

Three phases of the graphic Phase 2 intelligent design

computers will emulate

Traditional Tools that emulate

production tools of old media

Phase 2

with greater speed, economy

place professional tools in the

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will change traditional

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Computers and Design

Three phases of the graphic computers will emulate

Traditional Tools that emulate

production tools of old media with greater speed, economy, flexibility and interactivity and place professional tools in the hands of non-professionals

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The New Graphic Languages

Today's personal computer is a functional tool that mimics old tools. But the next generation of graphic computers will permit the merging of previously separate professional tools; at the same time, powerful networking, increased bandwidth* and processing capabilities will make the transition from print to electronic communication the basis of a vast industry. The primary interaction of electronic communication environments will be visual. Traditional graphic design skills will continue to be important for display and presentation, but a new interdisciplinary profession, whose practitioners will be adept in the integration of static and dynamic words and images, will be required to organize and filter information growing at an exponential rate.

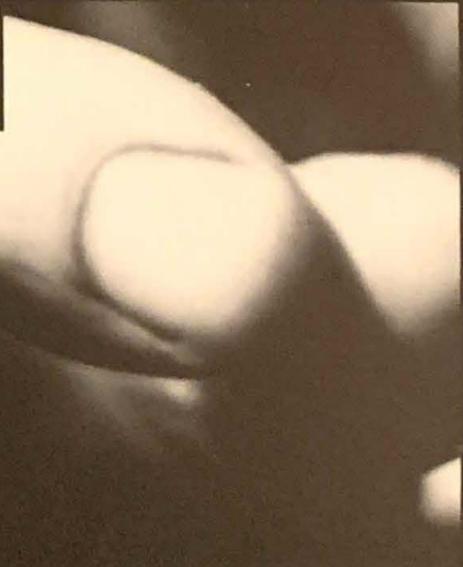
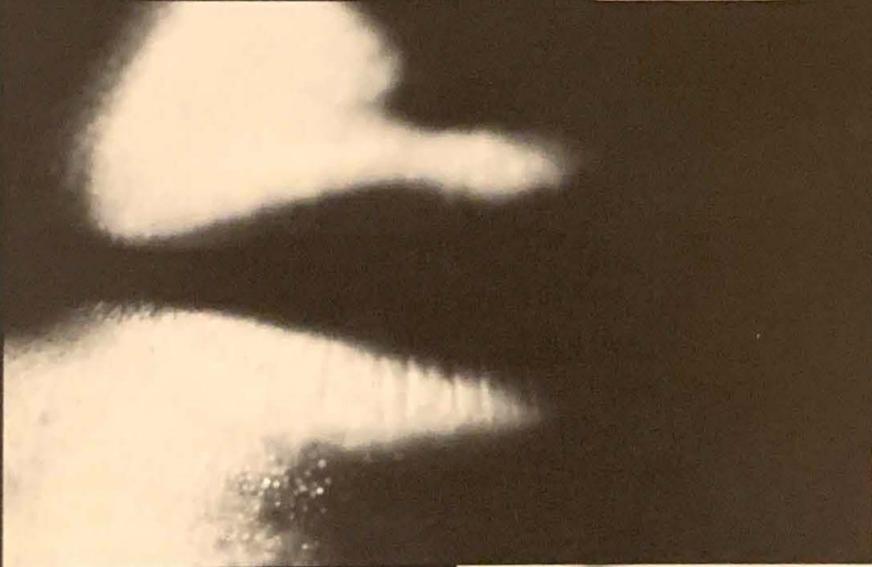
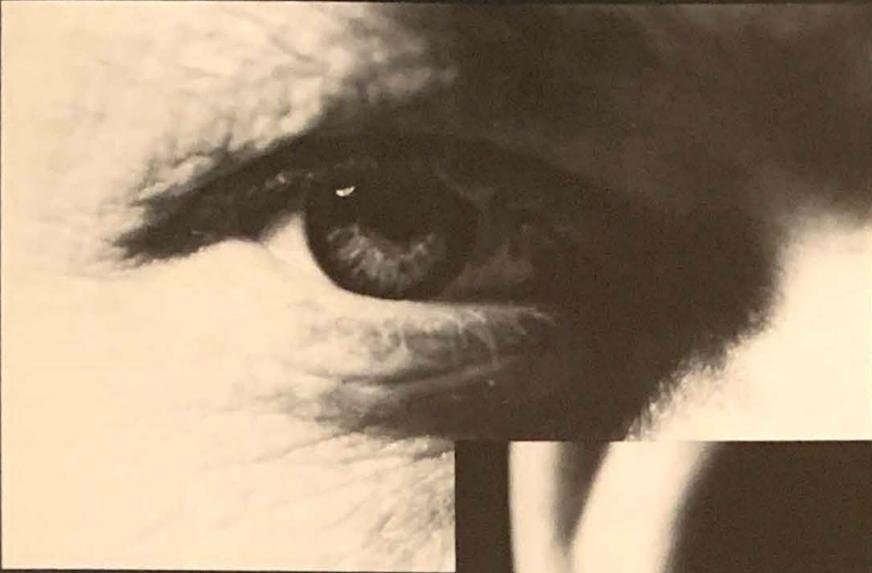
In each period of our history, design and communication have evolved synchronously with the technology of the time. Each new medium has extended our sense of reality and each has looked to its predecessor for language and conventions, referencing and adapting its characteristics until its unique capabilities can be explored and codified. Print, in its infancy, emulated the conventions of calligraphic writing on vellum; typography was modeled on the penmanship of the scriptorium; images and color embellishment

