thesis by Neil Wherle, a student in the Interaction Design program of the School of Design at Carnegie Mellon. His work speaks to the new dimen-

sion in product development, the new kinds of design firms that have come into being to carry out this work, the new groups within corporations that are pursuing similar ends, and, finally, the implications that this development may have on the matter of customer-valued quality in new product development. The work associated with this thesis was part of a broader effort to develop a model of product development in which "quality" is reinterpreted as an issue in design. Design theory has tended to focus on the decision-making processes in the creation of artifacts, with too little attention to the sources of innovation that come from user observation. In a sense, the discipline of marketing may have been asked to carry too great a burden in supporting the product development process. The new focus on "user experience" points toward other sources of insight that may enrich the contribution of marketing without reducing customer-valued quality to the outcome of classic marketing methodologies.

To me, this project is an example of applied design research, because it was directed towards a general class of phenomena in the product development process. However, I believe it also demonstrates how such research connects back to clinical research for relevant data—evident in the case studies that we produced in the early phase—and to basic research. The connection to basic research is perhaps evident only to this degree: work on this project has helped to identify problems for inquiry that have become one area of concentration in a new doctoral program in the School of Design at Carnegie Mellon. It is too early to tell whether work in this area of doctoral inquiry will involve basic design research, but the formation of a broader design theory is clearly one of our goals.

Of course, this project is not the only element in shaping the direction of the new doctorate. Ten years of experience in what we call "integrated product development," involving collaboration with faculty from engineering and marketing in an experimental studio course has played a critical role. So, too, has our ongoing work with the Human-Computer Interaction Institute, with faculty from the School of Computer Science, the School of Design, and departments of behavioral and social sciences. But the NSF project was a decisive event in demonstrating the ability of design research to identify and even anticipate emerging trends in the design professions and contribute to their understanding. Perhaps I should add that comparable experiences in other areas have led us to focus our doctoral program on four interrelated areas of concentration: Design Theory, Interaction Design, Typography and Information Design, and New Product Development. I will not explain the rationale for these areas or the specific issues that we expect to address in design research, but this is where design research at Carnegie Mellon is headed.

3   "Doctoral Education in Design: Proceedings of the Ohio Conference, October 8–11, 1998" is available from the School of Design at Carnegie Mellon University.
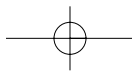
Future Directions: Doctoral Education in Design

As our experience at Carnegie Mellon suggests, doctoral education in design will grow significantly in the future. It is already evident in the United Kingdom and in many other countries around the world. For this reason, I would like to conclude with a brief report on an international conference that was held in October 1998 in the United States. The theme of the conference was "Doctoral Education in Design," and the meeting was sponsored by the School of Design at Carnegie Mellon, the Ohio State University, and the journal *Design Issues.*[3]

While doctoral programs in design have existed for several decades at various institutions around the world, it is apparent that doctoral education is still in a formative stage. Nonetheless, a community of inquiry has formed in the field of design and is moving ahead to consolidate what is known about the field in its most sophisticated and well-grounded form and to prepare researchers and educators who will expand that knowledge through original inquiry. I will not try to summarize the discussions, except to say that they were wide ranging and some of the most interesting that I have encountered in the design community in the past decade. The issues included some of the most difficult in our field today, ranging from the relationship between research and design practice to the nature of design knowledge and the influence of national policy on the direction of doctoral programs.

Behind the discussions, however, were fundamental differences of philosophic perspective and vision. The diversity was impressive, as was the determination of all participants to avoid narrow ideological disputes. The conference gave me confidence that design has reached a watershed moment in its development as a field of inquiry. We may not see major consequences from the development of design research in doctoral programs for some period of time, but there will be consequences, affecting design practice as well as design education. The changes will come sooner than many believe. This is why I believe our conference today, at the London Design Council, is important. As we discuss the design of research and the problems of investigating design, we are preparing for a new time in the field. Personally, I am less concerned about how we, as individual faculty members, will fare in the future than in how we will prepare a new generation of students who will understand the legacy of design and rise to the challenge of the new learning.

Innovation as a Field of Historical Knowledge for Industrial Design
Raimonda Riccini

II. But is history a science? No.
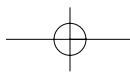III. Can it become one? Yes.
It is the subject of this book.[1]
Raymond Queneau

There is little doubt that, in the last twenty years' discussion, the historical culture of industrial design has made a significant contribution to put important theoretical issues into focus; first of all, that of the definition of the discipline and its field of action. I am thinking of, for example, the debate conducted in publications and periodicals,[2] the birth of associations, the multiplication of opportunities for international encounters,[3] exhibitions, and events in museums. These phenomena are familiar to all, so there is no reason to discuss them at length here. As often has been the case for other areas of study, historical research has turned out to be a preliminary, basic condition for the very nature of industrial design as a culture, a context, and a discipline.

Without attempting to retrace the fertile discussion that has taken place on an international level, we should at least mention that the results achieved have been very useful in a wide range of directions, especially for the identification of prevailing historiographic models, the identification of new ones, the expansion of the area of investigation,[4] and the refinement of research methods. And while many, perhaps a great many, fields have yet to be explored or have been overlooked, many new perspectives have appeared.

I would like to briefly indicate at least three points I feel emerge more than others, and that, in my opinion, are crucial: the relationship between historical research and design research; innovation as a key of interpretation both for history and for design activity; and the role of historical research for design. As we can see, these are wide-ranging arguments. What prompts me to discuss such themes is not the pretense of providing in-depth insight each of them. The fact of the matter is that they are closely interconnected; only their mutual interrelations can give a complete sense to my line of reasoning. Therefore, all I can do is to develop, for each of them, a few lines of working investigation (which have emerged in my work first in the doctoral program, then in teaching and research activities in the Industrial Design course of the Politecnico of Milan), illustrating their points of contact and cross-fertilization.

1 Raymond Queneau, *Una storia modello* (1966) (Torino: Einaudi, 1988), 6–7.
2 Although it is familiar ground, I would like to recall the important role in the design history debate played, in the past and present, by magazines such as *Industrial Design, Stile Industria, Design Issues, Design Studies, Journal of Design History,* and *Culture Technique* . (some of which still exist, fortunately). Here, I would like to call the reader's attention above all to *Design Issues* of Spring 1995, entirely devoted to the question of the history of industrial design. In my opinion, it represents an indispensable turning point for the theme discussed here.
3 After the first Convegno internazionale di studi storici sul design held at the Politecnico of Milan, 1991, we can mention the first International Conference on Design History and Design Studies, "Design History Seen From Abroad: History and Histories of Design," Barcelona, 5th Spring of Design, 1999 April 26–28. and the Second Scientific Meeting of Design Historians and Scholars, Havana, June 2000.
4 I am thinking of the fundamental area of the history of visual design, connected in an increasingly aware manner to the history of products, companies, and institutions; autonomous co-protagonist of a design situation in which certain sectors are encountering a blurring of the boundaries between product design and graphic design. But I am also thinking about the emergence of the historiography of "peripheral countries" and the questions it raises concerning the dominant, Anglo-Saxon approach to historiography.

Design Research and Historical Research

Some years ago, Tomás Maldonado—with a certain almost imperceptible irony, I believe—warned that industrial design, like all activities that have the task of integrating different disciplines, would have to defend itself against each of them.[5] At the time, Maldonado was referring, in particular, to the relationship between the design of products and mathematical methods, also with allusions to mechanical engineering and (I presume) to architecture. I have a fleeting memory that, for many years, these disciplines claimed a sort of supremacy in the area of design methods, and a role as mentors of the nascent discipline of industrial design.

In the area of research, too, and in particular that of historical research, things proceeded in a similar manner. It is well known—as is only logical in the case of any new disciplinary adventure—that at the outset industrial design was the focus of research "from outside," approached by already established spheres that demonstrated interest in industrial design, motivated by their own inner disciplinary reasoning, and by more or less superficial analogies and similarities. Design critics and historians often were, first and foremost, critics of art and architecture, and scholars of aesthetics or semiotics.[6]

Subsequently, when industrial design began to take on an autonomous physiognomy, becoming a subject of research and reflection "from within," the stage almost entirely was occupied by the debate on the identity of design itself, a debate that was not truly separated from that regarding the controversy of origins. In a certain sense, this uncertainty stimulated theoretical discussion, but in another sense, it slowed the development of instruments having a certain degree of autonomy.

In the moment in which an established practice of research (history), possessing a strong, well-structured disciplinary and methodological foundation, enters into relation with a field of research that has yet to be fully delineated (design), the confrontation necessarily produces effects of varying importance. On the one hand, the field of design has drawn upon history for certain working practices, and adopted them. The main ones include instruments of analysis, such as the comparison and interpretation of documents; and methods of analysis, such as those based on morphology or style; narrative criteria. The other history, coming into contact with industrial design, has been forced, in some cases, to review certain cornerstones of its doctrine. On the level of research sources, for example, history has had to modify its relationship with documents that, in the case of industrial design, are not only on paper, but also are three-dimensional; not only linguistic, but also visual; and not only quantitative, but more frequently qualitative. We can consider what has happened to the areas of research traditionally considered the closest to design such as art, architecture, and technology, which, faced with the appearance of

5   Tomás Maldonado, "Scienza e proget-
    tazione (1964)" in *Avanguardia e razion-
    alità* (Torino: Einaudi, 1974), 186.

6   It probably is that today it is already
    possible to trace a history of design
    historiography, which might also provide
    useful indications for an updating of
    methodologies and established research
    areas within the historiographic *ancien
    régime.* The expression has been used by
    Peter Burke, regarding the revolutionary
    role of the school of the *Annales* with
    respect to the precedent way of studying
    history. Peter Burke, *The French
    Historical Revolution. The "Annales"
    School, 1929-89* (London: Polity Press and
    Basil Blackwell, 1990). Certain contribu-
    tions in this direction already are visible
    including, among others, that of Clive
    Dilnot (see Bibliographics References).
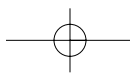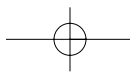
the phenomenon of the design of industrial products, have had to repeatedly revise their content and widen their range. Often, this operation has given rise to improper combinations such as the raising of industrial products to the level of artworks, or the view that they are like minor siblings of architecture. But over the long term, each field has reassumed its own position in the disciplinary hierarchy. We also can observe certain branches of history such as business history which, although with an inexplicable delay, are now starting to approach the themes of industrial design: the role of the project and the product in the context of corporate development and its innovative dynamics.[7]

This reciprocal contamination between industrial design and historical research demonstrates that the latter is particularly well-suited to function as a catalyst for the development of relations between different disciplines, favoring comparisons and interchange.[8] In my hypothesis, historical research also becomes one of the selected areas for discussion of our role as a discipline and the organization of a pedagogical structure for the purposes of teaching.

But which history? The question is neither rhetorical nor neutral. My choice is oriented toward a systemic approach to the reconstruction of the historical episodes of industrial design. The formulation reflects, on the one hand, the systemic tradition that belongs to design culture,[9] while, on the other, it is open to the most up-to-date aspects of the disciplines that are concerned with the dynamic interrelations between society and all things technical. Therefore, this approach is marked by a strong interdisciplinary character that attempts to channel multiple forms of expertise and knowledge into a nucleus of issues to be evaluated in all its aspects. We could call this a "pluralistic" approach to the history of industrial design, combining the historical tradition of modern design with other lines of reasoning and reflection, such as those on technical, socio-cultural and socio-economic progress. The result hoped for is a prismatic interpretation of a segment of our material culture. In this way, this interpretation perhaps might represent—in spite of its partial nature—one of the possible models for a propaedeutic framework for the cultural and professional training of future industrial designers.

Innovation: Circumstance of History and Design
Now I would like to examine certain questions related to the central theme of my contribution.
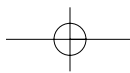
First of all, I would like to state that great caution should be applied regarding the theme of innovation. In fact, I feel that the concept of innovation today is being subjected to the classic phenomenon of erosion and loss of meaning caused by abuse of terms. It has been observed that certain ideas—and innovation undoubtedly is one of them—appear on the intellectual scene with extraordinary force because they seem to be capable of resolving or

7 On this theme, see Raimonda Riccini, "History From Things: Notes on the History of Industrial Design," *Design Issues* XIV:3 (Autumn 1998): 43–64.

8 For example, in the field of history, we have seen a gradual narrowing of the gap between science and technique, on the one hand, and architecture on the other. And in both directions, as Antoine Picon notes, "To begin with, the history of architecture, books such as Alberto Pérez-Gómez's *Architecture and the Crisis of Modern Science* and Kenneth Frampton's *Studies in Tectonic Culture* are representative of this renewal. Simultaneously, architecture has begun to interest historians of science and technology. A historian of science such Peter Alison has written, for instance, on the status of the architectural metaphor in early 20th century epistemology, whereas the celebrated historian of technological systems, Thomas Hughes, is more and more curious about architecture." Antoine Picon, "Architecture, Sciences, and Technology," in Peter Galison and Emily Thompson, eds., *The Architecture of Science* (Cambridge MA: The MIT Press 1999), 309–335. Quoted on pages 309–310.

9 Starting with Tomás Maldonado, *La speranza progettuale. Ambiente e società* (Torino: Einaudi, 1970).
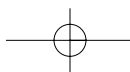
clarifying all questions. "We put it to the test for any connection, any purpose, and we try it out in the possible extensions of its specific meaning, with generalizations and derivatives. Nevertheless, once we are familiar with the new idea, once it has become part of our overall patrimony of theoretical concepts, our expectations shift back into balance with its effective uses."[10]

One of the ways in which the notion of innovation can return to equilibrium with its effective uses is that of positioning it in the process dimension of history. By separating innovation from history, we run the risk of assigning it a role in design that is analogous (and opposed) to that of creativity. "Creation or innovation?" Jean-Claude Beaune asks in his *Philosophie des milieux tech-niques.*[11] "The second notions implies…highly suspect economic connotations; the first can lead to a belief in a certain metaphysics of the artist." Therefore, if we want to avoid condemning innovation to the same fate as metaphysics, a term for all seasons and a demiurgic picklock for any commercial operation, we need to take it back to its concrete historical circumstances.
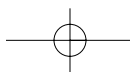
In this sense theories on innovation represent an important point of reference because they assign history a crucial role in the development of interpretation models that are also valid for an understanding of the present. In the wake of reflections on the changes in technological-productive processes and on their role in favoring economic development, a certain consensus exists in the belief that "processes of change depend on the history of the process in time and their explanation must include the reconstruction of the events in time, even small historical events, restored to the tradition of historical research."[12] In other words, innovative change, like all "irreversible" processes, can be explained only by starting with history, and by retracing a sequence of temporal events. Without getting involved here in the question of the irreversibility or reversibility of innovative phenomena, it seems to me that the path taken by studies of innovation, proposing a reassessment of historical time as an interpretation key, is proving to be one of particular interest for design culture.
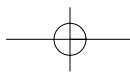
It is a well-known fact that this sector of study on innovation has developed by starting with the analyses of theorists and historians of technology, but also of economists and economic historians, analyses in which the theme of innovation assumes a structural value. In the aftermath of the abandonment of the deterministic and "internalistic" versions of the history of technological innovation, the focus recently has shifted to the role of societies in promoting the dynamic of innovation. Therefore, these studies are open to the areas of sociology, anthropology, ethnomethodology, and material culture. Empirical and theoretical fields of research, traditionally connected to the social disciplines, now are seen as selected ambits for a deeper understanding of the behavior patterns and paths of innovation. In other words, a theory of innovation as a social

10   Clifford Geertz, *The Interpretation of Cultures* (New York: Basic Books, 1973). Quotation from Italian edition, *Interpretazione di culture* (Bologna: Il Mulino, 1998), 9.

11   Jean-Claude Beaune, *Philosophie des milieux technique. La matière, l'instrument, l'automate* (Champ Vallon: Seyssel, 1998), 250.

12   Renato Giannetti and Pier Angelo Toninelli, *Dalla rivoluzione industriale alle traiettorie tecnologiche. La tecnologia tra teoria e storia d'impresa* in Renato Giannetti and Pier Angelo Toninelli, eds., *Innovazione, impresa e sviluppo economico* (Il Mulino, Bologna 1991), 100.

13   For an overview of the various theories of
     innovation, up to contemporary formula-
     tions, cfr. Madeleine Akrik, "Comment
     sortir de la dichotomie technique/société.
     Présentation des diverses sociologies de
     la technique" in Bruno Latour and Pierre
     Lemonnier, eds.,*De la préhistoire aux
     missiles balistiques. L'intelligence
     sociale des techniques* (Paris: Editions La
     Découverte, 1996) 105–131; Patrice
     Flichy, *L'innovazione tecnologica. Le
     teorie dell'innovazione di fronte alla rivo-
     luzione digitale* (Milano: Feltrinelli,
     1996).

14   Cfr. the document of the Centre de soci-
     ologie de l'innovation, Ecole de Mines,
     1967–1992. *Comprendre la création
     scientifique, technique et culturelle*
     Paris, 1992.

15   Alain Findeli, in his essay "Design History
     and Design Studies: Methodological,
     Epistemological and Pedagogical Inquiry,"
     Design Issues XI:1 (Spring 1995): 43–65,
     produces a long list of examples of how
     the history of design could be presented.
     As the history of: significant products;
     technology; materials; designers; design
     institutions; exhibitions, fairs and exposi-
     tions, regular events; design profession;
     design education; ideas in design;
     anthropological history of material
     culture; economic history of material
     production; design discourse; design jour-
     nal and literature; design industries;
     social history of design; design centers
     and design museums; compared history
     in various countries; reaction against
     design in some countries, institutions, or
     social groups; women in design; specific
     products or type of products; specific
     daily practices in connection with design;
     etc. (63).

16   As has taken place in the more radical
     version of the sociology of innovation, in
     which innovation is only one among the
     many elements of sociological analysis.

process has been developed.[13]

One immediate consequence of this shift of focus is that of entering spaces traditionally reserved to the range of action of industrial design: everyday life, consumption, and the typologies of industrial products. Thus, industrial design has become, although still on a marginal level, a subject of study and investigation on the part, this time, of disciplines that are extraneous to design culture. Design now is one of the themes of attention, for example, of the sociology of technology. Together with commercial distribution and advertising, it is seen as part of those mechanisms of integration of users in the process of conception and design of products and services that feeds the system of innovation in the world of business.[14]

Moreover, in this area of studies, the idea has emerged that innovation is a process in which multiple histories and multiple actors converge. For example, there is an increasing use of words typical of the language of industrial design, such as designer and project, but also consumer and user. In this context, we even find forerunners of the analyses used today in the world of marketing and design, on the active, design-oriented role of the user, and of the consumer-innovator.

As they begin to open their attention to industrial design, studies on innovation offer design culture certain interpretation models based on the dimension of process (history, linearity, and chronology) and systemics (interaction between technique and society, coordination of multiple factors of influence, and intertwinings of fields of knowledge). It is evident that this is a complex articulation that cannot be interpreted with the tools of the typical research traditions of other forms of historiography (art history, technical history, or history of communications) which, until now, have been the main axes of our way of interpreting the historical vicissitudes of design.

At this point, it seems possible to develop our own research modes, starting with the intrinsic characteristics of the subject of the research (namely design) rather than the analogies that can be established with respect to other subjects. This would lead to the demise of all those specifications we usually are forced to apply to the term "history of design."[15] But how can we construct a historical discourse on design that isn't a mere transposition of a history of innovation?[16] How can this discourse be characterized as history of industrial design? And what might be the results in the areas of training and education?

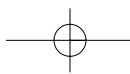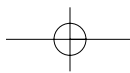### History as a Tool for Design, and Other Purposes

We need to recognize the fact that the question of history as a tool for design refocuses attention on the relationship between the aspects of theory and practice, especially in the area of pedagogy and training.[17] Therefore, this is a decidedly crucial question for

17   On this theme, see Tomás Maldonado, *Educazione e filosofia dell'educazione* (1959), in *Avanguardia e razionalità* (Torino: Einaudi, 1974).

18   Herbert Simon, *The Sciences of Artificial* (Cambridge, MA: MIT Press, 1969).

19   While the widest possibilities for application of the cognitive value of history are in the education and design areas, we should not overlook other concrete purposes that can be assigned to historical research. One example will suffice: research for the conservation and exploitation of the historical heritage of public and private entities, institutions, companies, and studios. The reasons for work in this direction are many. I will indicate just two of them. The first is primarily cultural in character: the institutions and companies that detain this heritage must be made aware of its cultural value for the society. The second is strictly related to the discipline: more than for any other historical discipline, in our case, the availability of artifacts is indispensable for a valid analysis because industrial design products are the true documents of study.

