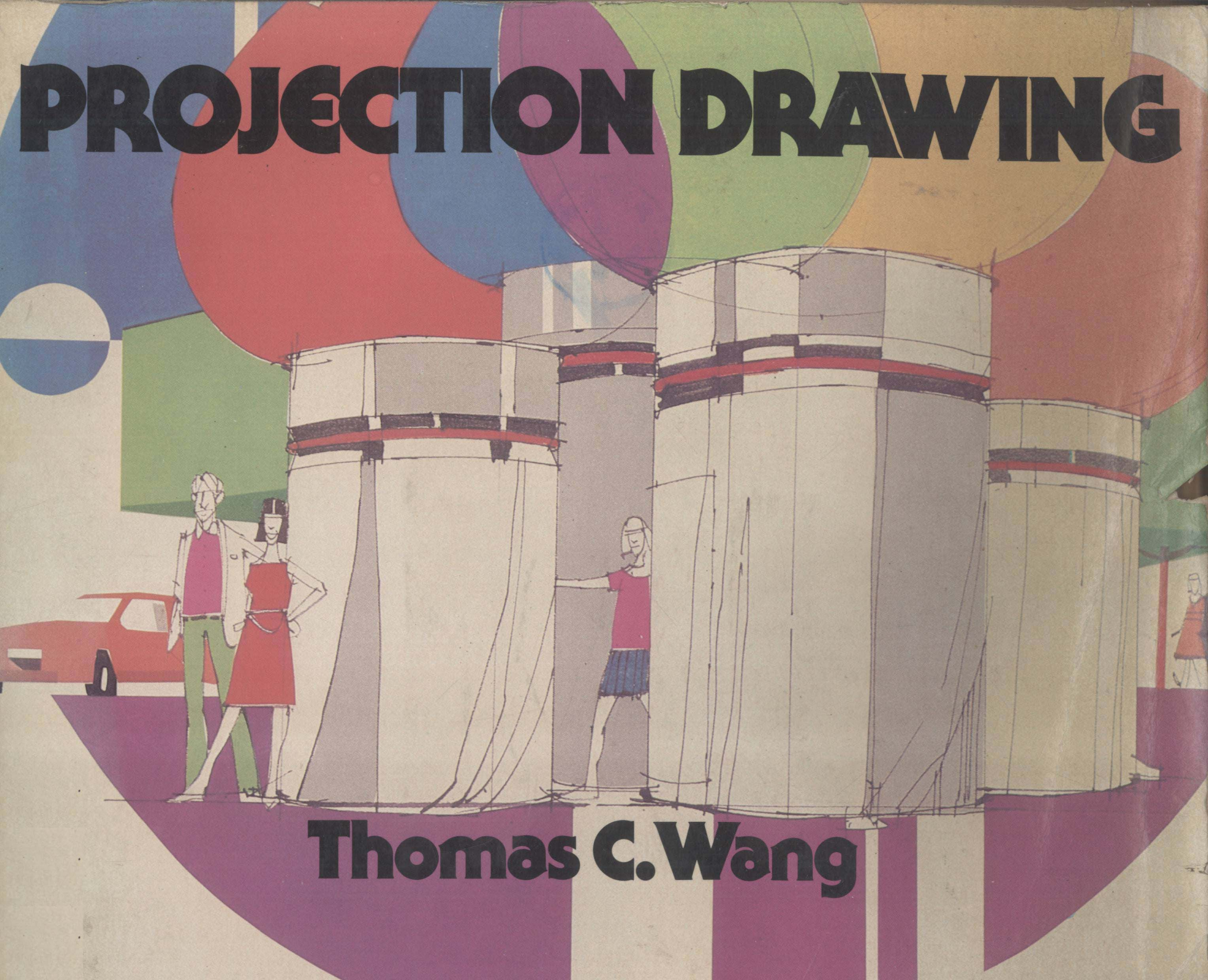
PROJECTION DRAWING



Thomas C. Wang

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VNR VAN NOSTRAND REINHOLD COMPANY