* *bandwidth= a range of frequencies within a band of wavelengths in which a computer can function.*

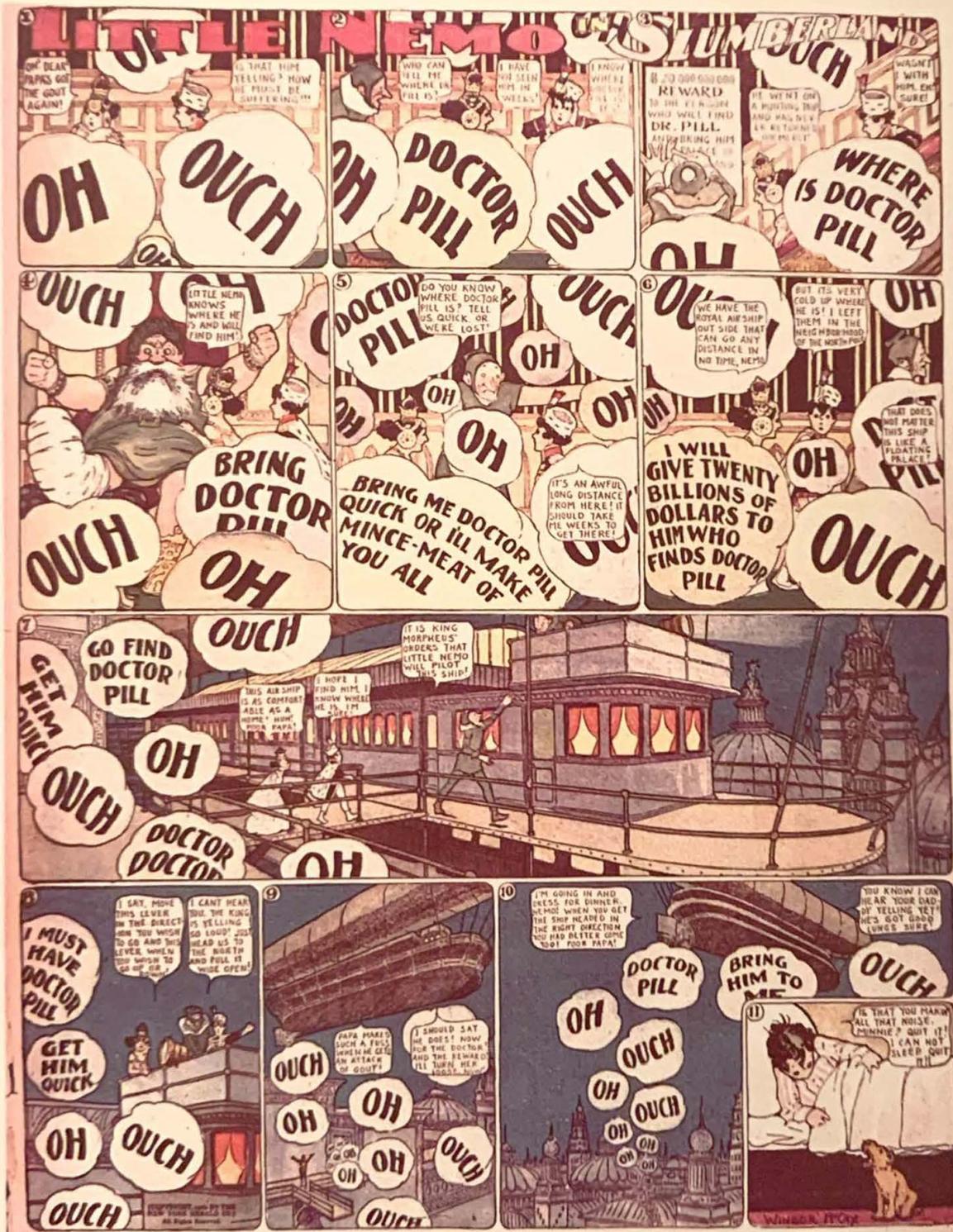
continued to be added to the printed page by hand, emulating the methods of the monastery.