20   Medardo Chiapponi, *Cultura sociale del prodotto. Nuove frontiere per il disegno industriale* (Milano: Feltrinelli, 1999), 70.

21   The attribution of an epistemological and cognitive function to technical and economic phenomena is not something to be dismissed out of hand. See the concept of the technological system as "a system of alterations of our forms of knowledge" in Joel Mokyr, *The Lever of the Riches* (Oxford: Oxford University Press, 1990) and the critique of this interpretation on the part of the some social constructivists, who see technical (and scientific) activity exclusively as a practical, strategic and contextual one. Cfr. Renato Giannetti, "Le rappresentazioni dell'innovazione tecnologica in prospettiva storica," in Id., ed., *Nel mito di Prometeo. L'innovazione tecnologica dalla Rivoluzione industriale a oggi* (Firenze: Ponte alle Grazie, 1996), 281–295.

studies regarding the discipline of design. In this sense, industrial design, like other project-oriented activities, has a rather singular relationship with history. These disciplines often manifest a need to orient the activity of historical research in the direction of an explicit strategic goal that normally would not be a part of its usual practice. One exemplary case of this phenomenon is the historical reconstruction of products, systems of products, images, and the communication programs of individual companies or institutions, aimed at the design or redesign of certain components, or even of entire systems. Historical investigation in these circumstances is usually not conducted by professional historians, but by the personnel of consultants, the companies themselves, or the designers. These are studies we might define as "applied research," in which the final objective is direct and explicit. In this case, the orientation scheme for research activities developed by Herbert Simon for design research has an unchallenged practical force. Based on his work, we can say that, if design can be seen as a problem-solving process, history can be a procedure "for gathering information about problem structure that will ultimately be valuable in discovering a problem solution."[18]
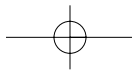
Nevertheless, these research modes which I have very briefly outlined here are necessarily also related to forms of academic research in which, in my opinion, Simon's scheme remains valid. Here I refer, for example, to all the research that contributes to orient and nourish university teaching, at all its levels.[19]

In this direction, once again, I feel that the studies on innovation are particularly useful as reference models. Their openness to the historical, social and, above all, the systemic dimensions permits industrial design to play an active role in the context of the interrelations of the system itself. As Medardo Chiapponi reminds us in a recent book, "industrial design, like any other design activity, or more than any other, is intrinsically oriented toward the production of change and innovation. Its very existence can only be justified by an innovative context."[20]

If we accept this radical assumption—namely, that one of the main characteristics of industrial design as a project activity has been, and remains, its capacity to encourage innovation—then this particular aspect can and must represent a key of interpretation for historical design research.

This research perspective not only offers a strong, cognitive approach[21] and a capacity to provide a solid methodological basis for historical studies, but it also is characterized by a noteworthy heuristic potential, for orientation of the design sphere, as is clearly evident in the case of the history of product typologies. From the point of view of design culture, the 360° reconstruction of particular artifacts, within a specific socio-technical context, placed in relation to systems of values and scientific knowledge, and with frameworks
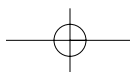
of distribution and use, offers a variety of advantages for the activity of design. These include the possibility of improving the contextualization of the design problem to be resolved; of avoiding paths already taken, or of returning to hypotheses that were abandoned because they were before their time, or because they were not yet technologically feasible; to come into contact with ideas, events, and solutions that can help to revise the very structure of the way the problem is posed. In other words, an assessment of innovative scope. And there's more: in this perspective, it is possible to salvage from oblivion all those artifacts that didn't have a place within the parameters of the previously established historiographies: aesthetic parameters, references to personalities, and movements. In short, the history of industrial design thus could truly become the history of contemporary material culture.

We are evidently not very far from the articulation of the historical reconstructions launched in the socio-technical sphere regarding typologies of artifacts,[22] opening new research strategies for that field of study as well.

By following this approach, moreover, we can get a clear picture of the particular nature of the historiography of industrial design. Just as the industrial designer must be capable, to develop a project, of establishing a dialogue and a sort of choreography among a series of disciplinary areas and specific types of knowledge (technology, production, distribution, psychology, and aesthetics), so the historian of industrial design must be able to move about within a range of different sectors of historiography. If it is true that the innermost nature of historical research is not that of specialization, the same must be true for the history of industrial design. This characteristic of wide-ranging curiosity is reinforced by the variety of points of view and accents that can be found in industrial design itself, in the case by case examination of products or visual communications, designers or manufacturers, problems of production methods, or aesthetics.

There is a methodological affinity between history and design, an affinity that should be food for thought for professionals in the present, who are not always aware of the value of history, unlike the historians, who are aware of the value of the present. "History"—François Furet says—"never loses its awareness of the fact that a part of its curiosity is rooted in the present. In contrast with the beliefs of the positivists, the relationship with the present takes part in the constitution of its relationship with truth...There can be no explanatory concepts of the past that are not based on participation in the present, connecting the historian to his time. But inversely, without thought regarding the present, there can be no possibility of a concept."[23]

22   Apart from the well-known cases of studies of the bicycle, Bakelite, and fluorescent lighting developed by W. E. Bijker, we can mention the studies of Ruth Schwartz Cowan, "The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology" in Wiebe E. Bijker, Thomas P. Hughes, and Trevor J. Pinch, eds., *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology* (Cambridge, MA: The MIT Press, 1989), 261–280, and of Quynh Delaunay, *Histoire de la machine à laver* (Rennes: Presses Universitaires de Rennes, 1994), because they focus on typical artifacts of the history of industrial design.

23   François Furet, *Il laboratorio della storia* (Milano: Il Saggiatore, 1985), 45.
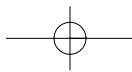
Bibliographical references

Braun, Ingo and Bernwar, Joerges, "Techniques du quotidien et macrosystèmes techniques" in Alain Gras, Bernard Joerges, and Victor Scardigli, eds., *Sociologie des techniques de la vie quotidienne* (Paris: L'Harmattan, 1992), 69–86.

Chant, Colin, ed., *Science, Technology and Everyday Life 1870-1950* (London: The Open University, 1989).

Cheney, Sheldon, and Martha Cheney, *Art and the Machine. An Account of Industrial Design in 20-century America* (New York: Whittlesey House, 1936).

Dilnot, Clive, "The State of Design History. Part I: Mapping the Field," *Design Issues* I:1 (Spring 1984): 3–23

Dilnot, Clive, "The State of Design History. Part I: Problems and Possibility," *Design Issues* I:2 (Autumn 1984): 3–20.

Maldonado, Tomás, "Ancora la tecnica. Un 'Tour d'horizon'," in Michela Nacci, ed., *Oggetti d'uso quotidiano. Rivoluzioni tecnologiche nella vita d'oggi* (Venezia: Marsilio, 1998), 197–227.

Maldonado, Tomás, *Gli occhiali presi sul serio.* Paper for the Conferences "Sapere e narrare. L'uomo e la macchina," Firenze, November 19, 1999.

Margolin, Victor, "The Product Milieu and Social Action" in Richard Buchanan and Victor Margolin, *Discovering Design. Explorations in Design Studies* (Chicago: The University Chicago Press, 1995), 121–145.

Pasca, Vanni and Francesco Trabucco, eds., *Design: storia e storiografia* (Bologna: Progetto Leonardo 1995).

Penati, Antonella, *Mappe dell'innovazione. Il cambiamento tra tecnica, economia e società* (Milano: Etas, 1999).

Walker, John A., *Design History and the History of Design* (London: Pluto Press 1989).

Taking Eyeglasses Seriously
Tomás Maldonado

There is a rather widespread notion, these days, that technology is an exogenous factor, something that impacts "the world in which we live" from the outside. It is a factor that reaches us from some distant place, surreptitiously worming its way into our society; something extraneous to us, but also (and especially) something higher, located above us.

After all, it is only natural that this emphasis on the autonomy of technology should contribute, in practice, to make it seem extraneous, and then to its sacralization. The groundwork is laid for *technological determinism*, or the belief that technology is the cause of all changes, both real or imagined, taking place in society.

In all this, a rather obvious fact is overlooked: technology is not some untamed force running wild beyond the boundaries and control of society. It is a part of society, forcefully conditioned by social, economic, and cultural dynamics. In short: what changes the world, for better or worse, is not technology, but society.

And when technology, as in the case of the environment, for example, "causes problems," in the long run, the problems are not problems of technology, but of society.

"Everything is technique," historian Fernand Braudel has stated, presumably alluding to the fact that, in any human act, there is always, to a greater or lesser extent, a moment of artifice, of prosthesis or of recourse to an instrument or device charged with the task of augmenting the operative and communicative potential of our action.

I believe that Braudel's statement is correct, from this point of view, or at least partially correct. A more accurate phrasing might "Everything is technique, because everything is society." Or, vice versa, "Everything is society, because everything is technique."

At this point, another question implicitly appears. In this total identification of technique and society, of technical action and social action, might not there be concealed a slightly subtler version of technological determinism?

In my opinion, this fear is not justified. To acknowledge the fact that, on the one hand, technology is omnipresent because society is omnipresent as well, and on the other, that society is omnipresent due to the omnipresence of technology, does not constitute an admission of the existence of an autonomy of technology. Nor can it justify any claim that technology is an indispensable

part of the governing of the world. Just the opposite. What is repudiated here is precisely the notion of the autonomy of technology, and therefore of its implicit technological determinism.

Of course, we must also reject, in the same manner, the idea of a total autonomy of society with respect to technology. And there is nothing very daring about such a rejection. After all, it is evident that the idea of such autonomy clashes blatantly with the real facts. Who could possibly doubt today, without seeming ridiculous, that technical developments are capable of strongly influencing our styles of living, our relationships with others, and our values and beliefs? Is anyone reckless enough to claim that technology is a marginal factor in our society?

The point is not so much to accept (or to deny) the importance of technology—it must be taken for granted—as to decide whether technology should be assigned a *causal* role with respect to the changes that take place in society.

Many historians and philosophers of science and technology, especially those oriented toward sociological constructivism, deny such a possibility. In their view, the cause, the main thrust behind changes in society, must be sought in society itself, not in technology. This position usually is summed up with the following slogan: society is the *cause*, and technology is the *agent* of change.

But it should be said that the tone of this assertion (although, in general, I would agree with it) deserves a bit of reflection or added explication. We should not overlook the fact that the notions of "cause" and "agent" have a long tradition in philosophical thought. Just consider Aristotle's doctrine of the "four causes," and the complex conceptual constructions of the medieval scholastics on the cause-effect relationship, not to mention the sophisticated logical-epistemological excogitations of modern philosophy of science on this argument.

Though I do not intend to dwell on the purely philosophical implications of technological determinism, it is evident that any discussion of this theme will be difficult (or even impossible) without taking them into account. This also is true when the notions of cause and effect are not utilized in an explicit manner, or when they are replaced, where necessary, by more or less ingenious metaphorical terms.

Let's take a look, for example, at the formula favored by the supporters of technological determinism, according to which technology "pushes" and society "pulls." Their opponents, naturally, believe that society does the pushing and technology does the pulling.

At this point, a doubt arises: are we really sure that these two versions are not both the result of the same error, namely that of believing that between cause and effect the relationship always must be linear, unidirectional, and irreversible? Hasn't the philosophical tradition regarding causality mentioned earlier often

invited us to reflect on the problem—a problem as yet unresolved—of *circular causality*, of *causal chains*?

In the theme we are discussing here, the question of circularity cannot be overlooked. If it is true, to go on with the same metaphor that, in a certain phase, it is technology that "pushes" and society that "pulls," it is equally true, that in an earlier phase, society was "pushing" while technology was "pulling."

On other occasions, I have defended the primary role of society in the dynamic of social changes. I am firmly convinced of the validity of this view. Nevertheless, the relationship between society and technology does not lend itself to description, as often attempted by the exponents of constructivism, as a process in which there is a point of departure—society—and a point of arrival—technology, i.e., a process in which technology is the point of destination or culmination, and, therefore, of definitive fulfillment. In the path from society to technology, there is never an *end of the road*, and never a *terminal* point, or a last stop. What "pulls" today may "push" tomorrow, and vice versa. Recently, there have been a number of attempts to document, with concrete examples, the way society, all told, with its complex range of economic, social, and cultural needs, stimulates, conditions, and guides technological innovation in every era. In short, a way to show how society "pushes," forcing technology to "pull."

With few exceptions, the cases studied belong to the sphere of technological macrosystems, as in the well-known works of T. P. Hughes on the electrification of the United States, or of F. Canon on the French railways. In the same perspective, William Pool, in his recent book with the significant title *Beyond Engineering. How Society Shapes Technology*, has selected, among many other examples, that of the development of nuclear technologies.
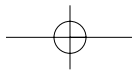
Naturally, technological macrosystems are simultaneously *excellent* and *very poor* examples for the support of the thesis in question.

I say they are *excellent* because their connection with society is so evident that it would be hard to infer that society, so to speak, has nothing to do with technological macrosystems, or that it plays a subordinate role to them. To look closely at the situation, it is evident that technical macrosystems are veritable macrosystems of social management (and control).

On the other hand, they are very poor examples, precisely because their probative obviousness prevents less evident, but no less important, aspects of the society-technology relationship from emerging in the overall assessment.

In order to explore the possibility of a different, less simplistic way of examining this relationship, I would like to examine the case of the birth and development of a technical object that, in spite of (or because of) its small size and lack of complexity, can be useful
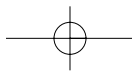
to grasp those aspects which, in the case of the macrosystems, usually are overlooked.

The technical object in question is the eyeglass, or *eyeglasses*, an object that quietly, without fanfare, for over seven hundred years now, enables a large majority of the human race—afflicted by myopia, presbyopia, hyperopia, or astigmatism—to facilitate sensory-perceptive access to reality.

Of course, a "serious look" at eyeglasses might not seem like a very stimulating choice for scholars who prefer to grapple exclusively with much more complex objects. But the fact that eyeglasses apparently are banal objects (or have become banal for us) is not a good reason to imagine that they are without historical relevance, or worse, to refuse to recognize their usefulness in today's theoretical reflections on technology.

Historian Lyn White writes on this subject: "Surely no one in the bespectacled academic world could be so impolite as deny the fact that the invention of eyeglasses contributed to a general improvement in the level of education, and to favor the almost feverish activity of thought that characterized the fourteenth and fifteenth centuries."

I would begin by recalling that the history of eyeglasses, as is well known, is closely connected to that of lenses. Moreover, the invention of ophthalmic lenses undoubtedly marks a turning point in the development of optical instruments. Lenses for visual purposes opened the way for the development of the first telescopes and composite microscopes. They were the forerunners of high-precision optics, that complex of instruments and devices that, in the period from the 1300s to the 1700s, created the technical-scientific premises for the industrial revolution. In short, instruments and devices that form the basis of the formidable breakthrough that took us "from the world of the approximate to the universe of precision,"to use the apt expression of A. Koyré. This is a universe in which careful observation, accurate measurement, and precise quantification become the three sustaining elements of the structural and functional order.

But isn't it a bit excessive—although some may object—to assign such a significant role to eyeglasses in the process of constitution of the modern world? Aren't we stretching the point for interpretational effect? In my opinion, such perplexities are not justified. I suspect that they simply are a legacy of what Vasco Ronchi, on several occasions, denounced as the "conspiracy of silence" of the "learned by profession" (philosophers and historians) regarding lenses and their applications. That same "conspiracy of silence" which the brilliant Giambattista Della Porta was the first, in the sixteenth century, to attempt to violate with his books *Magia Generalis* and *De Refractione*.

Nevertheless, it is quite amazing that, in spite of the centuries that have passed and the striking progress that has been
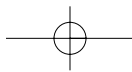
made, in the meantime, in the field of optical instruments and related endeavor, doubts remain regarding the historical importance of the invention of eyeglasses. A historical importance that does not have to do only with the invention of the utilitarian object known by this name, but also with the scientific knowledge and technical experiences that led up to it (and in some ways prefigured it). This is not to mention the knowledge and experience that, in the wake of this invention, were acquired immediately thereafter, opening the way for unprecedented developments in the field of instruments for scientific observation. For the preinvention phase, we can mention, for example, the contributions of Alhazen, Grossatesta, and Roger Bacon; for the post-invention phase, those of Della Porta, Kepler, and Galileo.

I would like to avoid the controversial question of to whom we should attribute the invention of eyeglasses: Florentines, Pisans, or Venetians. As we know, the Florentines claim the inventor was Salvino Armando degli Armati. The Pisans insist on Alessandro Spina. The Venetians boast of an unknown craftsman of glass or crystal from Murano.

As I have already mentioned, my aim is to find the answer to two different (and antithetical) questions.

First: what is the link, perhaps even random or coincidental, between progress in the glass or crystal industry, or the capacity to supply the lenses required for optical performance, and the invention of eyeglasses?

Second: how and why, in and around 1280, did the social, economic, and cultural need emerge to correct the visual problems of the *farsighted*, i.e., those who can see things well at a distance but not up close, and later, around 1450, to correct the visual difficulties of the *nearsighted*, i.e., those who can see things well up close but not at a distance?

It can be intuited that, with these queries, we are headed right back to the question discussed earlier of what "pushes" and what "pulls" in the technology-society relationship.

I would like to concentrate on the second of the two questions. This certainly is not an easy task. The main difficulty lies in our subjective condition as modern men and women. In fact, we are so accustomed to the use of glasses today, and other refined visual prostheses, that it is hard for us to imagine the everyday life of the nearsighted and the farsighted before the invention of eyeglasses. Nevertheless, it is worth making the attempt.

It is plausible to assume that, in the late Middle Ages, the life of the nearsighted and the farsighted was, to put it mildly, anything but easy. But the farsighted must have had an easier time of it than the nearsighted, or at least those afflicted with a medium-high level of myopia.

Let's try to examine the existential conditions of the latter group. Although we know many different things today including a

wide range of aspects of the everyday life of the late Middle Ages, practices of hygiene and nutrition, clothing, jewelry, and ornaments; and courtship, celebrations, parades and processions, we have a surprisingly limited amount of documentation on subjects suffering from acute forms of myopia.

This is hard to understand, because the apparent diversity of such persons must have been constantly evident in normal interpersonal relations.
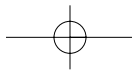
In the few documents that do exist on the subject, without excluding those from the history of medicine, the mention of myopia sufferers is indirect, with cryptic allusions and ironic or sarcastic comments. Whether due to ignorance or to poorly disguised maliciousness, the category in question often is registered, so to speak, under a false name. For example, in the records of persons who entered medieval hospices, alongside the infirm, the elderly, orphans, paupers, madmen, and, not the last on the list, the blind, there is mention only of the rather vague category of the "almost blind."

Who are they? It would seem logical to hypothesize that this category included, among others, those afflicted by myopia. In fact, it is probable that a large number of the women and men with myopia wound up in hospices. It also is probable, to be frank, that they were the lucky ones. In the worst cases, they could have been seen as undesirables, forced to live outside the walls of the fortified settlements, becoming a part of the motley rabble of the outcasts.

Naturally, all this happened only to nearsighted persons of humble origin; those of the upper classes met with different vicissitudes. In courtly culture, the ritual of the gaze was fundamental in interpersonal relations. The nearsighted, for obvious reasons, were excluded from this ritual. Therefore, they were unable to comply with the code behind the ritual, which was a code of etiquette, of good manners. In the light of this, the nearsighted person seemed indifferent, gloomy, cold, enigmatic, and disoriented or, at times, haughty and condescending.

In any case, apart from their social standing, the nearsighted provoked a general intolerance or worse. The aversion or even hostility they provoked could be transformed, in some cases, into abnormal suspicions and judgments leading to serious consequences for those unlucky enough to be nearsighted.

I am referring here to the tendency to attribute downright maleficent powers to the nearsighted and the blind. The fact that a person suffering from myopia can see things well up close and poorly (if at all) at a distance was interpreted not as an optical-physiological pathology—as is truly the case—but as proof of a presumed fundamental ambiguity. In other words, a nearsighted person was seen as an impostor who, for unspeakable motives, pretended to be blind without actually being so.

We should admit, however, that these facts supply a truthful, but also incomplete, image of the life the nearsighted in the late Middle Ages. There also was another side of the coin.