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To my son Andrew

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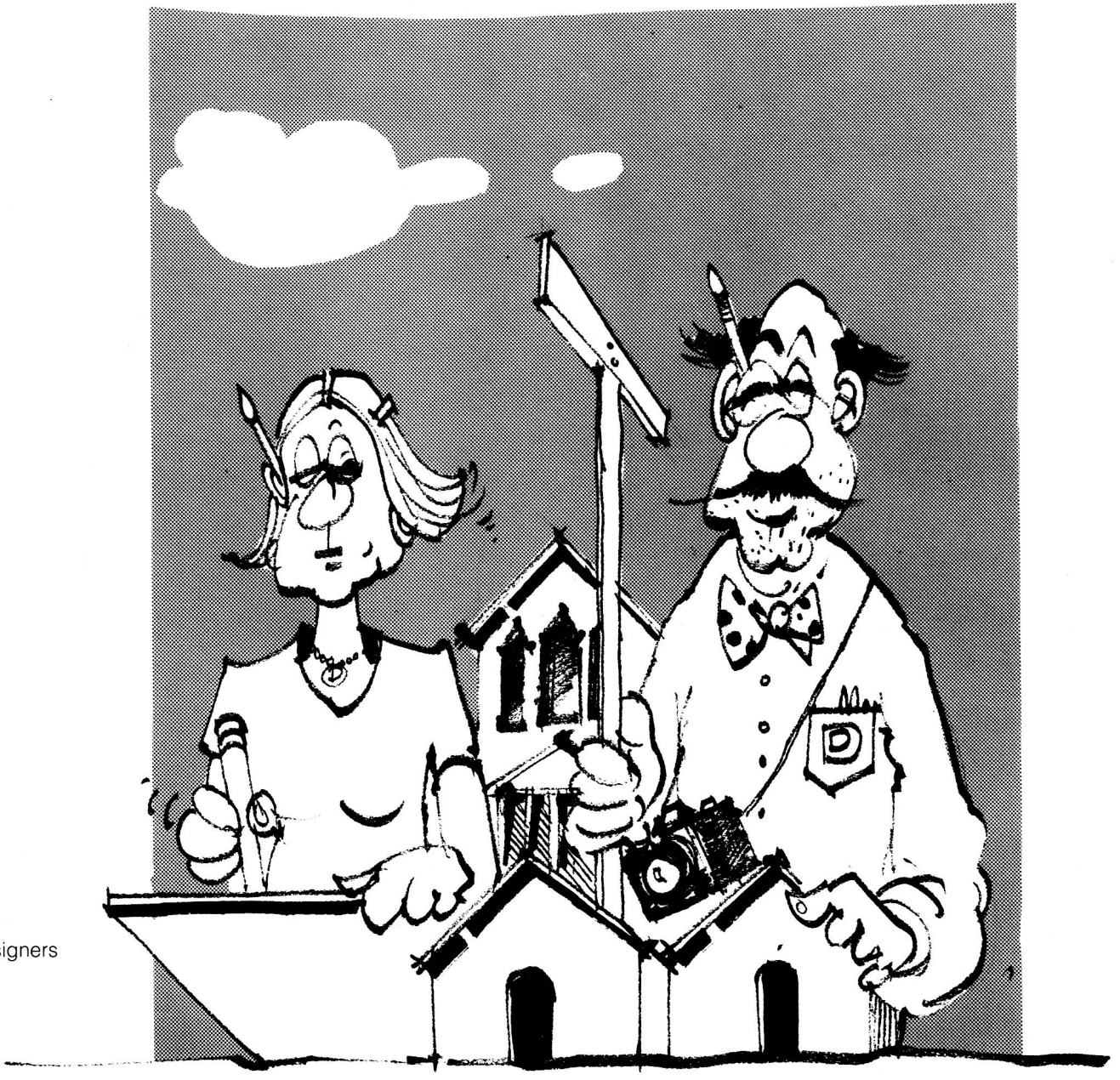
PREFACE

The purpose of this book is twofold: first to present a short course in orthographic and perspective projections and second to discuss the reasons for the importance of projection drawings in a design process.