Since the industrial revolution, the expanding tools of the print and broadcast technologies have made the broad dissemination of information possible. A rich and overlapping array of related design and communication fields evolved and matured rapidly in response to mass communication needs. These included graphic and typographic design, illustration, photography, multi-image design, exhibition and interior design, industrial, and environmental design. While the conventions and performance of each often overlapped, they also depended in unique ways upon the physical constraints and characteristics of their trades: reproduction tools of typography, photography, and print; slide, film and video projection, and synchronization tools; sound making, reproduction and mixing tools, for example. As the tools of these media were honed and adapted for broader penetration and use through continuing loops of research and market testing, so were the conventions and languages, the methods of production, and the patterns of communication within each of the design fields.

Natural visual and aural languages were gradually translated into message making conventions that coupled intuitive understanding of human perception with the organization of images and words into two dimensions. Reality was filtered and organized



All technologies are surrogates for physical experience; for example, typography is a substitute for audible speech.



The *Little Nemo* cartoon is an amusing and remarkable exploration of simultaneity. Its multiple voices and serial images bridge time and space and use typographic size, style, and placement to simulate sound and expression. Created by Winsor McCay for the *New York Herald*, 2 January 1910.

through the limitations of the media, modifying the way we think. The restrictions of the page, the frame, the aspect ratio^o of the television set, the physical space of an exhibition hall, and the manufacturing tools also defined the degree to which audience or user could interact with the medium. Communication with large audiences could only be accomplished through expensive, complex media channels, traditionally controlled by the few, motivated and driven primarily by sales and advertising in the United States and often by political expediency in other parts of the world. At this scale, the filtering and editing of information became a consequence of economic control. As H.J. Liebling once quipped, "freedom of the press is guaranteed — to anyone who owns one."

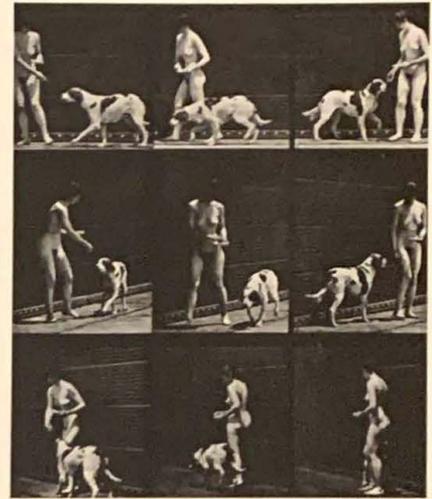
In that context design is interactive and recurrent. It is also focused and goal dependent. The beginning and end of the process are clearly defined and demand conceptual clarity and closure. This limits evolutionary interaction with the medium and the audience or user and requires generalized solutions for large audiences. It is counter to a more intuitive or evolutionary approach to the thinking and problem solving associated with the arts and research, which depends on constant testing and refinement, and encourages lyric leaps.

At the frontiers of expression, unencumbered by the restraints of

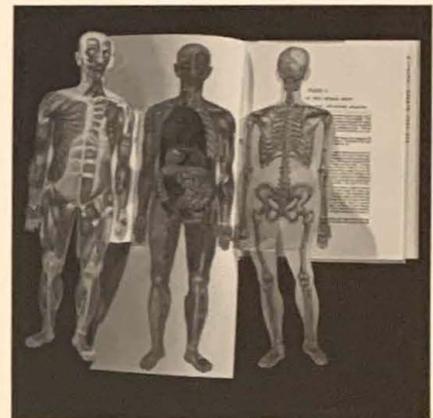
^o aspect ratio= the ratio of the width of a television or film image to its height.

the marketplace, artists and designers have pushed the time and space limitations of print and mass production with experimental works in limited editions. The traditions of binding, of the page, of sequence, of materials, of the package, of audience participation, have all been violated in an effort to break away from the tyranny of a fixed set of relationships. The ever evolving art of Robert Rauschenberg hovers between kinetic sculpture and redefining visual "literacy," in his 1967 print series *Revolver*. In these silkscreens, images are printed on translucent rotating Plexiglas discs, in which the time overlaps characteristic of his previous work are achieved in real time.