The nearsighted, precisely because of their particular visual problem, were present in all of those trades in which good close-proximity vision was required such as scribe, copyist, calligrapher, engraver, miniator, teacher, merchant, bookkeeper, notary, judge, goldsmith, spinner, weaver, embroiderer, carpenter, cabinetmaker, shoemaker, and tailor.

The farsighted, on the other hand, again due to their anomalous condition, had to work in areas in which good long-distance vision was indispensable. such as hunter, farmer, shepherd, livestock breeder, fisherman, woodsman, mason, miner, sailor, and soldier.

The former, to use the words of Lucien Febvre, were "greenhouse men," closed in limited, protected spaces, while the latter were "men of the open air," close to the land and rural life.

This division of labor sheds light on the role of both types of ametropia. It is clear that, while the farsighted appear, for the most part, connected to traditional productive areas such as the obtaining of nutritional resources, the extraction and transport of materials, and the construction of edified works, the typical fields of activity for the nearsighted were much more highly articulated and diversified.

Undoubtedly, the nearsighted were involved in traditional productive areas, especially those involving craftsmanship. But some of them, including both clergy and laymen, were also in–volved in monasteries and universities in activities such as writing, reading, translation, and the production of books.

Others (at times the same persons), due to their organizational abilities as bookkeepers or notaries, played an important role in the administrative (and also political) management of the economic affairs of the lords. In short, these nearsighted persons were able to achieve clear positions of power.

As is well known, the invention of eyeglasses took place in two phases: the first, toward the end of the thirteenth century, was based on the development of eyeglasses with convex-converging lenses, capable of correcting the problems of the farsighted; the second, in the mid-fifteenth century, involved the development of concave-diverging lenses, to correct the problem of myopia.

But why, one immediately wonders, was it necessary to wait a century and a half for the progress from eyeglasses for the farsighted to those for the nearsighted? How can this long gap between the two events be explained?

The exponents of technological determinism, of course, will support the thesis that this was due to the simple fact that the craftsmen-opticians were not capable, before 1450, of producing concave-diverging lenses. Does this argument stand up? Only in part. We
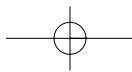
cannot deny the fact (it is blatantly evident) that the craftsmen did not make such lenses during this long period. This statement cannot be challenged but, on its own, it does not suffice.

There is a general consensus among technical historians that the knowledge required for the production of lenses for the farsighted was not, in the final analysis, very different from that required for the production of lenses to correct myopia. The craftsmen of Venice, the most highly skilled in all of Europe in the 1300s, most probably could have progressed, after a brief period of experimentation, to the production of the latter typology, without excessive difficulties. Just consider the high level of expertise they had achieved in the technologies of grinding, polishing, and smoothing of lenses.

An implicit question arises here: if, as it appears, all this was effectively possible, what prevented them from doing it? A possible answer has been supplied by some historians of science.

In their view, the invention of eyeglasses for the farsighted was the result of a rare temporal coincidence of two factors: on the one hand, the reflections of the "learned" Oxonians, Robert Grossatesta and Roger Bacon, on the optical properties of convex lenses; on the other, the construction of similar lenses on the part of the "practical" Italians.

In this context, by "learned," we mean "philosophers of nature," and, by "practical," we mean craftsmen. In a more modern definition, stretching the point just a bit, we could call the former scientists, and the latter technicians.

Moreover, we find confirmation that this temporal convergence between the learned and the practical was, on the other hand, absent for the entire fourteenth century, and that the blame for this can be assigned to the slowness, on the part of the "scientists," in supplying a theory of biconcave lenses similar to the one they had developed in the 1200s for biconvex lenses.

In logical terms, therefore, the conclusion, according to this point of view, can be summed up as follows: the development of eyeglasses for myopia became possible only when the "learned"managed to supply the "practical" with a theory of biconcave lenses.

And this takes us back to the old idea that the learned, not the practical, are the main protagonists of technological innovation. An idea that, together with its opposite, is notoriously at the center of the controversy over who is truly the inventor, for example, of the steam engine: the learned Denis Papin or the practical Thomas Newcomen; the learned Joseph Black or the learned-practical James Watt?

But it immediately should be said that while the interpretation illustrated above on the eyeglasses for myopia is, in my opinion, erroneous, its error does not lie in its implicit stance in the
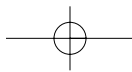
learned-practical controversy, but in the lack of historical founda-
tions for the thesis itself.

It is an undeniable fact that, as opposed to what happened in
the thirteenth century, the learned did not show up for the appoint-
ment at the same time as the practical, but arrived after a long
delay—one-hundred and fifty years after the technicians already
had invented the new eyeglasses.

Eyeglasses for myopia first appear in approximately 1450,
while the texts that completed (or nearly completed) a "general
theory of lenses" by Della Porta, Kepler, and Maurolico were pub-
lished in the period from 1589 to 1611.

The truth of the matter, however, is that these interpretative
subtleties, necessary as they may be, have not offered much help to
find an answer to the question of the basic reasons that, in a given
socio-historical context, led to a greater urgency for the develop-
ment of eyeglasses for the farsighted, with respect to those for the
nearsighted.

In order to pursue a possible answer, I feel it is necessary, at
this point, to pause for further clarification of some of the notions I
am employing. Up to this point, I have spoken, for simplicity's sake,
of the nearsighted and the farsighted, and excluded the important
category of the emmetropic, the *normal*, or that category of persons
who do not have problems of either nearsightedness or farsighted-
ness.

While sufferers of myopia, with slight improvements (or
further impairments) as they age, remain myopic for their entire life,
most "normally-sighted" people, after the age of forty or fifty,
become farsighted.

To go back to Fevbre's metaphor, we can say, that while the
nearsighted, before the invention of eyeglasses, were always (and in
any case) "greenhouse men;" for the persons with normal vision
who had decided, at a young age, to work in the same areas of
activity as the myopic, things became much more dramatic with the
advance of old age. At the critical age of forty-five to fifty, these
"greenhouse men" suddenly had to become "men of the open air."
For them, the most difficult part of all this was the need to find a
new means of livelihood. For example, a scrivener suddenly found
himself in the position of having to learn how to hunt, or how to
work in a mine. People with normal vision whose jobs were in line
with the capacities of the farsighted had an easier time of it. After
all, they already lived and worked as if they were farsighted, so
there was nothing traumatic about the change in their visual capac-
ities that came with aging.

But just what was the relationship, in terms of percentages,
in the 1200s and 1300s, between the nearsighted and farsighted? It
is impossible to know for sure, since very few statistics are available.
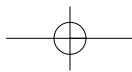
No reliable quantitative estimate can be made. Perhaps the only way to assess the situation is to make a purely indicative attempt to compare it to the present.

In the industrialized countries, there is no doubt that there are a great many farsighted people, and that their numbers are constantly growing. Due to the fact that presbyopia is a problem of aging, it comes as no surprise that a society such as ours in which life expectancy has risen to a level of about seventy-five years and, therefore, is a society containing many elderly people also is a society with many farsighted people. And, in proportion, it is a society with relatively few myopic individuals.

In the late Middle Ages, the situation was quite different. Although there is no precise agreement among experts of historical demographics on the life expectancy in this period, the most reliable and least pessimistic estimates range from fifty-five to sixty years.

This means that a normally-sighted person, for example, who became farsighted in the forty-five to fifty age range, would remain so for the rest of his or her life, or namely for only about one decade. Therefore, it is obvious that, with respect to the present situation, the number of farsighted people was proportionally less in relation to the number of the nearsighted individuals.

To support this thesis, let us, examine what happens in the world today. Robert N. Kleinstein, an epidemiologist of presbyopia, offers a comparison between a country such as the United States with a long life expectancy, and a country from the Third World, such as Haiti, where the life expectancy is similar to that of the late Middle Ages. The results speak for themselves: after the age of forty-five, in the United States, thirty-one percent of the population is farsighted; in Haiti, the figure amounts to just sixteen percent.

In the light of this (and other) assessments, we can clearly see certain elements of great interest for the question we are examining here. We can hypothesize that, on the threshold of the 1300s, the reigning division of labor, with its great rigidity, was beginning to be unsuitable for the emerging need for greater mobility in social relations.

An emerging need that is very often, it is worth noting, the focus of reflection of the most eminent scholars of the Medieval—from Rudolf Stadelmann to Charles Haskins, and from Marc Bloch to Georges Duby and Gioacchino Volpe to Ovidio Capitani—all if whom, each in his own way, were involved in identifying the latent factors of crisis and recomposition of the late Middle Ages. In other words, they attempted to debunk the static, immutable version of that historical period.

It is precisely in this perspective of the late Middle Ages that we can examine the relationship between the division of labor and the problems of eyesight. Everything points to the possibility that, in the 1200s and 1300s, the traditional practice of dividing up the work force in the territory according to the visual capacities of indi-

viduals to see things up close and at a distance was no longer regarded as the most suitable to deal with the changes that were slowly (but inexorably) happening in the society.

But in this new perspective the question remains: why was the invention of eyeglasses for the farsighted viewed as a priority, as opposed to the invention of eyeglasses for the nearsighted?

I am convinced that this priority was not the result of an arbitrary choice or a mere accident of progress but, instead, of the need to adapt to changes (or hopes for change) in the overall organization of the division of labor.

In the end, the objective was to permit normally-sighted subjects involved in activities in which close-up vision was important to continue, with the aid of glasses, to do their jobs, in spite of the fact that, after the age of forty-five to fifty, they tended to become farsighted.

This was, therefore, an effort to prevent the neo-farsighted from shifting into other fields of work in which close-up vision was not required. The result of this previous migration had been detrimental, leading to a lack of stability and continuity.

But behind all of this there also was a more ambitious project, that of attracting, thanks to the use of eyeglasses, many of those employed in occupations in which only long-distance vision was required. In short, to provide an incentive, so to speak, for a reverse migration of the work force from the realms of the farsighted to those of the myopic.

Naturally, at the base of this urge to reorganize, on a territorial level, the distribution map of the work force, there was the need to offer a response to new requirements that were becoming more and more urgent in the late medieval society. These requirements included the need for more "close-up" working activities, i.e., jobs involving meticulous, precise procedures.

The demand for a larger work force of "clerks" was the result of a number of developments including widespread literacy among young people and artisans, the spread of education and universities, the advent of systems of accounting, bookkeeping and notorial activities, the growth of international trade, the development of the textile industry, and progress in the areas of the manufacture of mechanical products such as timepieces and firearms.

In any case, by using this example of the invention of eyeglasses, I have tried to demonstrate how society "pushes" and technology "pulls." But I also wish to show that technology—once it is established—"pushes," while society does the "pulling."

I am aware of the fact that this process is not as linear as many would wish. But that is just the way things are. And in the case of eyeglasses, another ambiguous factor complicates the issue.
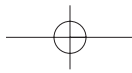
In everything that has to do with vision aided by instruments, or with any act of seeing in general, it always is difficult to identify the cause and the effect. It is a question Gaston Bachelard,
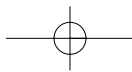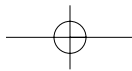
in his allusive style, has summed up as: "Utilization of a magnify-
ing glass means paying attention; but isn't attention already a
magnifying glass in itself?"
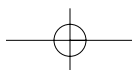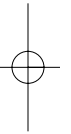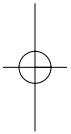
Can a Machine Design?
Nigel Cross

The original version of this paper was prepared for the 30th anniversary of design computing workshop held at the Key Centre of Design Computing and Cognitions, University of Sydney, Australia, 1998.

Introduction

Asking "Can a machine design?" is similar to asking "Can a machine think?" The answer to the latter question seems to be, "It all depends on what you mean by 'think.'" Alan Turing[1] attempted to resolve the question by his "Turing Test" for artificial intelligence — if you could not distinguish, in a blind test, between answers to your questions provided by either a human being or a machine, then the machine could be said to be exhibiting intelligent behavior, i.e., "thinking."

In some of my research related to computers in design, I have used something like the "Turing Test" in reverse—getting human beings to respond to design tasks as though they were machines. I had various intentions behind this strategy. One was to simulate computer systems that do not yet exist; another was to try to shed light on what it is that human designers do, by interpreting their behavior as though they were computers. My assumption throughout has been that asking "Can a machine design?" is an appropriate research strategy, not simply for trying to replace human design by machine design, but to obtain a better understanding of the cognitive processes of human design activity. However, this assumption recently has been challenged. In this paper, I first will review some of my research, and then return to this challenge.

Using Humans to Simulate Computers

My first research project began when I completed my undergraduate course in architecture in the mid-sixties and began my studies in the new field of design research at the Design Research Laboratory at UMIST, Manchester, run by John Christopher Jones. My M.Sc. research project was in "Simulation of Computer Aided Design"[2]—a novel but strange idea that we might get some insights into what CAD might be like, and what the design requirements for CAD systems might be, by attempting to simulate the use of CAD facilities which, at that time, were mostly hypotheses and suggestions for future systems that hardly anyone really knew how to begin to develop. The strangeness of this idea was that we would effect these simulations by getting human beings to pretend to be the computers! This was the reverse application of the "Turing Test."

1 Alan Turing, "Computing Machinery and Intelligence," *Mind*, 2236 (October, 1950):433–460.

2 Nigel Cross, "Simulation of Computer Aided Design," (M.Sc. Dissertation, Design Research Laboratory, Department of Building, University of Manchester Institute of Science and Technology, 1967).
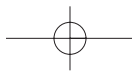
The project was based on getting designers (architects) to attempt a small design project in experimental conditions (like the protocol studies and similar studies that have grown up since that time). They were given the design brief, and asked to produce a sketch concept. In addition to conventional drawing materials, they had a simulated computer system to help them: they could write questions on cards located in front of a closed-circuit TV camera, and would receive answers on a TV screen in front of them. In another room, at the other end of the CCTV link, was a small team of architects and building engineers who attempted to answer the designer's questions. Thus, we had a very crude simulation of some features of what now might actually be parts of a modern-day CAD system, such as expert systems and databases.

The designers who participated in these experiments were not told what to expect from the "computer," nor given any constraints on what they might choose to ask of it. Thus, I hoped to discover what kinds of facilities and features might be required of future CAD systems, and to gain some insight into the "systemic behavioral patterns" that might emerge in these future human-computer systems.

I conducted ten such experiments, which lasted about one hour each. The messages between designer and "computer"were recorded, and one of the analyses made was to classify them into the topics to which they referred, from the client's brief to construction details. This kind of data gave some insight into the designers' patterns of activity, such as a cyclical pattern of topics over time, from requirements to details and back again. The number of messages sent in each experiment was quite low, with normally several minutes elapsing between requests from the designer. Of course, the response time from the "computer" also could be quite long, typically of the order of thirty seconds. Despite this apparently easy pace of interaction, all of the designers reported that they found the experiments hard work and stressful. They reported that the main benefit of using the "computer" was increased work speed, principally by reducing uncertainty (i.e., they relatively quickly received answers to queries, which they accepted as reliable information).

I also tried a few variations from my standard experiments. The most interesting was to reverse the normal set of expectations of the functions of the designer and the "computer." The "computer" was given the job of having to produce a design to the satisfaction of the observing designer. It immediately was apparent that, in this situation, there was no stress on the designer—in fact, it became quite fun—and it was the "computer" that found the experience to be hard work. This led me to suggest that CAD system designers should aim for

> a much more active role for the computer, tantamount to a
> virtual inversion of the present designer/computer roles.
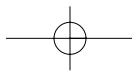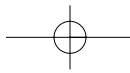
The computer should be asking questions of the designer, seeking from him those decisions which it is not competent to handle itself. The computer could be doing all the drawing work, with the designer instructing amendments. Drawings presented by the computer on a graphic interface would be gradually completed as the designer made more decisions… Programmed to proceed as far as possible without human intervention at each step, the computer would ask for decisions as required…We should be moving towards giving the machine a sufficient degree of intelligent behavior, and a corresponding increase in participation in the design process, to liberate the designer from routine procedures and to enhance his decision-making role.[3]

This vision of the intelligent computer was based on an assumption that a machine *can* design—that it can be programmed to do a lot of the design work, but under the supervision of a human designer. I still think that there is something relevant in this vision of the computer as designer—it still offers a more satisfactory basis for the human-machine relationship in computer-aided design than current CAD systems. Why isn't using a CAD system a more enjoyable, and perhaps also a more intellectually demanding experience than it has turned out to be?

Comparing Human and Machine Performances
I continued research on this question of human and machine roles in computer-aided design for my Ph.D.[4] My earlier studies had suggested that using computers in design might have adverse effects, such as inducing stress, while not having any beneficial effects on the quality of the resulting designs. The only "positive" effect that CAD appeared to have was to speed up the design process. The potential negative effects of CAD that I identified were an intensification of the designer's work rate and a concomitant reduction in the staff required in design offices. On the other hand, I suggested that CAD in architecture might lead to better communication between members of the design team, and to the inclusion of a wider range of participants such as the new building's users.[5]

However, I still believed that a machine *can* design and that it can produce designs that are somehow better—more efficient, or more elegant, or something—than designs produced by humans. Drawing on research in problem solving (of the "traveling salesman" route-layout type) at the pioneering artificial intelligence center at Edinburgh University, I expected that human-machine interaction (rather than wholly-human or wholly-machine problem solving) would efficiently produce design solutions that were better than either a human or a machine could produce alone.

So I set out to test that hypothesis, using the problem of efficient room layouts in a building plan. (There had been some early

3   Ibid.
4   Nigel Cross, "Human and Machine Roles in Computer Aided Design" (Ph.D. thesis, Design Research Laboratory, Department of Building, University of Manchester Institute of Science and Technology 1974).
5   Nigel Cross, "Impact of Computers on the Architectural Design Process," *The Architects' Journal* (March 22, 1972): 623–628.
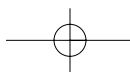
attempts at producing "optimum" room-plan layouts. The idea was that, if you had some data for the numbers of journeys that typically would be made by the future building's users between the different elements of accommodation, then you could get a computer to optimize the layout so as to minimize the "circulation cost" (i.e., the number of journeys multiplied by the lengths of journeys). Rooms that would have a high number of journeys between them would be placed close together, and so on.) I devised experiments in which fully-automatic computer programs, un-aided humans and human designers aided by interactive layout programs tackled the same layout problems.

I fully expected to replicate the Edinburgh results, and I was genuinely surprised to find that (a) there were no significant differences between the performances (i.e., the efficiency of the layouts) of unaided humans, and automatic computer programs, and (b) human-machine interaction produced worse results than either unaided humans or automatic machines! There were some mitigating circumstances arising from the crude nature of the human-machine interaction that was possible at that time (teletype terminals and storage-tube displays), but it nevertheless was a surprising result that shook my confidence in CAD developments at that time, and led me to the conclusion that machines cannot *design* very well at all, and actually make design results worse rather than better. In my thesis,[6] I concluded that CAD would have a very limited positive effectiveness as a design aid, but could have profound negative effects on design activity and the job of being a designer. In an article in the *RIBA Journal*, I confessed that "I have seen the future; and it doesn't work!"[7]

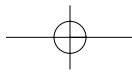**Eliciting Computable Rules From Human Behavior**
It was a long time before I returned to similar kinds of research. The developments in computing and CAD in the 1980s made me realize that, for good or bad, using computers in design practice was inevitable (indeed already was ubiquitous).

A project I was involved with in the mid-1990s was based on a sub-question of "Can a machine design?" It was "Can a machine make aesthetic judgments?" The aesthetic aspects of design often are assumed (by designers, if not by some of the CAD researchers) to be some of the most intractable aspects for computers to attempt. But my colleagues and I thought that there might be some implicit rule-based behavior in aesthetic judgments, which might be modeled in a computer system.

The design domain we were working in was that of graphic design, where designers normally guard their aesthetic freedom very jealously. We agreed with them that it might not be possible to construct rules of aesthetically "good" design, but we thought that it might be possible to establish rules of "bad" design. If so, then a rule-based expert system could be used to evaluate graphic designs,

6   Nigel Cross, *The Automated Architect* (London: Pion Ltd., 1977).
7   Nigel Cross, "Problems and Threats of Computer-Aided Design," *RIBA Journal* (October, 1977): 439–440.

pointing out the "bad" features. Users of such a system, even if they could not produce "good" designs, at least be might able to produce designs that were "not bad." We had in mind users of word processors and simple desktop publishing systems, producing amateur graphic designs such as in-house notices, newsletters, and similar publications.