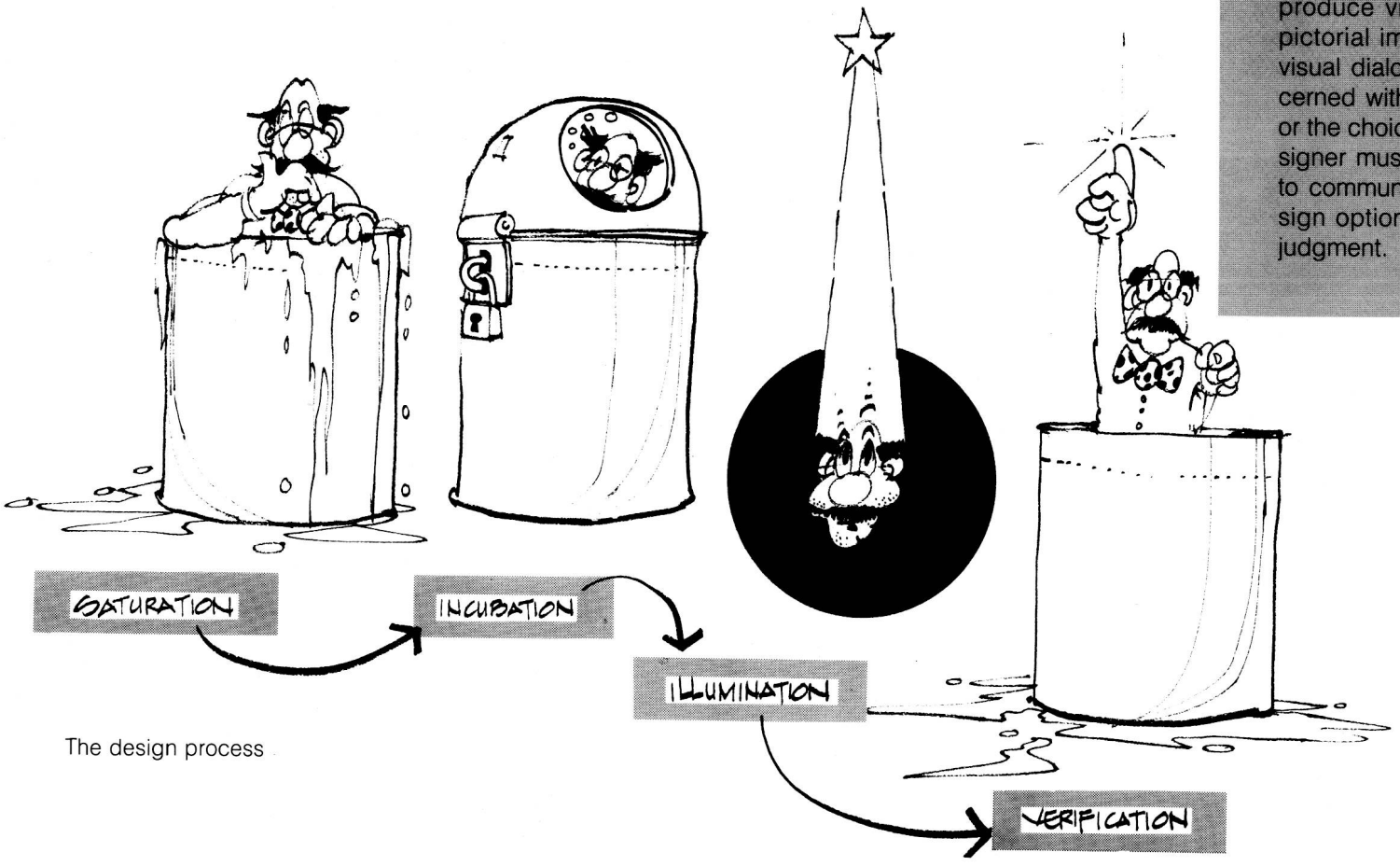
It is not a book on the history of perspective nor does it intend to emphasize the technical precision of the architectural projections. Readers are urged to regard the mathematical part of the presentation merely as a means to help them better understand the liveliness and adaptability of such mechanisms during their own design explorations.