Special purpose educational productions have extended old boundaries. A medical encyclopedia opens to reveal the underlying anatomy of the human body — a third dimension or spatial understanding is achieved through die-cutting, pop-ups, pullouts, and transparencies. Tables are made dynamic by the use of wheels and pullouts. Children's books have included scratch and smell, built-in sound, and holographic illustrations. Artists and designers have often become their own authors and producers, gathering to themselves the autonomy that allows control over all aspects of



Eadweard Muybridge's turn-of-the-century experiments with photographic motion studies provide both visual and scientific information.



Bonanza Books *Foldout Atlas of the Human Body*, by Alfred Mason Amadon, MD, achieves simultaneous three-dimensional views of elements of the human anatomy by using pop-ups, pullouts, and transparencies that reveal underlying structure. This book is a 1984 reprint of the original 1906 edition.

the objectification of an idea, breaking away from the limitations of mass production. Self-publishing centers created by artists or art schools are equipped with traditional reproduction tools normally found in commercial printing establishments and generate creative publishing alternatives for limited editions. Xerography and computer typesetting and walk-in copy centers with increasingly sophisticated typesetting, printing, and binding facilities allow a form of on-demand printing and inexpensive self-publishing in limited editions. Desktop publishing coupled with high-resolution typesetting challenges the mass production paradigm even further.

The Graphics Computer as Tool and as Medium

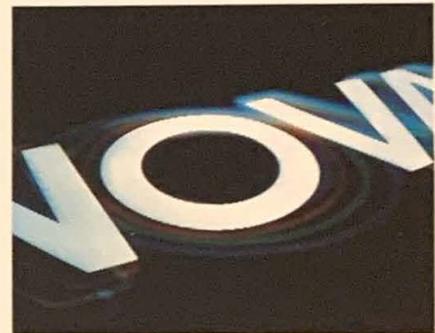
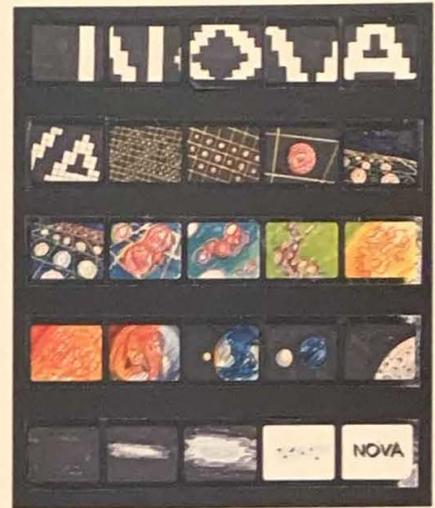
The history of the computer as a new medium follows the pattern of new media emulating old. Very early, its capacity to transform information from analogue to digital and back, shape it at processing speeds that resemble the way we think and maintain massive amounts of data in memory provided us with fast and effective tools that emulate many of the old ones in every professional medium. Early digital paint systems were modeled on physical, analogue brushes; the language

and behavior of physical oil and watercolor painting were laid on top of a digital world like a varnish.

Computer graphics, image processing, computer vision, and robotics required huge computing power and were used only in high-cost research environments. Mathematics provided the tools to model physical processes, to visualize complex scientific data, to animate space travel, and to simulate real-time flight. Large and very expensive mainframe computers dominated the industry well into the 1970s, and continue to play a key role in many corporate and institutional systems.

The advantages of the computer for expensive, high-resolution graphic arts soon became clear. Computer typography and layout developed in parallel with the visual computer. Word and image were merged later, when high-end designer stations were developed as a logical extension of the pre-press production process. The creative potential of these machines soon attracted designers and artists. Predictably, the work was traditional but took advantage of the machine's capability for fast and seemingly infinite transformations that would have been impossible with traditional physical tools. New digital techniques, such as "cloning" and changing color matrices were quickly exploited.

Use of the machines was not easy. It required the help of operators or, in the case of research environments, the help of programmers. And use was expensive on an hourly basis. A few



Boston's public television channel, WGBH, has created a number of title sequences for the NOVA science series since its inception in 1974. Traditional filmic techniques had given way to more sophisticated computer paint and animation systems in 1981 when designer Paul Souza created this new title sequence.

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