We collected examples of such amateur designs (A4 -sized "poster") from around our own departmental noticeboards, and submitted them for critique by two expert graphic designers. We then converted the experts' comments on the "bad" design features into rules, and tested these rules by using ourselves as "human computers"—strictly following the instructions in a machine-like way, until ambiguity was eliminated. (In a way, this also was following Turing's early theoretical argument that problem-solving programs might, in principle, run on any kind of "machine"—thus separating the program from the computer.) Then we applied the rules to a new sample of posters and compared the "machine" results with those of the human experts' critiques of the new posters.

We found that a relatively small number of rules (less than twenty) could be used to eliminate common "bad" design features. Some of our rules were very simple, such as "Left and right margins should be equal" and "If more than seventy percent of text is centered, then all text should be centered." But applying such simple rules does lead to designs that are "not bad." We also found that the human experts were frustratingly inconsistent in applying their own "rules;" when we pointed this out to them, they were quite happy to accept that the rules indeed were valid, but need not always be applied rigorously in every case! This seems to be something like allowing the judge some leniency in passing sentence. This work is reported in Glaze, et al.[8]
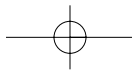
This was not a demonstration that a machine can design. It was a demonstration that, in principle, a machine can do some things that many human beings regard as a uniquely human attribute—in this case, making aesthetic judgments. To me, it also was a confirmation of the value of asking "Can a machine design?" as a research strategy for investigating design. We had learned something about a relatively difficult area of design activity, and also something about designers and their ways of thinking.

Natural Versus Artificial Intelligence

We might not necessarily want machines to do everything that human beings do, but setting challenges for machines to do some of the cognitively hard things that people do should give us insight into those things and into the broader nature of human cognitive abilities. I always had assumed that this argument was one of the validations for research in artificial intelligence. Thus, we would learn more about ourselves. For example, the research program in

8   G. Glaze, J. Johnson, and N. Cross, "Elicitation of Rules for Graphic Design Evaluation" in J.S. Gero and F. Sudweeks, eds., *Artificial Intelligence in Design: AID96* (Dordrecht: Kluwer, 1996).
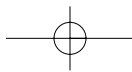
computer chess-playing presumably has not had the ultimate aim of making it unnecessary for humans ever to "need" to play chess again. Rather, it has been to gain understanding of the nature of the "problem" of the chess game itself, and of the nature of the human cognitive processes which are brought to bear in chess playing and in the resolution of chess problems.

That always has been my assumption about the value of trying to get machines to do things that human beings do, whether playing chess or designing. But John Casti of the Santa Fe Institute came to a rather disturbing conclusion about the lessons that may have been learned from chess-playing machines. In his book, *The Cambridge Quintet*, Casti[9] imagines a debate on computation and artificial intelligence between Turing, Wittgenstein, Schrödinger, and Haldane; chaired by C.P. Snow. In a postscript, Casti refers to the 1997 defeat of the world chess champion, Garry Kasparov, by the computer program Deep Blue II, and he quotes Kasparov as saying, "I sensed an alien intelligence in the program."

Casti then goes on to come to the rather surprising, and depressing conclusion that "we have learned almost nothing about human cognitive capabilities and methods from the construction of chess-playing programs." So, in computer-design research, will we be forced to come to the same conclusion, that "we have learned almost nothing about human cognitive capabilities and methods from the construction of designing programs?" Will designers rather nervously contemplate the "alien intelligence" of the designing programs? Will we have built machines that can design, but also have to bring ourselves to Casti's view of the "success" of chess-playing machines: "the operation was a success—but the patient died!"?
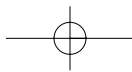
Perhaps Casti is being unduly pessimistic. One thing that we have learned from chess-playing programs is that the brute force of computation actually can achieve performances that outmatch human performance in a significant area of human cognitive endeavor. Researchers of computer chess-playing have surely learned something of the cognitive strategies of human chess players, even though their programs do not "think" like humans? Certainly, I believe that, on a much smaller scale, our research on aesthetic judgments in design had that kind of value.
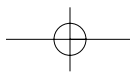
In more recent research, I also have found that computational models of design activity can be useful descriptive or explanatory models of human design behavior. This has been particularly so in the field of creative design, where attempts to build computational models have provided some useful paradigms for the nature of creative design activity.[10] I think that many of the attributes of design cognition that we now regard as essential features of the natural intelligence of design[11] have been identified as a result of attempts to simulate design activity in artificial intelligence.

9   J. Casti, *The Cambridge Quontett* (London: Little, Brown, 1998).

10   Nigel Cross, "Creativity in Design: Analyzing and Modeling the Creative Leap" *Leonardo* 30:4 (1997): 311–317, and Nigel Cross and K. Dorst, "Co-evolution of Problem and Solution Spaces in Creative Design" in J.S. Gero and M.L. Maher, eds., *Conference on Computational Models of Creative Design: HI98* (Key Centre of Design Computing, University of Sydney, 1998).

11   Nigel Cross, "Natural Intelligence in Design," *Design Studies* 20:1 (1999): 25–39.

It seems to me that research in artificial intelligence should always address the question, "What are we learning from this research about how people think?" Similarly, our computer-design research should attempt to tell us something about how designers think. I believe that we can learn some important things about the nature of human design cognition through looking at design from the computational perspective (although "the computationalist paradigm in design research" also has been challenged by Liddament[12]). For me, the value of asking the question "Can a machine design?" is that it begs the corollary question, "How do people design?"

12 T. Liddament, "The Computationalist Paradigm in Design Research," *Design Studies* 20:1, (1999): 41–56.
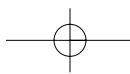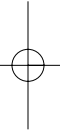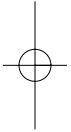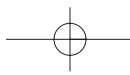
Detachment and Unification: A Chinese Graphic Design History in Greater China Since 1979
Wendy Siuyi Wong

The illustrations are identified by the name of designer, the client or title of the work, the design category, and the year. The title of the work is the author's own title, if an official name is cannot found. All woks reprinted with permission of the designer.
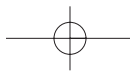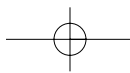
1 Matthew Turner, "Early Modern Design in Hong Kong" in Dennis P. Doordan, ed., *Design History: An Anthology* (Cambridge: MIT Press, 1995), 212. This article was first published in *Design Issues,* 6:1 (Fall 1989): 79–91; also Matthew Turner, "Development and Transformations in the Discourse of Design in Hong Kong" in Rajeshwari Ghose, ed., *Design and Development in South and Southeast Asia* (Hong Kong: Centre of Asian Studies, University of Hong Kong, 1990), 123–36.

2 The translation of the Chinese names used in this paper is based on the Chinese system in which the family name is first and the given name last. English names are used if they have been established by individual designers. The system of translation of Chinese names to English used in this article is based on the Romanization of Cantonese for Hong Kong and Macau designers, or the Romanization of Mandarin for mainland China and Taiwanese designers, and the Romanized names already established by individuals.

3 Shou Zhi Wang, "Chinese Modern Design: A Retrospective" in Dennis P. Doordan, ed., *Design History: An Anthology* (Cambridge: MIT Press, 1995).

Introduction

The history of modern Chinese design is virtually unknown due to its relatively late development compared to design in the West. Not until recent decades, since the opening up of China in 1979, has a unifying Chinese graphic design history started to form. This was assisted by China's rapid economic development and interactions with Hong Kong, Taiwan, and Macau; which, together with mainland China, make up the Greater China region. Traditionally, in academic practice, it was common to separate the investigation of these individual Chinese societies. Matthew Turner, one of the few Western historians to examine Chinese design, notes that the history of Hong Kong design prior to the 1960s "simply was believed not to exist." [1] Chinese-trained design scholar Shou Zhi Wong [2] emphasizes that there has been very little written about modern design in mainland China, because design activity under the communists before the start of the Open Door Policy in 1979 was mostly in the service of party propaganda. [3] Both Turner and Wang, as well as Scott Minick and Jiao Ping, published their works on Chinese design history before a number of key economic and political changes in China and Hong Kong took place.

With the return of Hong Kong and Macau to Chinese sovereignty in July 1997 and December 1999, respectively, it now is possible, and even preferable to consider a unified history of Greater China rather than simply the individual histories of these regions. In addition, during the past decade, important political solidification has taken place, and the various locales within Greater China have been engaged in increasing levels of cultural and economic exchange. Thus, it makes little sense at this time to consider each locale as a separate entity. Although Greater China cannot be considered a single entity for the purpose of writing a political history, a great deal of cultural similarity and creative cross-fertilization that has taken place throughout many decades in spite of political shifts of great magnitude. Arguably, then, the history of Chinese graphic design can be understood more meaningfully as encompassing the whole region rather than as a set of discrete local histories.

This article takes the potentially controversial position that Chinese design history should be studied as one unified whole rather than individual studies of several separate entities. It argues

that the development of graphic design in the Greater China region since 1979 involves shared common ground among the locales within the region such that their histories cannot easily be separated. This article will focus specifically on graphic design, examining artistic and commercial visual communication activities other than Communist Party propaganda. Its objective is to uncover the history of Chinese graphic design, and to begin to build the foundations of this history from a unified regional perspective.

Origins and Development Before 1979

Many of the influences that shaped modern design throughout Greater China had their origins in centuries-old Chinese arts and crafts traditions. These traditional elements later were combined with foreign influences to form dynamic modern design styles. The most prominent example of Chinese modern design may be found in the Shanghai style of the 1920s and 1930s. Design works produced in Shanghai during this period reflect various outside influences in large part due to the existence of numerous foreign concession zones in the city. As Minick and Jiao note, "[c]oming to a culture with such a strong decorative heritage, the geometric and patterned compositions of art deco only succeeded in fueling further the renewed interests in China's own past."[4] They refer to the "masterful synthesis"[5] characterizing Chinese design works at this time.

The Shanghai period represented both the beginning of Chinese modern design and the best of this emerging form before the Second World War. Creative design work of the quality produced in Shanghai could not be sustained during the war, and after the Communists gained power in 1949 commercial graphic design was seen as a symbol of "Western lifestyle" and said to be a "waste of national resources" because it encouraged the consumption of unnecessary products.[6] However, the Shanghai spirit of commercial graphic design continued under the capitalist economic system and British colonial rule in Hong Kong after the war.

The level of talent and quality of creative production in Hong Kong before 1950 was never equal to that of Shanghai, nor was the direction of development begun in Shanghai continued after this time. From the period after the war through the 1960s, commercial graphic design developed at a steady pace in Hong Kong. Turner argues that Hong Kong was able to maintain its modern Chinese design style until at least the 1960s, through the contributions of both mainland and Hong Kong designers.[7] He attributes a rapid fading of Hong Kong modern design style after 1960 to the influx of American companies and to government assistance for American design specialists, rather than local designers. Local Chinese designers previously trained in Guangzhou and Shanghai had to gradually alter their style to fit into the new commercial environment dominated by American companies, and

3   continued
    213-41. This article was first published in
    Design Issues, 6:1 (Fall 1989): 49–78;
    also Shou Zhi Wang, "The
    Internationalization of Design Education:
    A Chinese Experience" in Rajeshwari
    Ghose, ed.,*Design and Development in
    South and Southeast Asia,* (Hong Kong:
    Centre of Asian Studies, University of
    Hong Kong, 1990), 267–76.

4   Scott Minick and Jiao Ping, *Chinese
    Graphic Design in the Twentieth Century*
    (London: Thames and Hudson, 1990), 38.

5   Minick and Jiao*, Chinese Graphic Design
    in the Twentieth Century,* 38.

6   Wang, "Chinese Modern Design: A
    Retrospective," 230.

7   Matthew Turner, *Ersatz Design:
    Interactions Between Chinese and
    Western Design in Hong Kong, 1950s-
    1960s* (Unpublished Ph.D. dissertation.
    Royal College of Art, London, 1993). His
    dissertation provides a detailed account
    of the interactions of modern Hong Kong
    design with Chinese, British, and United
   States traditions in the 1950s through
    1960s.
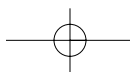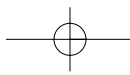
8   Turner, "Early Modern Design in Hong Kong," 209.

9   Henry Steiner graduated from the Art and Architecture School at Yale University with an MFA in Graphic Design in 1957. Before starting his career in Hong Kong, he worked in Paris and New York in various graphic design positions. He arrived in Hong Kong in 1961, and established his own company, Graphic Communication Limited, in 1964. He is the first designer based in Hong Kong to receive international attention and recognition. See Wang Xu, ed., *Henry Steiner: A Graphic Designer's Design Life* (Beijing: Chinese Youth Publishing, 1999). [In Chinese]

10   Henry Steiner and Ken Haas, *Cross-Cultural Design: Communicating in the Global Marketplace,* (London: Thames and Hudson, 1995), 2.

11   The elements of cross-cultural design that Steiner generated in the book are "iconography," "typography," "symbolism," "split imagery," and "ideography." The book provided directions for designers to achieve a harmonious juxtaposition and interaction with their own culture and new surroundings. See Henry Steiner and Ken Haas, *Cross-Cultural Design.*

12   A Beijing-based magazine, *Art and Design*, published a special feature for Chinese readers entitled "100 Years Retrospective on Graphic Design in China." Contributors, including professors from major art institutes in China, give a brief account of graphic design on the mainland in the past hundred years. A study of articles in this special feature indicates that the major graphic design categories are publication design, old Shanghai advertising calendar posters, propaganda posters, and logo type design since the Open Door Policy in 1979. See *Art and Design* (Beijing: Art and Design Publishing House, 2000-2, issue 94) 3–20. [In Chinese].

13   Wang, "Chinese Modern Design: A Retrospective."

to meet the standard set by American-trained designers.[8] This transition was significant to the history of Hong Kong design, because it brought Western design theory and principles directly into contact with Chinese culture.

Among the newly arrived American designers during the early 1960s, Henry Steiner has been the most influential.[9] A graduate of Yale who arrived in Hong Kong in 1961, Steiner demonstrated new possibilities in incorporating Chinese cultural symbols and written characters into his otherwise Western-style designs. A student of Paul Rand, he practiced what he had learned about two important design principles, "the primacy of concept" and the use of contrast to "give life" to a design.[10] In Hong Kong, he established the principle of cross-cultural design,[11] successfully adapting the generally understood concepts of Western design into the Hong Kong/Chinese context. For example, in his poster for the Hong Kong International Music Festival in 1969 (figure 1), Steiner places the graphic presentation of the body of a butterfly between two ears, which function visually as the wings. The addition of pearl earrings adds the final symbolic reference, representing Hong Kong as the "Pearl of the Orient" to most local viewers. Steiner introduced the basic design principle of "concept" to Hong Kong design. His work brought local design closer to the international design style of the times, something that had not yet been accomplished by locally trained designers. It is difficult to know the extent to which the works of Henry Steiner provoked local Chinese designers to turn their thinking in the direction of Chinese cultural symbols and meanings. It certainly is the case that elements of response to the unique local environment in Hong Kong can be found in his work in the late 1960s. For example, in a 1972 logotype Steiner designed for Jade Creations (figure 2), the Chinese character for jade is used to form the final "E" in the company name. Thus, the name can be read in both English and Chinese by the Chinese reader. This innovative combined use of written languages can be seen in Steiner's work from the early 1970s forward, including in much work produced throughout the 1990s.

While Hong Kong was developing towards a new direction in graphic design through the inclusion of Chinese elements, communications between Taiwan and Hong Kong were not well established. Taiwan design was less developed than Hong Kong's due to political suppression and restricted personal freedom. Commercial graphic design also was less on the mainland under the tight ideological control of the communist regime. Propaganda materials such as posters and publications designed for the service of the party were the main graphic design activities.[12] The cultural revolution period from 1966 to 1976 brought about the virtual elimination of commercial graphic design work in mainland China.[13]

The era of local design education began in the 1970s. Fundamental Bauhaus design principles were introduced and
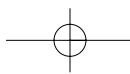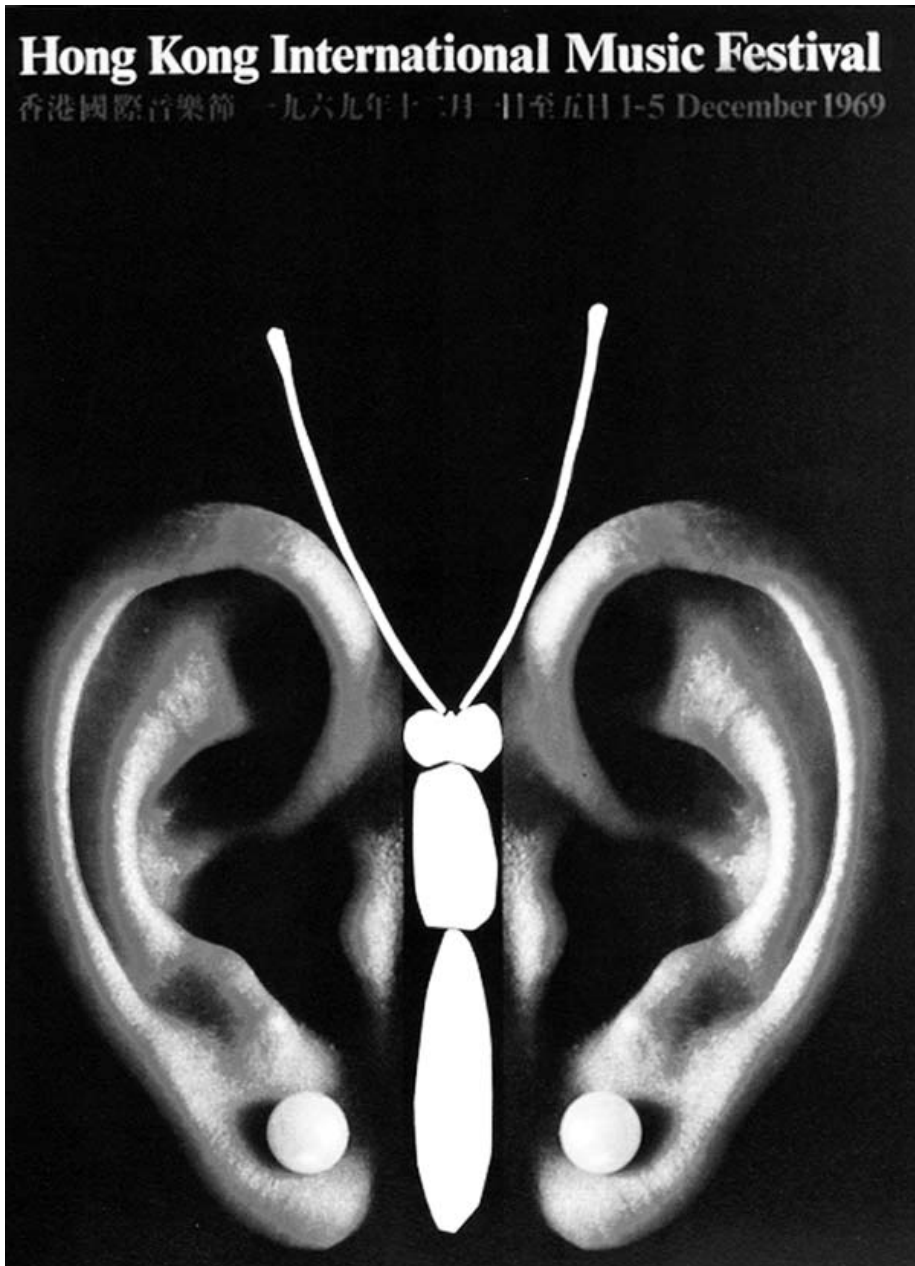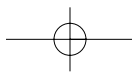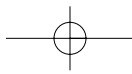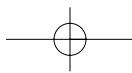
Figure 1, above
Henry Steiner, Hong Kong International Music
Festival, Cultural Poster, 1969.

Figure 2, right
Henry Steiner, Jade Creations, Logotype,
1972.

widely read among young designers in Hong Kong through the books of Wucius Wong, an active design educator from the mid-1960s to the early 1980s in Hong Kong. Wong was an American-trained Chinese, whose two books, *Principles of Two-Dimensional Design* and *Principles of Three-Dimensional Design*,[14] brought a strong Western influence to design theory education in the region. In turn, the new generation of emerging Hong Kong designers was heavily imbued with Western sensibilities and design values.

