It was in the mid-1980s that I conceived the ideas presented in this book. Technology has dramatically changed since then, but the problems and opportunities that motivated me remain relevant.

As a design student then, I witnessed the changes brought about by computers in ways we exchange information. Without knowing much about the technology, I was concerned that designers had little involvement in the development of digital communication. My first reaction was to resist the emerging technology and stay with the tradition of print medium. However, I was increasingly frustrated by the fact that although I could avoid participating in generating low-quality products for digital communication, increasing numbers of such artifacts were starting to surround my visual environment.

Lessons in the history of design were helpful. I was reminded of the failure of the craftsman's resistance to the factory-made objects after the industrial revolution and the effort of the modern design movement that embraced the industrial manufacturing process and incorporated design into factory-made objects. As a student, I began to dream of solving the problem of design for digital communication, though without really knowing what the problems were.

My exploration began with the study of the differences between traditional media and digital media from the perspectives of both design processes and the expressive capabilities. Traditional visual design seemed to encapsulate discrete information into fixed forms, such as print or film, so that the message could be distributed or stored. In the design of digital communication, design prob-

lems were becoming more dynamic as the media became interactive and in-cluded continuously updated information.

My fascination with this difference between the traditional and digital design led me to explore a range of new opportunities and discover various problems associated with the design of digital media. After my earlier explorations, I came to believe that the field of communication design lacks models and languages for developing design solutions that are unique to digital communication. This was not meant to be a criticism of existing design or designers. Rather, I felt that there were opportunities for extending the repertoire of communicative expressions with digital media.

Initally, I thought there would be two approaches I could take. One approach to exploiting these opportunities would be to practice. Generally, repeated exposure to new design problems over time will increase the designer's problem-solving strategies and methods. Not only does this happen at the individual level, but new approaches in design emerge from social interactions among designers as well.

There is, however, another approach, and it is the one I took in the research probject described in this book. Although repeated practice is effective for improving the design of a medium that is new to the field at any time, it can be constrained by the conventions and bias employed in the design of traditional media. Breaking out of traditional approaches can be difficult, so I thought that a fundamental understanding of the nature of digital communication and critical analysis of the existing methods would also be necessary.

Much of the research in design theory in the past has addressed a specific field of design, such as mechanical engineering or architecture, with only a limited amount of theoretical research in the field of visual design. I speculate that this is because most visual design problems seem smaller and often less complex than those of other fields. They are also less obvious and less harmful. A mistake in visual design is not usually life threatening—except in a few areas, such as air traffic displays and street signs.

As digital media became more dynamic and interactive, however, design problems became increasingly complex. Therefore, I felt it would be worthwhile

to make an effort to develop a new framework from within the field of visual design.

As I began my research in the late 1980s and early 1990s, I discovered several related projects that were done primarily in the field of computer science and were concerned with the development of computer systems that automate visual design. Initially, I became pleasantly surprised by their strong interests and understanding of design. However, I was soon disappointed to find that much research in the development of computer systems focused less on designers and design practice. The goals of these research projects were primarily in automation rather than in supporting individual designers to represent their own design solutions in a computational form. I thought their lack of concern with design practice was problematic. I also thought that work in the visual design field for digital media had primarily emphasized visual experimentation and had not made strong contributions to developing theoretical foundations.

As a consequence, my primary research interest became the development of a theoretical framework that would encompass the repertoire of communicative methods and expressions for designers in the context of digital communication.

My work has often been mistaken for the study of design automation. Although the result of this project suggested a computer system that generates design solutions automatically, I must emphasize that this book is not about computer systems or design automation. The primary purpose of this book is to suggest a theory of design. Although this research significantly involves the development of computational experimentations, I consider those the apparatus for intellectual reflection.

The content of this book emerged from my doctoral dissertation, completed in 1995 at MIT's Media Laboratory. Although the fundamental ideas remain the same, much of the text has been rewritten as digital communication technology has significantly advanced since that time. I have updated several parts of this book to reflect technological changes, but I believe that the problems I raised in my dissertation have not been addressed yet in practice, and the basic

framework is still highly relevant to the design of digital communication, now and in the future.

I intend this book to be accessible by anybody involved with the design of interactive artifacts, which includes, but is not limited to, interaction designers, visual designers, software engineers, and human-computer interaction experts.

Interaction and communication designers may find it useful to use the framework of *Improvisational Design* in their own design projects. Designers may use it informally or formally to benefit from the framework. Readers in other disciplines may find it useful to understand the logic behind the process of designing dynamic design solutions. Because of my background as a visual designer, *Improvisational Design* naturally focuses on visual communication design. However, I hope designers of other disciplines, such as product design and architecture, will find it relevant to their practice.