Among the pioneer local designers in interpreting and exploring the use of traditional Chinese folk art and high art elements in their design work is Kan Tai-keung. The retrospective of his work published in 1998[15] reveals that Kan's early 1970s works were devoid of Chinese elements, and simply followed the Western style. Starting in the mid-1970s, he began to employ Chinese symbols and images in his designs.[16] In a 1977 poster design produced for a graphic design course," a private design school, (figure 3) Kan explored the integration of traditional Chinese calligraphy together with the constructive lines borrowed from Western typographic design. Choi Kai-yan was a pioneer who attempted to apply Western typographic theory to Chinese writing. In his work for the Baptist Press in 1977, (figure 4) Choi employed Chinese characters but used icons to replace parts of them. For example, the logotype design for the company places an icon of a book at the top right of the character. In spite of the replacement, the character's original meaning still can be read. This technique of adding icons and meaning to Chinese characters became Choi's design signature.

The late 1970s marked the beginning of cultural exchange activities between Hong Kong designers and institutions in mainland China. After the cultural revolution ended in 1976 and prior to the official announcement of China's Open Door Policy in late 1978, some art and design institutions began to interact with overseas organizations. Activities such as Kan Tai-keung's lecture on packaging and graphic design at the Guangzhou Institute of Arts in 1978,[17] and the visit of the First Institute of Art & Design Association of Hong Kong to the Central Arts and Crafts Academy in Beijing in 1979,[18] stimulated new developments in graphic design in mainland China. These two visits were followed by exhibitions. The first, the Hong Kong Designers Show, was held in 1979 at the Guangzhou Institute of Arts. The second, Design '80, was held both in Hong Kong and Beijing in 1980. These two events were some of the activities that introduced outside influence into the development of contemporary graphic design directions in mainland China.

China had been cut off from the outside world, and there were hardly any commercial art activities there for almost three decades. Under such circumstances, the modern Chinese design movement started in the 1930s by Shanghai designers was not able to keep pace with the international design trends throughout this period. With the introduction of the latest design trends through an

14   Wucius Wong, *Principles of Two Dimensional Design* (New York: Van Nostrand Rhinehold, 1974) and *Principles of Three-Dimensional Design* (New York: Van Nostrand Rhinehold, 1974).

15   Kan Tai-keung, *Selected Posters by Kan Tai-keung: Sentiments and Harmony* (Hong Kong: Kan and Lau Design Consultants, 1998).

16   See Wang Xu, ed., *Kan Ta-keung, Graphic Designer's Design Life.*

17   Ibid.

18   See First Institute of Art & Design Association, *Design '80* (Hong Kong: First Institute of Art & Design Association, 1980).
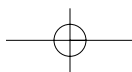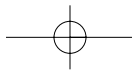
Figure 3
Kan Tai-keung, Studio II, Commercial Poster,
1977.

Figure 4
Choi Kai-yan, Baptist Press, Calendar, 1977.

increasing number of international exchanges, very little influence of the older generation of mainland designers was passed on to the younger generation in the 1980s and 1990s. The main direction of the design education system in mainland China, in today's context, is still based on a skill-training curriculum from the 1960s Russian model.[19] Creative and conceptual thinking have not been emphasized in design education. Thus, the influx of overseas design concepts, in which Hong Kong initially was significant, played an influential and inspirational role for young people and students such as Wang Xu and Wang Yue-fei, who later became a pioneer in graphic design in mainland China.

Spreading the Seeds of Communication in the 1980s
The 1980s was the era during which Hong Kong played a major role in fostering and building connections with design practitioners and institutes in mainland China and Taiwan. Hong Kong designers responded to the invitation of a Taiwanese graphic design group to participate in the Exhibition of Asia Designing Masters held in Taiwan in 1982.[20] Compared to work from Hong Kong, Taiwan graphic design was less exposed to Western design, due to the political constraints, censorship, and martial law on the island until 1987. The early 1980s also saw the rise of the awareness of Hong Kong Chinese of their identity due to the coming handover to Chinese sovereignty in 1997, which led to the development of two divergent design trends in Hong Kong. The incorporation and exploration of traditional Chinese elements, begun in the mid-1970s, was expanded and refined while, at the same time, other local design work developed in another direction toward the expression of pure Western themes.

Among the prominent Hong Kong designers to continue with the inclusion of Chinese elements in graphic design was Kan Tai-keung. As a practitioner of modern Chinese shuimo painting, Kan Tai-keung often used Chinese high art objects and brush strokes in his designs. For example, his transitional work between his Chinese style works in the mid-1970s and late-1980s is illustrated by a poster design for *Shui Mo: The New Spirit of Chinese Tradition* exhibition in 1985 (figure 5). Its black brush strokes, Chinese painting pallet, and red paint formed the basis for his future stylistic signature. The simplicity of the use of only red, white, and black is evidence of the continuity of his style from the late 1970s.

Another Hong Kong local trained designer to gain prominence in the 1980s was Alan Chan. As a collector of Chinese antiques, Chan benefited from his knowledge of artifacts from the past, which he often used in his designs. For example, in corporate identity work for the Canton Disco Club in Hong Kong in 1983 (figure 6), Chan borrowed images of swimmers from the illustrations of 1930s Shanghai publications, and set them against brightly

19 Lin Jiayang, "On Design Education" in *Art and Design* (Beijing: Art and Design Publishing House, June 2000) 29–34. [In Chinese].

20 Amoeba Group, *Leaflet of Asian Designers' Invitational Exhibition & Amoeba Annual Show* (Taiwan: Amoeba Group, 1982). [In Chinese].
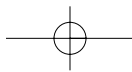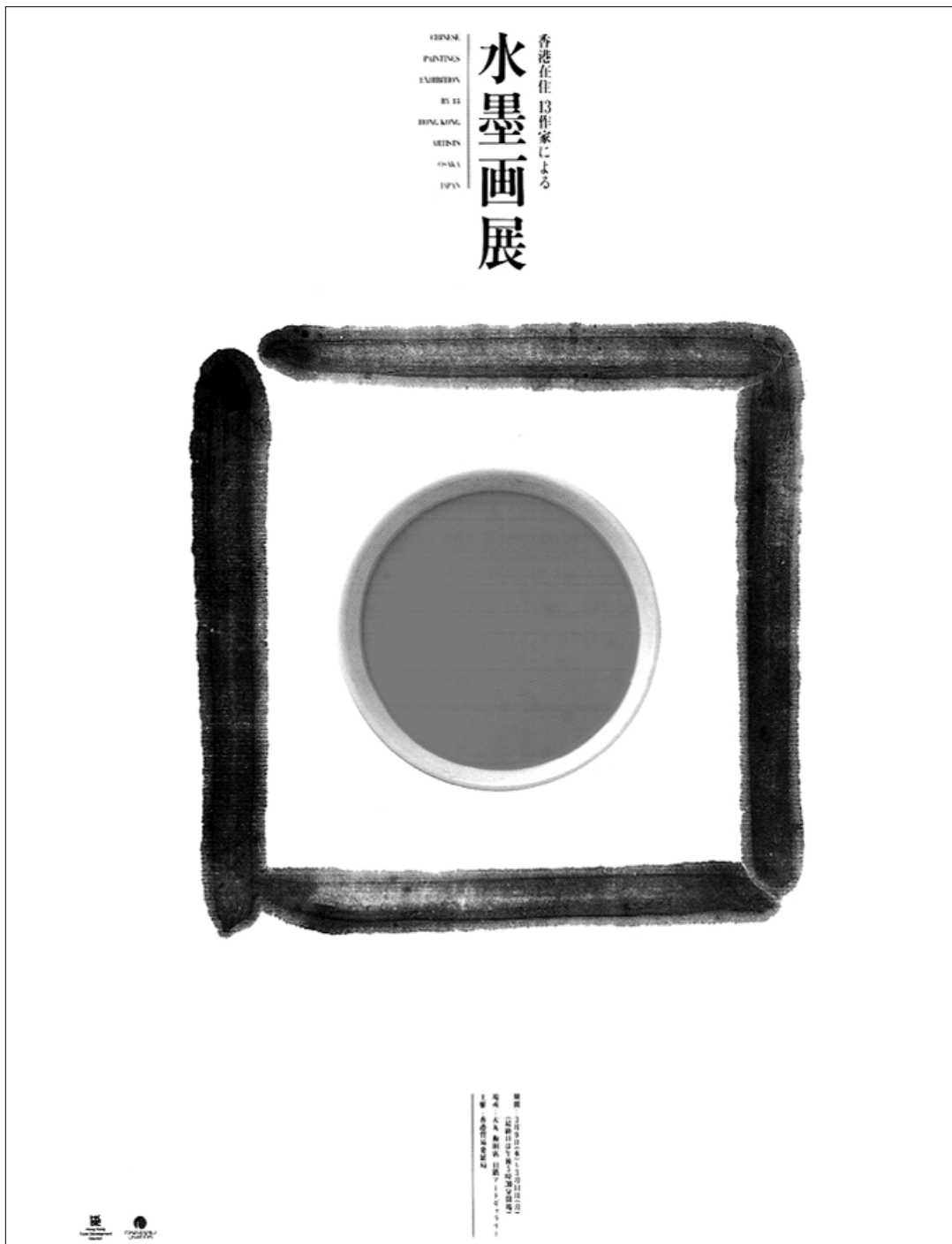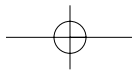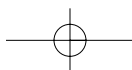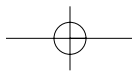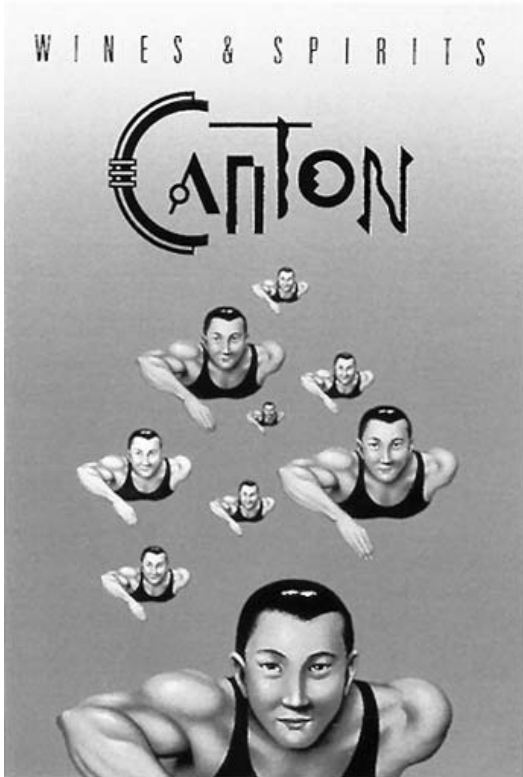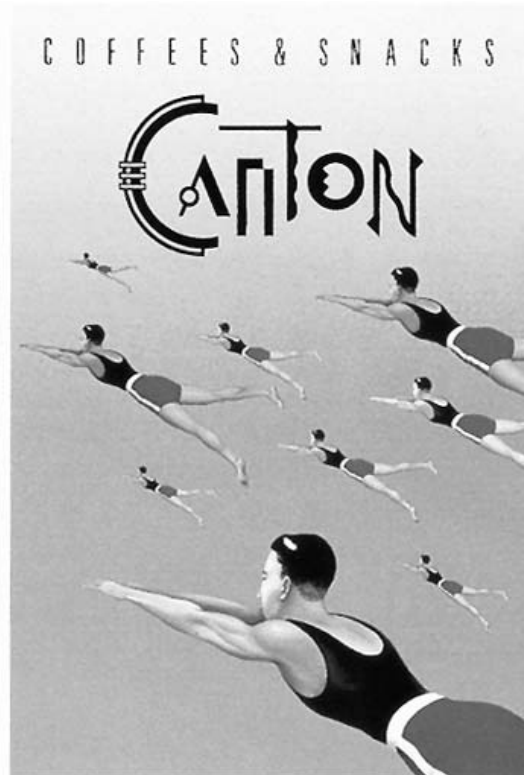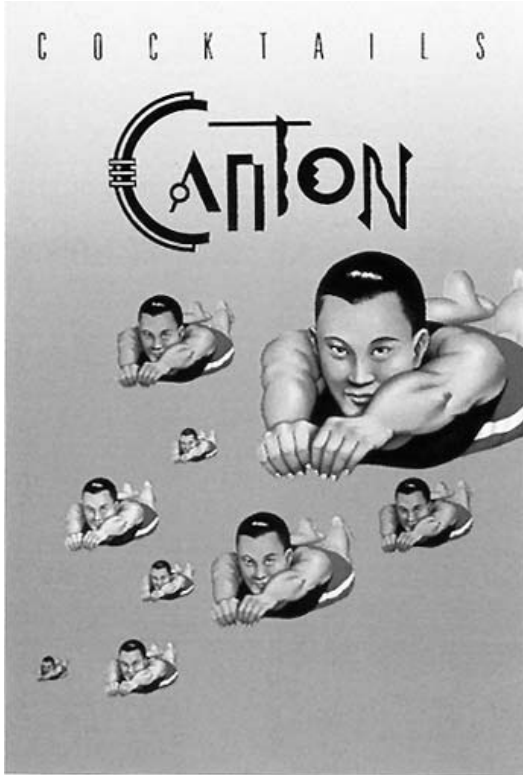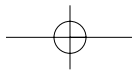
Figure 5, above
Kan Tai-keung, *Shui Mo: The New Spirit of Chinese Tradition*, Exhibition Poster, 1985.

Figure 6, right
Alan Chan, Canton Disco Club, Corporate Identity, 1983.
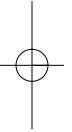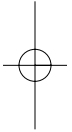
colored backgrounds to give the illusion of flying through space. Although Chan was best known for this modernized nostalgic style, his other works also demonstrate a sophisticated understanding of the blending of Chinese images with modern graphics. In the poster design for *Hello Hong Kong* in 1987, (figure 7) he created a central image of a black dragon on a red background. The traditional image of the dragon is modified in two ways, with the top half pixilated to evoke a computer image and the bottom half in a stylized brush stroke to evoke traditional calligraphy. Kan and Chan are the best known pioneers of the modern Chinese graphic design style. Other local designers, trained both in Hong Kong and overseas, who did not identify their style with Kan and Chan also found their own way without featuring a blend of Chinese and Western elements in their design work. Designers such as William Ho, Alan Zie Yongdar, Lillian Tang, Michael Miller Yu, John Au, Jennings Ku, Tony Tam, and Winnie Kwan continued their Western design approach without the incorporation of Chinese concepts and icons as part of their own characteristic styles.

By the mid-1980s, when Hong Kong designers were developing into two divergent design trends, their works began to be exhibited in mainland China on a regular basis. For example, the winning pieces from the HKDA shows of 1986 and 1988 traveled to Guangzhou.[21] Through such shows, as well as visits from Hong Kong designers, Hong Kong was able to export some influence to mainland China. Although Hong Kong played a leading role through the 1980s because of its relatively free and liberal environment for creative ideas, starting in the 1990s, the quality of graphic design work in mainland China and Taiwan improved rapidly to reach an international standard. By the late 1980s, the more liberal political situation in Taiwan, together with continued economic development, supported international exchanges. From this period on, rapid improvements in the quality of Taiwanese design can be seen, and Taiwanese design organizations began to initiate joint ventures within Greater China.

A New Era of Interaction in the 1990s
In the early 1990s, the outstanding representative designers in mainland China and Taiwan noticeably followed the style of Kan Tai-keung and Alan Chan. By that time, Kan and Chan were well established as the masters of Chinese graphic design within Greater China design circles. Kan, in particular, played an active role in promoting his work in both Taiwan and China, and frequently was invited to give lectures, donate his works to institutions, judge competitions, and participate in shows and solo exhibitions on the mainland. There is no doubt that Hong Kong graphic design, especially as represented by Kan Tai-keung, has played an important role in Chinese graphic design history. However, with more active designers in recent times, a great diversification of style has devel-

21   Hong Kong Designers Association, *HKDA Members Profile* (Hong Kong: Hong Kong Designers Association, 1998).

Figure 7
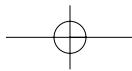Alan Chan, *Hello Hong Kong*, Commercial
Poster, 1987.

Figure 8
Freeman Lau, *Written Chinese Characters:
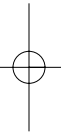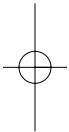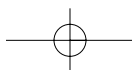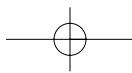The Love of Nature*, Thematic Poster, 1996.

Figure 9
Wang Xu, *Written Chinese Characters: Claw*,
Thematic Poster, 1996..

oped. The 1990s can be seen as the era of the rapid establishment of graphic design associations, expanding activities including many events centering on poster design and graphic design publications within Greater China, and the active participation of Chinese designers in major international poster design competitions. The various locales of Greater China had never been so connected and interactive, with a fully merged history of modern Chinese graphic design.

*The Proliferation of Professional Associations*

Professional design organizations in Greater China always have played an important role in stimulating and promoting the local design industry, as well as establishing overseas connections, following the original example of the Hong Kong Designers Association (HKDA) in Hong Kong. Established in 1973, HKDA was one of the earliest professional design organizations in the region. Since then, HKDA has played a key role in organizing local design awards competitions and maintaining contacts with the outside world. In Taiwan as well, professional design organizations have played a central role in the development of graphic design, although not until much later.

The Amoeba group was formed in Taiwan by professional graphic designers in the early 1980s, but never generated much local or regional attention. Not until 1991, with the establishment of the Association of Taiwan Image Poster Designers (renamed the Chinese Poster Association in 1997) was a stable and influential professional association formed.[22] The primary objective of this association was promoting the quality of Taiwanese graphic design through creative poster design. Taiwanese graphic design was still searching for its own developmental direction at this stage. With the awareness of the needs of internationalization, new professional graphic designer groups such as the Taiwan Graphic Design Association, formed in 1994, and the Kaoshiong Graphic Design Association were established in Taiwan.

The development of graphic design associations in mainland China first began in Shenzhen. Due to the geographic proximity of Shenzhen to Hong Kong, Shenzhen design work for many years was the most advanced in mainland China. Before the establishment of the first graphic design association on the mainland, the Shenzhen Graphic Design Association in 1996, many future members of the Association already were active in organizing shows such as the Graphic Design in China Show in Shenzhen in 1992.[23] The event was a design competition accepting entries from Taiwan and mainland China, co-organized with the Taiwanese magazine *Taiwan Graphics Communications Monthly.* Soon after 1994, the quantity and quality of activities in inland cities in mainland China also increased rapidly. By the late 1990s, Shenzhen was no longer the dominant city in graphic design in mainland China.

22 Chinese Poster Association, *2000 Exhibition of Chinese Poster Design Association* (Taiwan: Chinese Poster Association, 2000). [In Chinese]

23 Wei Yew, "Graphic Design in China Show" in *Communication Arts* (Communication Arts, September/October, 1992): 48–57.
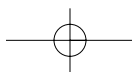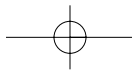
Figure 10
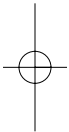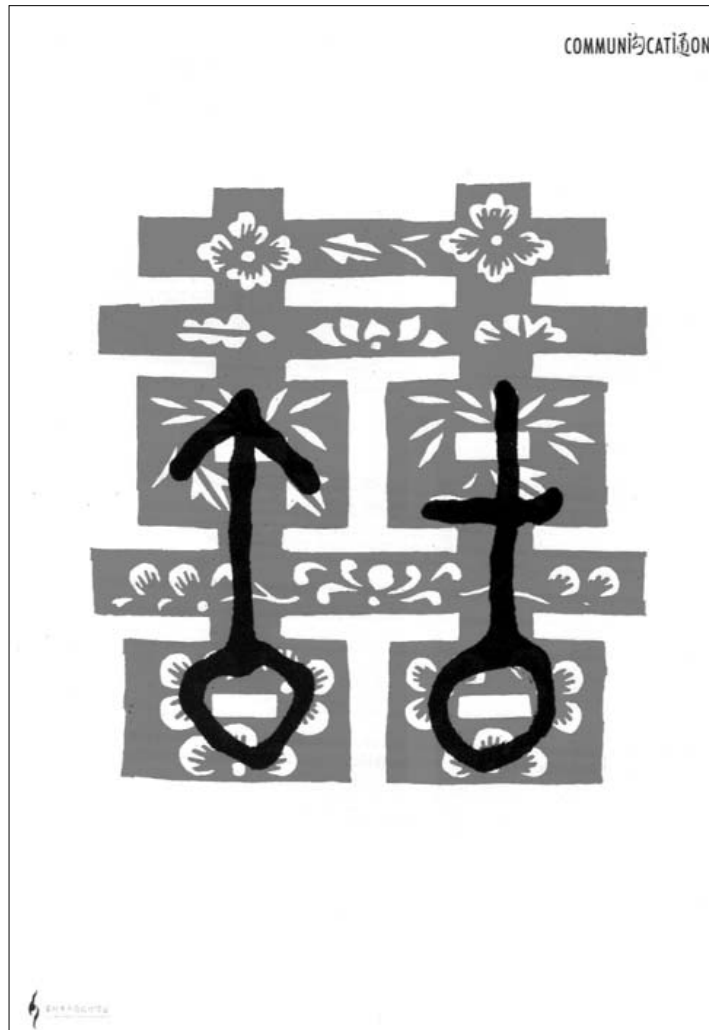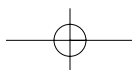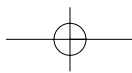Zhou Peng, *Communication: Double Happiness*, Thematic Poster, 1997.

Figure 11
Chen Shao-hua, *Communication: Dreaming West*, Thematic Poster, 1997

Some other inland cities have quickly gained ground, and have been organizing their own activities including corporate identity conferences, nationwide design competitions, and international design exhibitions. The Shanghai Graphic Designers Association, established in 1998, was the second professional group to be formed on mainland China.[24]

Within Greater China, Macau is a relatively small city compared to Hong Kong both in terms of area and population. It was under Portuguese colonial rule until 1999, when it returned to Chinese sovereignty. The Department of Design at Macau University was not established until 1994. Since that time, Macau designers have had the option of obtaining local training and education. The Association of Macau Designers also was established in 1994, and included members from various design disciplines. Although the membership is small compared to comparable associations in Taiwan, Hong Kong, and mainland China, the members remain active in intra-regional design competitions and other events.

*The Intra-regional Poster Design Frenzy*
The idea of thematic poster design invitational exhibitions is influenced by the Japanese and Europeans, but it is fair to say that the Chinese Poster Association of Taiwan started the thematic poster design frenzy, which later spread to Hong Kong and mainland China. Its main yearly event is a thematic poster design exhibition. The theme of the first invitational exhibition, held in 1991, was "The Beauty of Taiwan," and participation from 1991 to 1994 was restricted to its members.[25] Starting in 1995, the Chinese Poster Association Exhibition began to invite other Chinese participants from outside Taiwan to participate. In 1995, two designers from China and two from Hong Kong were invited.[26] The design theme for that year was "Written Chinese Characters." Designers could create freely within this theme, using written Chinese characters in the design.

The thematic poster exhibitions organized by associations within Greater China often centered on themes related to Chinese identity, and when the stated theme was not clearly related to Chinese-ness, participants often would include Chinese elements or interpretations in their works. The nature of this type of poster design exhibition primarily is to display the personal creative expression of the invited designers. However, the early exhibition on written Chinese characters also opened up new possibilities for Chinese typographic design. The theme of Chinese characters was used by many participants to explore explicitly Chinese subject matter, and to interrogate the cultural meanings of written characters. In Freeman Lau's work, the symbolic character for "good luck," normally used at the start of the Chinese New Year, is altered and thus reinterpreted to make a personal statement about the love

24   Shanghai Graphic Designers'
     Association, *Hi-Graphic* (Shanghai:
     Shanghai Graphic Designers'
     Association, Issue 1, 1998).
25   Chinese Poster Association, *2000
     Exhibition of Chinese Poster Design
     Association.*
26   Two designers from China were Yu Bing-
     nan and Wang Xu, and from Hong Kong,
     Kan Tai-keung and Freeman Lau.
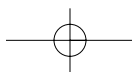
of nature (figure 8). Mainland Chinese designer Wang Xu reinterpreted the ideogram elements of Chinese characters, replacing them with pictures of the objects they represent, such as chicken feet for "claw" (figure 9) and vertical stones for "valley."

Compared to the development of Hong Kong graphic design, the mainland graphic designers have taken only a very short time to reach an international standard, especially in the area of poster desig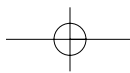n. The key figure in mainland China graphic design is Wang Xu, who had been working in Hong Kong since 1986 and returned to Guangzhou in 1995 to open his own design and publication business. Designers such as Wang Yue-fei, Zhang Da-li, Zhou Peng, Xia Yi-bo, Chen Shao-hua, and Han Jia-ying were key figures on the Shenzhen design scene in the mid-1990s. Chen Shao-hua was invited to the thematic poster invitational exhibition held by the Chinese Poster Association in 1996 under the theme of the "Colors of Taiwan." The following year, a thematic poster invitational exhibition was held for the first time on the mainland, in Shenzhen. The exhibition was co-organized by graphic design associations from Shenzhen, Hong Kong, Taiwan, and Macau under the theme of "Communication."

Again, many of the participants interpreted the theme in specific relationship to Chinese identity and culture, or in relation to cross-cultural themes. For example, mainland designer Zhou Peng utilized a Chinese paper cut of the character for "double happiness" along with black, superimposed icons for "male" and "female" to convey the idea of male-female communication within marriage (figure 10). Chen Shao-hua's work depicts a sleeping Chinese man dreaming a garbled mass of Romanized alphabet letters (figure 11). A third example, Wang Xu's Coca-Cola bottle, is a porcelain version with a Chinese dragon in blue and green tones. These latter two examples represent cross-cultural communications with some humor and criticism. Together with mainland China, Hong Kong and Taiwan have become the three major players in most of the intra-regional events, but there are a few outstanding works from Macau. Ung Wai-meng, one of Macau's outstanding graphic designers, was born on the island and received his education in Portugal. His unique artistic drawing style shows a European influence, and his work has won many awards within Greater China.

Hong Kong has a tradition of concentrating on commercial works rather than on noncommercial creative poster design works. To respond to the intra-regional poster design frenzy, the HKDA adopted the thematic design idea for their biannual member shows. In 1997, their member show was organized under the theme of "Harmony." One of the major intra-regional poster design competitions held by Hong Kong organizations was the Asia-Pacific Poster Exhibition in 1997.[27] This exhibition called for entries from Asian countries including those of the Greater China region as well as Japan, Korea, Malaysia, and Singapore. The show reflected the qual-

27 The Asia-Pacific Poster Exhibition was organized by the Provisional Regional Council and the Hong Kong Designers Association from November 22, 1997 to December 12, 1997.
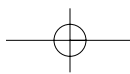
ity and standard of work in Greater China compared to other Asian countries. The quality of Japanese work always has been considered the highest in the Asia-Pacific region, so the competition provided an opportunity for the designers of Greater China to have their work judged against this standard.

Since the first event of the intra-regional poster design invitational exhibition in 1997, different groups have organized various thematic poster exhibitions such as *Celebration of Reunification of Hong Kong With China* in 1997, *Establishment of the Shanghai Graphic Design Association* in 1998, *Celebration of Reunification of Macau With China* and *Opening of Design Museum in Beijing* in 1999. These intra-regional design competitions and invitational shows enabled the region to produce a large number of posters within a short time. However, because some of the invitational events did not include a referee system, the quality of the work produced varied considerably.
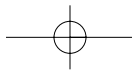
Another important recent trend in invitational poster exhibitions is their expansion beyond Greater China into the international sphere. For example, one of the latest invitational exhibitions, *Shanghai International Poster Invitational Exhibition '99*, invited not only Greater China designers, but also solicited the participation of designers from Japan, Korea, the Netherlands, Germany, England, the Czech Republic, France, Finland, Poland, Switzerland, and the United States.[28] The creative theme for the Greater China participants was "Interaction," while the overseas participants were invited to submit any of their poster works. Like the Asia-Pacific Poster Exhibition held in Hong Kong in 1997, events of this type provide an opportunity for Greater China designers to gain insight into how the standard of local works compared with the international standard. This trend of creating a theme and inviting overseas designers to also submit their works also has been adopted in Hong Kong. The biannual member show of the HKDA under the theme "Designers' Eyes on Hong Kong 2000" also invited prestigious overseas designers to submit their work without necessarily following the given theme. Subsequently, the same exhibition strategy also has been used by the Hong Kong Poster League, newly founded in 1998 by Kan Tai-keung, Alan Chan, Stanley Wong, Tommy Li, and Freeman Lau. The primary purpose of the group is to identify themes and to organize corresponding exhibitions on a regular basis. In their first show in 2000, under the theme of "People," they displayed their own thematic works and invited international designers[29] to submit works on any subject matter.

Publishing the Sources of Inspiration
An active intra-regional design scene and the flow of information have played a very important role in elevating the standard of work in mainland China. Together, these elements provide designers with creative opportunities as well as chances to display their work. Very

28 Shanghai Graphic Designers' Association, *Shanghai International Poster Invitational Exhibition '99* (Shanghai: Joint Publishing House, 1999).

29 The international designers invited included Michel Bouvet from France, Alan Fletcher from England, Helfried Hagenberg from Germany, Pekka Piippo from Finland, and Ralph Schraivogel from Switzerland. Freeman Lau's book of his own poster design works, *Looking Back: Freeman Lau's Poster Design,* was published by Kan and Lau Design Consultants in March 1999. The Kan and Lau books both were funded by the Hong Kong Arts Development Council. Tommy Li self-funded a book on his retrospective works, *Tommy Li: My Work My Words,* published in May 1999.
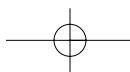
often, works from intra-regional poster design shows have generated media exposure and publication opportunities. Before the 1990s, the flow of information was so limited that mainland designers had to purchase magazines and other publications imported from Hong Kong in order keep up with recent developments in the field. Due to the loosening of the political environment in mainland China, leading to a more liberal attitude toward commerce and advertising, the publication business for international graphic design books and local graphic design magazines has experienced a boom since the mid-1990s. The mainland printing industry also has developed rapidly through Hong Kong investment and experience, particularly in Shenzhen and southern coastal areas.

With the expanding of the local market as well as the demand of local designers to have access to knowledge about international developments and trends, magazines such as the Beijing-based monthly *Art and Design,* and the Guangzhou-based *Design Exchange* and *Packaging Design*, often report major overseas design competitions and exhibitions. *Hi-Graphic* is a magazine published since January 1998 by the Shanghai Graphic Design Association, and is another trendy graphic design periodical. This publication plays a role in introducing outstanding work from overseas, as well as providing a venue for members to display their work and report on their activities. Magazines have become an important means for mainland designers to learn from established international designers. Major book series of collections of individual designer's works such as *Graphic Designer's Design Life,* edited by Wang Xu, invite international designers such as Niklaus Troxler (Switzerland), James Victore (USA), Kari Piippo (Finland), Art Chantry (USA), Koichi Sato (Japan), Tanaka Ikko (Japan), Louise Fili (USA), and Henry Steiner (Hong Kong), to allow their work to be published and circulated in Chinese for a mainland audience. Other Hong Kong designers also have published their own individual portfolio books. Examples include Kan Tai-keung's book of his poster works, and the Freeman Lau and Tommy Li retrospective collections.[30] This type of design portfolio collection book often simply displays the design work by category or theme, seldom adding any analytical perspective or much informational text.

International Poster Graphic Design Events
In the year 2000, Hong Kong no longer enjoys a leadership role on the intra-regional design scene. Rather, new trends and developments now are being established in many of the cities within Greater China, and the common ground on which Greater China designers compare their work is the realm of overseas international competitions. Mainland designers have played a particularly active role in participating in these overseas competitions since the mid-1990s, and designers from other parts of Greater China have taken up the practice as well. For example, starting from the mid-1990s,

30 Kan Tai-keung's book of his poster works, *Selected Posters by Kan Tai-keung: Sentiments and Harmony,* was published by his own company, Kan and Lau Design Consultants in 1998.
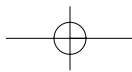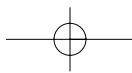
mainland designers were represented at the International Poster Biennale in Warsaw, Poland, the Lahti Poster Biennale at the Lahti Art Museum in Finland, the International Computer Art Biennale in Rzeszow, Poland, the Colorado International Invitational Poster Exhibition in the U.S., the International Biennale of Graphic Design in the Czech Republic, the International Poster Trienniale in Toyama, Japan, and the Seoul Triennale Exhibition of Asian Graphic Posters in Korea. Many of the mainland entries won awards in these international competitions. For example, a series of posters designed by Zhang Da-li and Tang Di on the theme of "Human and Nature" won major awards at the International Computer Art Biennale in Rzeszow, Poland in 1999. Chen Fang also was one of the three highest award winners at the Colorado International Invitational Poster Exhibition in the U.S. with his poster *Victory* depicting a hand gesturing the "peace sign," with the two peace-sign fingers intact and the other three apparently violently blown away (figure 12).

Compared to mainland designers, Hong Kong and Taiwan designers have not received many international awards. However, Hong Kong and Taiwanese work continues to receive international recognition on a regular basis. For example, in 1999, posters of four Hong Kong artists, as well as three from the mainland and seven from Taiwan, were selected for the 12th International Poster Salon in Paris. In 2000, John Au was awarded the Savignac Grand Prize at the 13th International Poster Salon in Paris (figure 13). This can be considered the most prestigious international award ever received by a Hong Kong designer. It represents a new stylistic direction in the territory, without the incorporation of Chinese elements in the design. The international recognition of a wide range of designers from the Greater China region also symbolizes a new era characterized by a lack of dominance any individual or group of designers or particular style. The scene at the beginning of the new millennium is full of potential for diversification. The next stage of Chinese graphic design history within the region will likely continue the search for international visual languages with the subtle expression of Chinese stylistic and aesthetic characteristics.

Conclusion

In this article, I have provided a brief survey of Chinese graphic design in Greater China. I have taken an historical view of the pioneering role of Hong Kong designers within the region, and have established the importance of treating the whole region as having one, unified history. The article has demonstrated the leadership role of early Hong Kong designers such as Henry Steiner, Kan Tai-keung, and Alan Chan, whose styles were influential throughout Greater China in the 1970s and 1980s. Their use of Chinese elements in design works is now thoroughly established as one means of expressing Chinese identity and culture in design works, although expressions of regional identity today certainly are
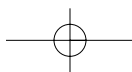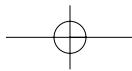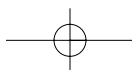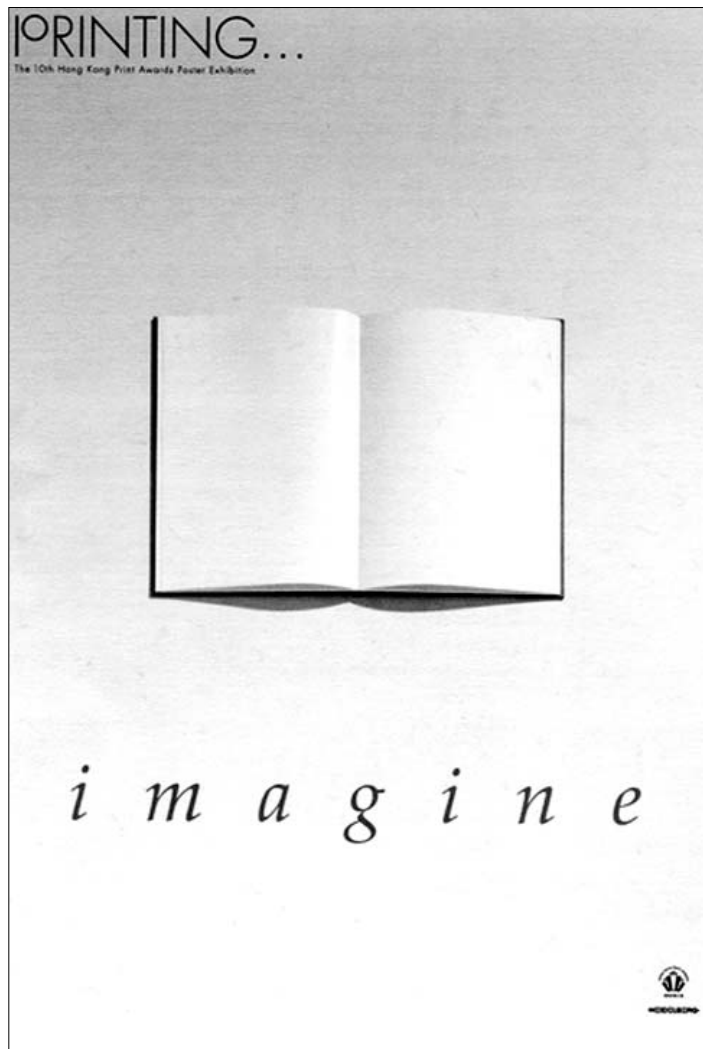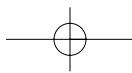
Figure 12
Chen Fong, *Victory,* Experimental Poster,
1998.

Figure 13
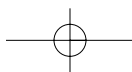John Au, *Printing: Imagine,* Thematic Poster,
1999.

not limited to the use of Chinese elements in design. The current direction of stylistic expression is more towards a universal language that can be understood internationally in any culture.

The developments in the various locales of Greater China are so intertwined that a separate history of any one area necessarily would leave out key influences and developments involving the others, and thus would create a distorted and inaccurate view of Chinese graphic design history. In addition to the regional influence of the styles of early Hong Kong designers, regional history has been linked through the regular organization of intra-regional design competitions, exhibitions, and publications. Although many developments such as the establishment of professional design organizations have been at the local level, other important events have taken place among the various cities within Greater China. In order to maintain their competitiveness within the region and beyond, local designers have found it necessary to organize and participate in intra-regional events and international competitions.

Graphic design in Greater China definitely is entering into a stable environment, with the economy and politics of the region in a relatively secure state. Hong Kong once enjoyed a leading position but, with the developments of recent years, it seems unlikely that this former dominance will return. While Hong Kong and Taiwan are likely to continue their high-quality work, their sheer volume of output will never equal that of the mainland designers, who recently have been outstripping their Hong Kong and Taiwanese counterparts in sheer numbers of awards won. This is largely due to the fact that there are many more active designers in mainland China than elsewhere throughout the Greater China region. The future definitely will see an increasing visibility of mainland designers on the international scene. Thus, although mainland design had a slow start, its present and future importance and potential influence cannot be underestimated. Today, the high quality of mainland graphic design in poster works cannot be questioned. Quality design works in other commercial application areas of graphic design should improve rapidly in the near future.

Reshaping and Rethinking: Recent Feminist Scholarship on Design and Designers
Carma R. Gorman

Pat Kirkham, curator, *Women Designers in the USA, 1900–2000: Diversity and Difference* (exhibition at The Bard Graduate Center for Studies in the Decorative Arts, Design and Culture, New York, November 15, 2000 – February 25, 2001).

Pat Kirkham, ed., *Women Designers in the USA, 1900–2000: Diversity and Difference* (exhibition catalog published for The Bard Graduate Center for Studies in the Decorative Arts, Design and Culture by Yale University Press, 2000).

Pat Kirkham and Ella Howard, eds. *Women Designers in the USA, 1900–2000* (special issue of *Studies in the Decorative Arts* VIII:1, Fall-Winter, 2000–2001).

Joan Rothschild, ed., *Design and Feminism: Re-Visioning Spaces, Places, and Everyday Things* (New Brunswick, NJ: Rutgers University Press, 1999).

Introduction

The four works I have been asked to discuss in this review essay comprise recent writings by approximately fifty different people, many of whom are prominent feminist design critics, practitioners, and/or historians.[1] Three of the works—the exhibition at The Bard Graduate Center for Studies in the Decorative Arts, Design, and Culture (BGC), the substantial accompanying catalog, and the special issue of *Studies in the Decorative Arts* (also a BGC publication)—are part of a large research project spearheaded by Pat Kirkham that attempts to chart the "diversity and difference" of women designers practicing in the U.S. between 1900 and 2000.[2] The definite (but not exclusive) focus of the BGC publications is on women who "design" small-scale, discrete, aesthetically pleasing objects, whereas the contributors to Joan Rothschild's edited volume *Design and Feminism* are more often interested (though again, not exclusively) in the needs of "consumers" of architecture and urban design. The Bard projects and the Rothschild book thus are engaged with such different questions and categories of design that there is little overlap between the two, either in terms of content or approach.

Comparing the BGC enterprises to Rothschild's book is nonetheless instructive, as the juxtaposition illustrates the diversity of scholarship that is currently being produced by self-proclaimed feminists. The BGC projects, for example, are characterized by fairly conservative notions about the nature and purposes of feminist inquiry. However, by including crafts in the exhibition, Kirkham does make use of what are still apparently perceived as fairly radical definitions of "design" and "designers," at least if comparing the content of the Bard exhibition to the content of two concurrent design shows at the Met and Cooper-Hewitt is any indication.[3]

In marked contrast to the BGC productions, Rothschild's book seems to employ a fairly standard definition of design that is notable only for its inclusion of architecture, which the BGC publications do not address. Rothschild's book also provides a wider sampling of feminist approaches to the study and practice of design, many of which are explicitly activist in nature.

Due to the number of authors represented in these works, and to the difficulty of addressing in sufficient detail the diversity of their approaches and subject matter, this essay is not intended to serve as an overview of the "contents" of the show and the three publications. Instead, it is intended as a critique of the methodologies that Kirkham and Rothschild have employed as editors (and/or as curator and conference organizer, respectively) of these works.
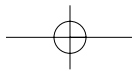
Women Designers in the USA, 1900-2000:
The Exhibition, the Catalog, the Journal

Each of the three Bard "Women Designers" productions serves the useful purposes both of promoting "a deeper understanding of the varied and multiple roles and achievements of women designers during the twentieth century" and of "explain[ing] women's absences from certain activities as well as their participation in others."[4] All three are also visually compelling; the illustrations in the catalog, for example, are plentiful and lush, and the videos and timelines in the exhibition spaces add considerably to the appeal and educational value of the show.

However, even though many of the individual essays in the catalog and journal do merit praise for their impressive historical research, clear writing style, and good illustrations, the project's focus on women's roles as "designers" means that little mention is made in either the essays or the exhibition placards of women's other important roles as purchasers, users, patrons, and scholars of design. Given that Cheryl Buckley's 1986 article "Made in Patriarchy" is clearly a key text for Kirkham's formulation of the category "designer"—and of her inclusion of what are usually called "crafts" in an exhibition on "design"—I was disappointed that Kirkham's study did not seem to be informed by the other half of Buckley's argument, which was that feminist scholars should move away from the study of individual designers, and instead focus on the other kinds of interactions women have had with design. Focusing on designers does of course have certain uses, but as Buckley points out, "The monograph, the primary method used by historians to focus on the designer, is an inadequate vehicle for exploring the complexity of design production and consumption."[5]

Especially given the influence that Buckley's article has had on feminist design scholarship since it was published, the kinds of questions posed both explicitly and implicitly by Kirkham et al. seem somewhat dated; they are virtually identical to the queries typical of "traditional" art history (e.g., how "significant" or "great" was this designer? Can she be considered an innovator or, better yet, a "pioneer"? What influence did she have on her field and on subsequent practitioners? Has her work been unjustly overlooked or undervalued by historians? What obstacles did she overcome on the road to fame and fortune? and so on). As a result of this mode of
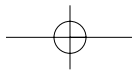
inquiry, the conclusions that many of the BGC scholars draw are unsatisfying. In many of the essays, readers are assured that female designer X (or X and the other members of her design specialization or race with whom scholars choose to group her) indeed was one of the "greats"; that she was unfairly omitted from the history of design; and—now that she has at last been "recovered" from the dustbins of history—that due to her "sheer determination and talent" in the face of so many obstacles to success, she can now serve as an inspiring example to all (or at least to all who share her sex, race, or design specialty).[6]

In the BGC essays these familiar tales of artistic heroism have been reworded to apply to female designers rather than male fine artists, but the assumptions underlying both the stories and the questions that generate them remain largely unaddressed. I find it curious that Kirkham and her coauthor, Lynne Walker, readily acknowledge in the first chapter of the catalog that Nikolaus Pevsner's 1936 book, *Pioneers of Modern Design*, "set the tone for histories of male modernist heroes, and for proto-modernist ones, too," but that they nonetheless seem undisturbed by the extent to which Pevsner's master narrative of male modernist heroes also has shaped the tone and terms of many of their co-contributors' essays.[7]

The word "pioneer," in fact, appears with great frequency in both the catalog and the journal; two of the eight journal articles feature the word in their titles.[8] Given that Susan Weber Soros, director of the BGC, claims in her foreword to the catalog that "By focusing on diversity and difference, this project challenges the hierarchy of the arts and the eurocentrism of scholarship surrounding them," I am surprised to see that the term "pioneer" is employed so often and seemingly so uncritically.[9] What is a pioneer if not the protagonist of eurocentric myths of manifest destiny? Was it not European pioneers who, as catalog contributor Pamela Kladzyk suggests, were responsible for the obliteration of Native American design traditions and ways of life?[10] I would argue that pioneers are venerable figures only when viewed from a eurocentric standpoint. Although the term "pioneer" (much like the monograph) indubitably has certain uses, it is ironic that the term is featured so prominently in a self-avowedly feminist research project that claims to challenge eurocentrism and embrace "diversity and difference."

In this post-Pevsnerian era, describing an artist or a designer as a "pioneer" suggests (at least to me) a desire to position that person within a eurocentric, masculinist, modernist canon of "greats," an endeavor that, as Buckley pointed out in her 1986 essay, is fraught with a number of problems. Indeed, Kirkham and Walker are rather defensive on this point. They claim in the first chapter of the catalog that "This publication contributes to the ongoing efforts, which began with the Women's Movement in the late 1960s, to recover women previously 'hidden from history' and to reevaluate their roles and contributions." As the authors note, "it is easy to
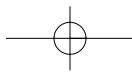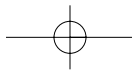
caricature such studies as [doing] little more than adding token women to 'male' narratives." Rather than formulating a carefully argued response to this critique, however, they dodge the issue by claiming that "the best feminist scholarship has always gone beyond that [process of recovery and reevaluation(?)]—to the broad social context of political and personal issues—and has been at the center of reshaping and rethinking the telling of history." [11]

I agree that engagement with political, personal, and social issues is absolutely central to feminist scholarship, and feel that, as director of this research project, Kirkham did provide much of the context needed for an understanding of the legal, political, and social status of women in twentieth-century U.S. culture. However, due to a number of flawed premises related to the ways in which design was, and is, customarily defined and valued in this country, the feminist "telling of history" that Kirkham presents in the exhibition and publications demands "reshaping and rethinking" itself.[12] Had Kirkham framed her guiding question in a Nochlinesque manner—for example, as "Why have there been so few famous female designers, and what attitudes and practices would need to be changed in order to produce more of them?"—I believe that the resulting exhibition and publications would have been both more compelling and more constructive than the ones that were actually produced.[13]

Instead of questioning and defending their premises carefully in light of the many critiques of their method that have been written in the last two decades, Soros and Kirkham take the surprising position that theirs is a "groundbreaking project." [14] Mounting an exhibition that focuses explicitly on both white women *and* women of color simultaneously—especially mounting a design exhibition that does so—indeed is unusual. However, as Kirkham herself points out, the notion that "separating out" women and minorities allows their work to be showcased more effectively is one that can be traced to much earlier exhibitions, such as the one at the Woman's Building at the 1893 Columbian Exposition.[15] Although Kirkham's positioning of named Native American women as active "designers"—rather than as anonymous, passive subjects of ethnographic analysis—still is somewhat unusual, I nonetheless hesitate to call an exhibit that is both so heavily influenced by traditional curatorial preferences for "objects of beauty and originality" and so exclusively focused on establishing an expanded canon of named individuals a "groundbreaking" one.[16]

I also take issue with Soros's claim that the women included in the exhibition have been "underrecognized." [17] Given that design usually refers not to the work of just one mind or one pair of hands, it is unrealistic to expect that a single person's name can or should be associated with any given work of design. Although there are a fair number of designers who are known by name, and many of them are males, there also are legions of designers—both male and
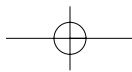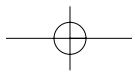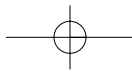
female—whose work could be said to be "underrecognized" or even unrecognized, but only if one's standard of comparison is the history of Western art. The exhibition does not support the claim that women designers have been lost to history to any greater degree than men have; if anything, the show suggests that those women who did succeed in entering the design professions garnered a great deal of attention.

I therefore find it problematic that Kirkham and Ella Howard state in the journal that one of the primary purposes of the BGC research project is "to redress the marginalization of women within the history of design and the decorative arts." [18] A similar goal is outlined in the catalog, in which Soros states that by examining "the multifaceted and largely underrecognized contributions of women designers to American culture in the twentieth century," she and Kirkham hope to place women "at the center of history, rather than the margins." [19] I question such noble-sounding aims for a number of reasons. First, as Ellen Mazur Thomson correctly points out in the BGC journal in her astute review of Martha Scotford's *Cipe Pineles: A Life of Design*, "To concentrate on the life of individual designers would appear to distort graphic design history [and other kinds of design history, I might add], yet graphic design critics and historians continue to insist on writing design history in a series of biographies of individuals, as if biography were the best approach to understanding design history." [20] Thomson notes on the same page that "Writers and critics in the field have defended their almost exclusive reliance on monographs as a necessary step to build a foundation of 'facts' before a more general history can be written," a questionable premise that certainly seems to be one accepted by many participants in the BGC project. Thomson's points nicely problematize Kirkham's goal of "redressing" past inequalities in the design and design history professions by "recovering" women "pioneers" and arguing for their centrality to the history of design; Thomson is right to suggest that writing biographies of individual women designers will do little to help people today understand the ubiquity and persistence of gender bias in the past. If anything, a biographical approach fosters the notion that truly "exceptional" women will always triumph over the obstacles society places in their way (which, in turn, minimizes the obstacles posed by sexism and racism by suggesting that they were not that great after all).

Although I certainly would not go so far as to say that biography is of no use to feminist scholars, it is nonetheless ironic to see Thomson's excellent critique of biography as a method of studying design history juxtaposed with some of the other essays and interviews included in the journal. In some cases, the interviewers asked more questions about the personal lives of their women designer interviewees (Eva Zeisel, Lella Vignelli, Gere Kavanaugh, and Judith Leiber) than they did about their training, career paths, works, or design philosophies. The following are some of the ques-

tions from Eva Zeisel's and Lella Vignelli's interviews that I found somewhat impertinent:

> "You have always struck me as a strong and independent woman. Did you have women role models in your early life?" (Ron Labaco to Eva Zeisel, p. 130)
> "Do you think your experience of household work has helped you as a designer of products for the home?" (Labaco to Zeisel, p. 135)
> "Did you take time off to get things set up for your family?" (Melissa W. M. Seiler and Pat Kirkham to Lella Vignelli, p. 144)
> "As working mothers, we are both interested in how you managed." (Seiler/Kirkham to Vignelli, p. 147)
> "Did your mother want you to become a professional architect?" (Seiler/Kirkham to Vignelli, p. 149)
> "Do you try to keep work away from home?" (Seiler/Kirkham to Vignelli, p. 150)
> "What advice would you offer young women entering the design profession?" (Seiler/Kirkham to Vignelli, p. 151)

The answers to these questions, I believe, tell us about the interviewees as *women*, but do not provide much information about them as *designers.* The interviews were conducted very differently than most interviews of male designers; men are much less frequently asked personal—as opposed to professional—questions like these. One certainly could argue that male designers should in fact be subjected to personal questions, too, but until that happens, I would prefer to see less emphasis in interviews on "woman questions" and personal lives, and more discussion of actual design practices. Further, I would like to question the assumption that is articulated between the lines in these interviews, namely, that mentor-protégé relationships between females are somehow more significant than those involving persons of the opposite sex. I would counter that young women are not the only people who need mentoring, and that female professionals are not the only ones who can or do provide it. To suggest otherwise plays into sexist stereotypes about women as "natural" nurturers, as well as implying that men are uncaring and that young women need "extra" help and guidance to succeed in male-dominated professions.

Defining "Design"

My most serious criticism of the exhibition and of the BGC project more generally probably is the one most likely to cause controversy. In short, the way in which Kirkham defines (or declines to define) the term "designer" has been an issue of considerable concern to me since my visit to the exhibition on its opening night. Surprisingly few of the "designers"" represented in the show actually conformed to my own definition of that term. Kirkham's definition of
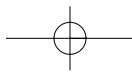
"designer" is not the same one used, for example, by the faculty or students at the school of art and design where I work, and many of the women "designers" whose works were represented in the show, I felt, would be more accurately described as "artists" or "craftspersons."

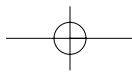Since the wall placards at the exhibition neither defined the term "designer"" nor explained how (or if) Kirkham understood a designer to differ from an artist or a craftsperson, it took me some time to grasp and then articulate her operating definition. My confusion was compounded by Kirkham's seemingly interchangeable use of the terms "decorative art," "applied art," and "craft" with "design." But after viewing the show twice and testing my hypothesis repeatedly on the various objects on display, I concluded that the show ultimately defined as a "designer" anyone who makes—or creates plans to make—tangible things other than paintings, photographs, buildings, or traditionally defined sculptures (i.e., "artists," "photographers," and "architects").

Probably I would not be so concerned by a lack of clear definitions and consistent usage if it were not for my conviction that many of the objects displayed in the show were not actually "design," at least not in any useful sense of the term, and that many of the women represented there were thus not actually "designers," either in the current sense of the word or in the sense in which it was used in their lifetimes. I would argue that Carolyn L. Mazloomi's quilt *The Ancestors Speak to Me*, Frances Higgins's *Dropout* vase, and Maria Martinez's and Nampeyo's jars (as well as numerous other objects included in the exhibition) do not belong in a show that is titled *Women Designers*. My resistance to applying the term "designer" to these women, I am well aware, bucks the trend in feminist scholarship set by Buckley in her aforementioned 1986 article. In that essay, which Kirkham prominently cited in her literature review in the catalog, Buckley claimed that "Central to a feminist critique of design history is a redefinition of what constitutes design."[21] She contended that design historians have misguidedly privileged mass production over craft production, and that "if a feminist approach to women's design production is to be articulated, it must cut across these exclusive definitions of design and craft to show that women used craft modes of production for specific reasons, not merely because they were biologically predisposed toward them. To exclude craft from design history," she argued, "is, in effect, to exclude from design history much of what women designed."[22]

Kirkham seems to have agreed wholeheartedly with this assessment. She not only included "craft" in the exhibition by retroactively recategorizing it as "design," but also created a new ancestry for feminist design history. In the first chapter of the catalog Kirkham and Walker trace a lineage of feminist design history that begins with Patricia Mainardi's 1973 essay "Quilts: The Great

American Art" (incorrectly cited on page 78 of the catalog as "Quilts: The Great American Myth"), followed by Roszika Parker's 1975 essay "The Word for Embroidery Was WORK," and then by Buckley's 1986 article. However, I would argue that neither Mainardi's nor Parker's essays would have been considered design history at all had it not been for Buckley's intervention in the discipline, since neither Mainardi nor Parker was interested in claiming that quilting or embroidery was "design." [23] Instead, they sought to elevate needlework from the lowly status of "craft" to the much more prestigious status of "art," as their arguments and word choices make very clear. "Design" as a category of endeavor or mode of production (as opposed to "a design" in the sense of "a composition") was not even one of the terms of Mainardi's and Parker's debates. I believe that only in retrospect—after Buckley had pressed the claim that craft history and design history should be desegregated—did it occur to most feminist historians, including Kirkham, to claim that quilting and embroidery (among other things) should be considered part of design history rather than of art or craft history.

Since Buckley's argument that craft history constitutes part of design history is one of the fundamental premises of the *Women Designers* exhibition, and is essential to an understanding of the way in which design and designers are defined therein, it is important to examine Buckley's own premises and assumptions with some care. First, I would like to take issue with Buckley's claim that "a redefinition of what constitutes design" is "central to a feminist critique of design history." [24] It certainly is true that the term "design," as most people use it, refers to a category that excludes the work of the majority of women, who historically lacked access to many of the educational and professional opportunities available to males, and who labored under other less obvious but no less powerful forms of sexual discrimination. However, redefining "design" to include "craft" is a truly dangerous move. Such a redefinition can do absolutely nothing to change the fact of past inequities. Americans' reluctance to accord "crafts" the same level of respect they accorded "art" or even "design" should not be dismissed or ignored or forgotten, which is what scholars risk when they promote interpretations of the past—such as the one seen in this exhibition—in which every woman was a "designer." If, as Buckley currently contends, the means to "interpret and understand, and perhaps to conceive of change" lies in "the analysis of design within its context and history which aids our understanding of its significance in women's lives," then it is foolish to dismiss the way that past practitioners and theorists categorized art, craft, and design, since those categories are an important part of the context and history of the production and consumption of objects.[25] Thus the exhibition, I believe, does its viewers a disservice by suggesting that despite the odds against them, many white women and women of color were
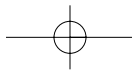
leading productive, satisfying lives as amateur or professional "designers" in the twentieth century, when in fact that was rarely the case.

My point is that it is all very well to declare—assuming a sizeable group of practitioners or scholars can be persuaded to follow such a proclamation—that from this day forward, the crafts and design will be defined differently than they have been in the past. It is another proposition entirely to proclaim such a definition to be in effect retroactively. Thirty years ago Linda Nochlin very sensibly argued that "What is important is that women face up to the reality of their history and of their present situation, without making excuses or puffing mediocrity. Disadvantage may indeed be an excuse; it is not, however, an intellectual position. Rather, using as a vantage point their situation as underdogs in the realm of grandeur, and outsiders in that of ideology, women can reveal institutional and intellectual weaknesses in general, and, at the same time that they destroy false consciousness, take part in the creation of institutions in which clear thought—and true greatness—are challenges open to anyone, man or woman, courageous enough to take the necessary risk, the leap into the unknown." [26] Like Nochlin, I believe that until scholars are willing to accept that the past was unfair, and that the creations of some groups of people were (and still are) valued more highly than those of others, they are going to find it difficult to analyze and critique the ideologies that informed those value systems. And until they can formulate persuasive critiques based on systematic arguments rather than on wishful thinking, it will be very difficult for them to effect positive social change, which, like Nochlin, I take to be the point of most feminist discourses.

I do not believe Buckley's essay or the Bard exhibition and catalog serve that end particularly well. Kirkham, summarizing Buckley's article, argues that "the work of many women designer-makers and designers was marginalized because it was too decorative and domestic; made by the 'wrong people' in the 'wrong place.'" [27] This statement is problematic both because it uses the term "designer-maker" (which, though never defined, seems to mean exactly the same thing as "craftsperson"), and because Kirkham seems to wish to use the term to refer to almost everyone who "designs" or "plans," with the exception of fine artists, architects, and photographers. Buckley and Kirkham apparently promote this generous definition of "designer" because they feel it counters design historians' biases toward "modernist form and practice, machine mass production, and innovation." [28] The problem with such a broad definition of the term, however, is that it encompasses so many activities that it becomes almost useless as a descriptor.

Defining the term "designer" through a process of subtraction—that is, as everybody *except* fine artists, architects, and photographers—means, in effect, that anyone who picks out his or her own
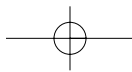
outfits each morning is a costume designer and that anyone who cooks dinner or orders lunch at a restaurant is a meal designer. To laugh off examples such as these as trivial or meaningless (whether because the designers in these cases are not professionals, because they don't think of themselves as designers, or because their "products" are not necessarily aesthetically pleasing) is, in a very real sense, to buy into those same hierarchies of design that privilege certain groups of makers and certain kinds of design over others. But despite their oft-stated desires to dismantle such hierarchies, neither Buckley nor Kirkham seems very interested in dealing with all the kinds of "designers" that their definition logically includes. Kirkham, for example, may very well be committed to studying the ways in which ordinary people design their wardrobes, their homes, their hair, their food, their gardens, etc., but if so, that commitment is not made apparent in the exhibition or the publications. It seems to me that Kirkham wants it both ways—she wishes to employ an expansive enough definition of "designer" to include the crafts, but yet wants to maintain distinctions between "serious" and mundane design, as well as between design and art.

I would argue that, if scholars wish to use the terms "design" and "designer" in ways that distinguish certain kinds of planning activities from others (which Buckley and Kirkham both seem to wish to do), then much narrower definitions are required. A definition I find more useful is this: a designer is simply a certain type of participant in a mode of production characterized by a division of labor between planner(s) and maker(s). This definition does not necessitate (or even imply) a bias in favor of modernism, mass production, or innovation; it simply refers to the fact that within industrialized societies (and within certain non- and pre-industrial ones, too), labor often is divided in a particular way among two or more people. Such a division of labor is not inherently sexist, nor does it inherently privilege one part of the production process over the other; rather, so long as people are free to perform either planning or making tasks to the extent that their skills will allow (rather than being relegated to one role or the other simply on the basis of their sex or class or race), there is little inherently "wrong" with division of labor. Nor does reserving the term "designer"— used as a complement to the term "technician" or "executor" or "maker"— to describe one of the participants in this mode of production imply machine rather than hand production.

Some of the women whose works appear in this show fit my definition of a designer, but most, including the persons to whom Kirkham refers as "designer-makers," do not.[29] I would argue that when both "designing" and "making" roles are performed by the same person, and thus no division of labor exists, the proper descriptor is "craftsperson" or "artist" rather than "designer," and that "designer-makers" therefore do not belong in a show called *Women Designers*, since the distinction between designers and
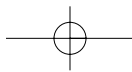
craftspersons is a fairly logical and clear one that has been (and still is) persistently maintained in American culture. To ignore or dismiss the importance of the distinction is to misunderstand not only the terms and the people that used (and still use) them, but also the roles to which those terms refer. Given that the English language boasts a number of words that could describe the range of objects and persons represented in the Bard show without blurring the important distinction that Americans have maintained between the fields of design and craft, I think a more appropriate title for this exhibition would have been *Women Designers and Craftspersons* or *Women Designers and Decorative Artists* or *Women Producers of Material Culture.*[30] Although there is nothing wrong with displaying design and craft together—and in fact there are a number of good reasons for doing so—the exhibition's title is misleading. If its purpose was to promote Buckley's position that craft history should be integrated with design history, then somewhere in the exhibition Kirkham needed to persuade viewers that her expanded definition of "designer" was a reasonable one to adopt.

The exhibition not only reframes "craft" as "design" in a rather troubling way, but also favors one-of-a-kind, "precious" works of art and handcraft over more mundane, mass-produced types of objects. For example, rather than displaying the mass-produced glasses Francis Higgins designed for the Dearborn Glass Company, Kirkham instead chose to exhibit one of Higgins's studio glass "experiments."[31] Similarly, the vast majority of the clothing in the exhibition was one-of-a-kind couture, theater, or cinema garb rather than mass-produced, ready-to-wear clothing. Kirkham seems to have adhered to the hallowed curatorial practice of displaying objects that are notable for their "beauty," "quality," and "crafts-manship," rather than for their popularity or typicality, which I might argue are the more useful criteria to employ in the study of design (rather than art) history. Whatever the reasons for her selections, through them Kirkham effectively privileged "one-off" artworks and crafts over "design."

Part of the reason I have dedicated so much time to questioning Kirkham's definitions of "design" and "designer" is because the definitions she uses are crucial to her focus on "diversity and difference." That is, if one were to apply my definition of "designer" to the exhibition, not only would a large portion of the white women drop out because they would be categorized as artists or craftspersons, but nearly all of the women of color would disappear as well. An overwhelming majority of the women of color represented in this exhibition are identified as either African American or Native American, and a high percentage of their works are what I would argue are "craft" or "art." Kirkham and Shauna Stallworth claim in the introduction to their catalog essay "'Three Strikes Against Me': African American Women Designers" that "despite various levels of invisibility, some black women worked as design-

ers throughout the twentieth century, though only in large numbers toward its end."[32] If the authors are using the term "designers" in the same way that Kirkham does elsewhere (i.e., to include craft and art), this statement is clearly inaccurate, as a quick perusal of the essay demonstrates that African American women were designing quilts, for example, throughout the century.

On the other hand, if Kirkham and Stallworth are using "designer" in the more limited sense that I prefer—as I believe them to be doing in this instance—then their statement is a very telling one, and in fact presents a far clearer picture of the effects of race discrimination in this country than either the exhibition or the remainder of the catalog essay does. As Kirkham and Stallworth point out, women of color suffered from both sexual and racial discrimination; their access to educational and professional opportunities in design was thus at times virtually nonexistent. So even though I commend Kirkham for her effort to draw attention to women designers of diverse races and ethnicities, it seems to me that a more responsible structuring of the show would have emphasized the *absence* of racial and ethnic diversity in the design professions, rather than deflecting attention from that absence by filling in unseemly historical gaps with the works of "designers" who most likely thought of themselves as artists or craftspersons (and who most other people, I think, would categorize similarly).

As a feminist design historian, albeit one who is less interested in designers than in consumers, I believe it is a mistake to try to rewrite history in a more palatable way (by claiming that there were many women who have been unfairly forgotten), or to redefine the category of "design" in such a way that more women can be included in its history (as Buckley and Kirkham do). Only by emphasizing the ideologies and social structures that kept women politically powerless and denied them educational and professional opportunities (rather than by setting up "exceptional" individual women as heroes or geniuses and studying their biographies) can scholars create an accurately devastating picture of the ubiquity of sexism and racism in the twentieth-century U.S. "Recovering" women designers, artists, craftspersons, and architects for history is, of course, a worthy pursuit, but I would question whether it is intrinsically any more useful than recovering the even greater number of males who have been "unfairly" forgotten by design history. Asking questions about the fame, "importance," and influence of individual female (or male) designers does nothing to challenge the notion of the canon. As many others have argued before me, such scholarship generally serves instead to ratify it and its attendant hierarchies.

Design and Feminism (defined very differently)

In contrast to the designer-oriented nature of the BGC projects, Joan Rothschild's edited volume *Design and Feminism: Re-Visioning Spaces,*

Places, and Everyday Things focuses on users of design. Rothschild's book and the conference from which it sprang asked contributors to consider how well "our designed environments—the places and spaces where we live, work, and play, the tools that we use—meet our needs, both aesthetic and functional." [33] The book also addresses process, which Rothschild notes "is the special focus of the last three essays—that is, who has input, how designing is taught and carried out." [34] I would argue that these questions point to a more self-conscious, theoretically informed, and yet simultaneously more practical form of feminist writing than is often displayed in the BGC projects. Rothschild claims that the purpose of her book is "to open doors and be a useful tool for design practitioners, educators, and a wider public. If it inspires readers to learn more and take a greater role in shaping their designed environments, then the first step will have been taken." [35] Rothschild seems to see her book as an opportunity to expose others to "feminist" ways of framing questions, so that they will be more alert to opportunities in their own lives to restructure their environments in ways that suit their needs (whether "they" be male or female, old or young, white or black, etc.).
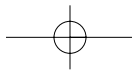
A fairly obvious criticism of the formulation of Rothschild's initial question, however, is that it is not clear whom she includes in the term "we"—women? men? children? the differently abled? feminists? middle-class Americans?—and of course "our" answer to her question will probably vary greatly depending upon who "we" are (there is certainly a group of people—though probably not the same people Rothschild assumes her audience to be—for whom the status quo is quite comfortable). For example, Rothschild assumes that "we" are Westerners. She concedes that the book has a Western and industrialized-world focus; however, to her credit, in the afterword she does address "how the book's feminist approaches might be relevant in very different contexts and cultures." [36]

Like Rothschild, who through her use of the term "we" implies that her readers are on her side, so to speak, many of the contributors to this anthology have a tendency to preach to the choir by assuming that their audiences are already in agreement with their premises, rather than working to persuade the "unconverted" that those premises are reasonable ones. For example, Buckley's essay "Made in Patriarchy: Theories of Women and Design—A Reworking" is based on what I consider to be highly problematic assumptions about the character of her readers. Buckley states in the essay that her intention "is not to argue that women remain hapless victims, incapable of challenging the vagaries of patriarchy….And yet it seems to me that we are losing our original focus. We risk disempowerment and marginalization particularly at the hands of postmodern theorists who pay scant attention to women." [37] Who are "we" in this case? Women? Feminists? Scholars? All three? Buckley seems to assume not only that women or feminists are the

sole audience for her work, but also that she is authorized to speak for one or all of those groups (a rhetorical strategy that, if my students' reactions to it are any indication, tends to turn off many readers). Buckley's (and a few of the other authors') casual assumption of the role of spokesperson for all women and all feminists is troubling, as are her statements that although "the feminist agenda in design has continued and developed," "women's agenda has yet to be incorporated into the mainstream."[38] I would question the notion that either of these groups could articulate a single agenda on which all of its members could agree! In short, I think Buckley's arguments would be more effective were she to reconsider her use of language; many feminists, as well as the "unconverted," react very negatively to language that seems to include or exclude them against their will, and which assumes their agreement rather than attempting to win it.

Buckley also makes a number of problematic claims in this essay. She contends that "Questions about women's role in design remain tangential to the discipline and are tackled with reluctance," and blames this state of affairs on postmodernism's "emphasis on masculinity."[39] She claims that "it is possible to argue that postmodern theory, although ostensibly challenging the value systems of moribund academic disciplines, has remained largely ignorant of and uninterested in feminism," and that it has "replaced one set of patriarchal discourses with another set which is equally patriarchal." However, her conception of what constitutes postmodernism is very different from my own; she states that "Postmodernism is dominated by yet more 'great' men—for example, Baudrillard, Barthes, Lacan, [and] Lyotard," whereas I would argue that postmodernism is a far more complex and diverse phenomenon, which is integrally related to and based on many of the same premises as feminism.[40]Although Buckley claims that "To some extent the problem facing us as feminist design historians is how to rearticulate the categories 'feminine,' 'gender,' 'woman,' and 'subjectivity' in order to move beyond postmodern discourse," I see the problem as a different one, which is that of producing writing that is sufficiently rigorous and accepting of ideological "diversity and difference" (both within feminism and without) that it can speak to a wider audience.[41] I think Buckley's assumption of the role of authoritative spokesperson and her conception of "feminism" as a monolithic entity, in other words, could both stand to be "postmodernized."

The tone that Buckley takes in the reworking of her 1986 essay—i.e., that she knows what "our" agenda is, and that she can tell "us" how to get back on track—is echoed by other writers in the Rothschild book, particularly by Ghislaine Hermanuz in her essay "Outgrowing the Corner of the Kitchen Table." Hermanuz's project is a sincere attempt to reconceptualize housing to respond to the needs and desires of female heads of households; however, some of her assumptions seem almost essentialist in nature, as when she
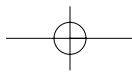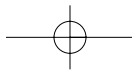
claims that "Home spaces have special meanings for women" (do they not for men as well?).[42] She also claims that "Because of women's dual role as nurturers and producers, the ideal conceptualization of a 'good' community is one where homes, production spaces, and neighborhood are one and the same."[43] I am surprised by both the premise and conclusion of this statement; not all women are nurturers or producers, and therefore surmising that housing must be built to accommodate one or both of those activities seems a dubious conclusion to draw. Mightn't it be more productive to ask if gender roles could be made more flexible? Is tailoring architecture to fit existing social structures really the goal Hermanuz thinks feminists should pursue? My own preference would be to explore other options—ones based on the assumption that both men and women are potential nurturers and producers—rather than accepting the status quo, and building structures and cities that accommodate and thus perpetuate it.

Conclusion

If the Kirkham and Rothschild publications represent the state of the field of feminist design scholarship—if it can be considered to be a unified entity at all—what is that field like, and what challenges does it face? Buckley claims in the Rothschild anthology that "we" are losing ground due to postmodern theorists' shift in interest from "women" to "gender."[44] Kirkham and Howard also claim that feminist design history is endangered, but they believe that the problem is a lack of appreciation: "We as historians of design and the decorative arts," they state, "argue that our academic discipline deserves [i.e., apparently they feel it is not receiving] the respect shown to the history of art and the history of architecture."[45] Since feminism and design are both (according to these scholars) currently at the margins of contemporary critical theory and of art and architectural history, respectively, being taken seriously by non-feminists and non-design historians may indeed be a challenge that feminist design scholars need to face head-on.

I agree that feminism has not had, up to this point, the earthshaking effects on design history, theory, and practice that some might have desired. But as a feminist scholar myself, I am skeptical of "our" chances for greater influence on mainstream scholarship and practice if the Kirkham and Rothschild compilations are representative of "our" work. Make no mistake; many of the essays in each of the three publications, taken individually, are excellent. However, at least as they are framed by Kirkham and Rothschild, as a group the writings seem riddled with questionable premises and assumptions, a tendency toward antiquarianism (by which I mean that many of the essays shed light only on the specific topics they address, rather than drawing connections or conclusions that foster an increased or more nuanced understanding of the past or the present), and an anti-theoretical bias or avoidance of theory, all of

which will conspire to damn them in the eyes of those who are not already self-identified feminists (as well as in the eyes of some who are). In other words, if the exhibition and publications in question are indeed representative of contemporary feminist design scholarship, then I believe the form and the content of the discipline's rhetoric needs "reshaping and rethinking" far more urgently than the history of design itself does. If feminist design scholars wish to move from the margins of critical debate to the center, then I believe they must employ a more rigorous, theoretically savvy form of rhetoric that will both address and sway an audience wider than themselves.

1   I would like to thank the editors of *Design Issues* for inviting me to write this review; Ron Labaco and Han Vu of the Bard Graduate Center for providing copies of publications and photographs of the exhibition, respectively; the School of Art and Design, UWPA/Women's Studies, the Graduate School, and the Office of Research Development and Administration (all at Southern Illinois University at Carbondale) for providing travel support to New York; and Diane Stadelmeier for her patience and encouragement throughout the writing of this essay. I am also greatly indebted to Eric Peterson for accompanying me to the exhibition, discussing it with me both at the time and thereafter, and for helping shape and refine many of the ideas expressed herein.

2   Because the three BGC productions share the same author, title, and date, I will refer to them in the text and in the notes as the exhibition or show, the catalog, and the journal
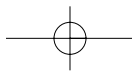
3   I refer to the shows *American Modern, 1925–1940: Design For a New Age*, Metropolitan Museum of Art, New York, May 15, 2000–February 4, 2001 and *Masterpieces from the Vitra Design Museum: Furnishing the Modern Era*, Cooper-Hewitt National Design Museum, New York, October 10, 2000–February 11, 2001.

4   Kirkham, "Preface," catalog, 15 and Kirkham and Lynn Walker, *Women Designers in the USA, 1900–2000: Diversity and Difference,*" catalog, 50

5   Cheryl Buckley, "Made in Patriarchy: Toward a Feminist Critique of Design," *Design Issues* 3:2 (Fall 1986):3–14. Reprinted in *Design Discourse: History, Theory, Criticism*, edited by Victor Margolin (Chicago: University of Chicago Press, 1989), 251–262. The quotation appears on 259.

6   The phrase "sheer determination and talent" is from the introductory paragraph of Kirkham's and Shauna Stallworth's "'Three Strikes Against Me': African American Women Designers," catalog, 123. In all of the BGC projects, but especially in the catalog essay on African Americans, there exists what I consider to be an undue insistence on the necessity of having role models of one's own gender and race (and in turn serving as a role model to others of one's own gender and race). The mentoring roles played by males and by persons whose skin pigmentation does not match one's own are consistently downplayed or ignored.

7   Kirkham and Walker, "Diversity and Difference," catalog, 79.

8   The two essays to which I refer are Judith B. Tankard's "Defining Their Turf: Pioneer Women Landscape Designers" and Ashley Brown's "Ilonka Karasz: Rediscovering a Modernist Pioneer," both of which appear in the journal. The term appears with particularly notable frequency in Tankard's essay; she uses the term not only in her title, but also in phrases such as "Other important pioneers" (34), "Unusual for a pioneer-woman in landscape architecture" (34), "Three exemplary pioneer landscape designers" (36), "the subject of pioneer women designers in the field" (48), "other pioneer women" (51), and "Rose Nichols…stands as a pioneer" (also 51).

9   Susan Weber Soros, "Director's Foreword," catalog, 10.

10 Pamela Kladzyk, "The Sacred Hoop: Native American Women Designers," catalog, 101. Unless the organizers of this show define "eurocentric" to mean only "centered on Europe," rather than "centered on Europe and its former North American colonies" (and they do not to my knowledge ever define the way in which they use the term), I do not think that they can convincingly claim that the exhibition presents a challenge to eurocentrism. All of the women designers included in the exhibition lived and worked for at least a portion of their lives in the United States of the twentieth century. In the past to an even greater degree than in the present, the U.S. was a country in which the dominant culture was indubitably eurocentric or even anglocentric. All of the women represented in the exhibition worked within the parameters of the dominant culture, albeit to varying degrees. As Kladzyk makes clear in her essay, even the work of those women who were reared and trained within the context of traditional Native American cultures were directly affected by the expectations of white tourists. Not only did they produce work specifically meant to suit the tastes of white tourists, but many also began signing their works in response to white Americans' belief that a signature guaranteed "authenticity" (when of course it implied precisely the opposite).

11 Kirkham and Walker, "Diversity and Difference," catalog, 50.

12 Kirkham and Walker, "Diversity and Difference," catalog, 50.

13 I refer to Linda Nochlin's 1971 essay "Why Have There Been No Great Women Artists?"; in that truly ground-breaking essay, Nochlin not only discussed some of the institutional and social biases contributing to women's historic lack of access to necessary training, but also problematized many of the gendered terms that were then (and still are now) so prevalent in art historical discourse ("genius," "virility," "decorative," etc.). By changing the terms in which artistic production was described, she suggested, art historians could alter entrenched ways of thinking about gender and about art, and by so doing, promote positive social change.

14 Susan Weber Soros, "Director's Foreword," catalog, 10.

15 Kirkham "Preface," catalog, 14–15 and Kirkham and Walker, "Diversity and Difference," catalog, 52.

16 Soros, "Director's Foreword," catalog, 10.

17 Soros, "Director''s Foreword," catalog, 10.

18 Kirkham and Howard, "Guest Editors' Introduction," journal, 4.

19 Soros, "Director's Foreword," catalog, 10 and Kirkham, "Preface," catalog, 14.

20 Ellen Mazur Thomson, review of Martha Scotford, *Cipe Pineles: A Life of Design*, journal, 180.

21 Buckley, "Made in Patriarchy," 255.

22 Buckley, "Made in Patriarchy," 255.

23 Roszika Parker, "The Word for Embroidery Was WORK," *Spare Rib* 37 (July 1975): 41–45; cited in Kirkham and Walker, "Diversity and Difference," catalog, 78–79.

24 Buckley, "Made in Patriarchy," 255.

25 Buckley, "Made in Patriarchy: Theories of Women and Design—A Reworking," Rothschild, 116.

26 Linda Nochlin, "Why Have There Been No Great Women Artists?" *ARTnews* 69:9 (January 1971). Reprinted in *The Philosophy of Art: Readings Ancient and Modern,* edited by Alex Neill and Aaron Ridley (Boston: McGraw-Hill, 1995): 56.

27 Kirkham and Walker, "Diversity and Difference," catalog, 79

28 Kirkham and Walker, "Diversity and Difference," catalog, 79.

29 Kirkham applies the term "designer-maker" to potters, jewelry makers, quilters, etc.—women whom I would call "craftspersons."

30 I can certainly sympathize with the argument that craft and design can and should be studied together, even if I do not agree that the same term should be applied to both. I have often wondered why the term "material culture" is not used more often by those who study the twentieth century, since it is a fairly non-hierarchical term and applies to all kinds of goods/objects, regardless of mode of production.

31 Ella Howard and Eric Setliff, "'In a Man's World': Women Industrial Designers," catalog, 286.

32 Kirkham and Stallworth, "'Three Strikes Against Me,'" catalog, 124–5.

33 Rothschild, "Introduction: Re-visioning Design Agendas," Rothschild, 1.

34 Rothschild, "Introduction," Rothschild, 5.

35 Rothschild, "Introduction," Rothschild, 5.

36 Rothschild, "Introduction," Rothschild, 5.

37 Buckley, "A Reworking," Rothschild, 110.

38 Buckley, "A Reworking," Rothschild, 111, 109.

39 Buckley, "A Reworking," Rothschild, 111.

40 Buckley, "A Reworking," Rothschild, 113.

41 Buckley, "A Reworking," Rothschild, 116.

42 Hermanuz, "Outgrowing the Corner of the Kitchen Table," Rothschild 67.

43 Hermanuz, "Outgrowing," Rothschild, 70.

44 Buckley, "A Reworking," Rothschild, 110–114.

45 Kirkham and Howard, "Women and Design: Guest Editors' Introduction," journal, 7.