The designers

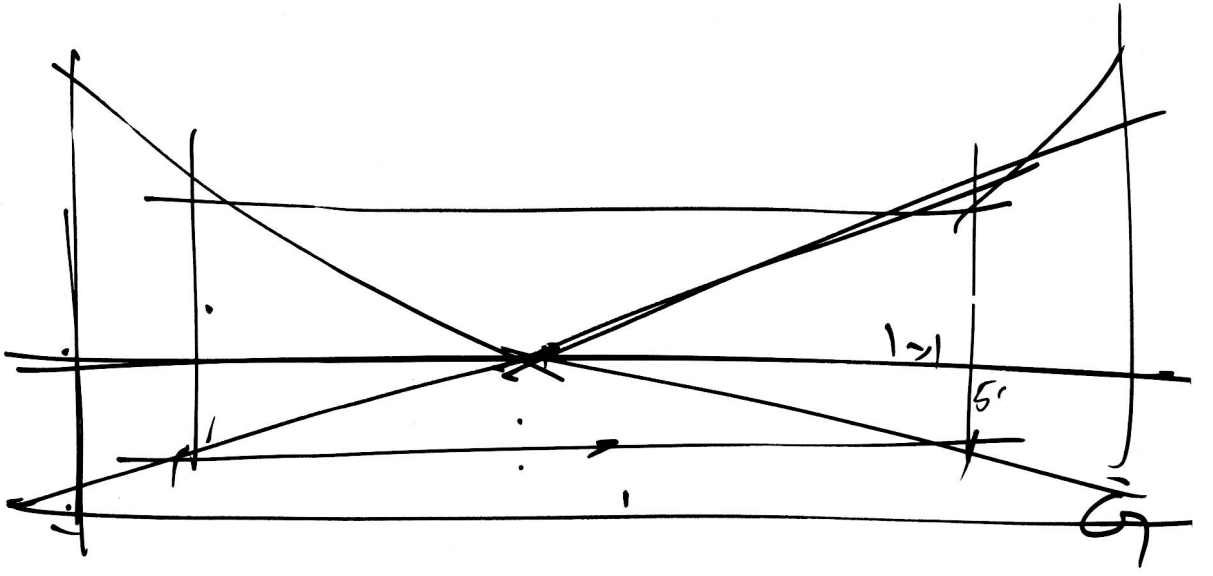
INTRODUCTION

The design process is indisputably a linear process. It can be systematically divided into various stages according to the tasks performed and the timing of these performances. Herman Von Helmholtz described this creative process in four steps: saturation, incubation, illumination, and verification. Designers work with visual images: we produce visual images; we think in pictorial images; and we engage in visual dialogues. Whether he is concerned with the articulation of space or the choice of a certain fabric, a designer must constantly use drawings to communicate his feelings, his design options, his decisions, and his judgment.



The design process

A designer must not only create mental images but he must know how to translate these pictorial thoughts into the "real thing." Obviously, one can build or make the real thing immediately after visualization in the mind. This, however, tends to be rather risky because of the scope of contemporary design projects. Alteration during the construction of such real things can be extremely costly and time consuming. In today's design professions, drawings are an indispensable step between the creative mind and the product. Drawings help track one's ideas. They help record and organize one's thoughts. They are a sounding board for new thoughts and ideas for improving a design. Design drawing is a language used to communicate with the clients. It can also serve as a legal document. Drawing is above all a self-communication tool. Drawing is such an important element of a design process that it cannot be thoughtlessly bypassed. The assumption of this book is that more drawings will lead to a better design.



Sketch of a courtyard (A)

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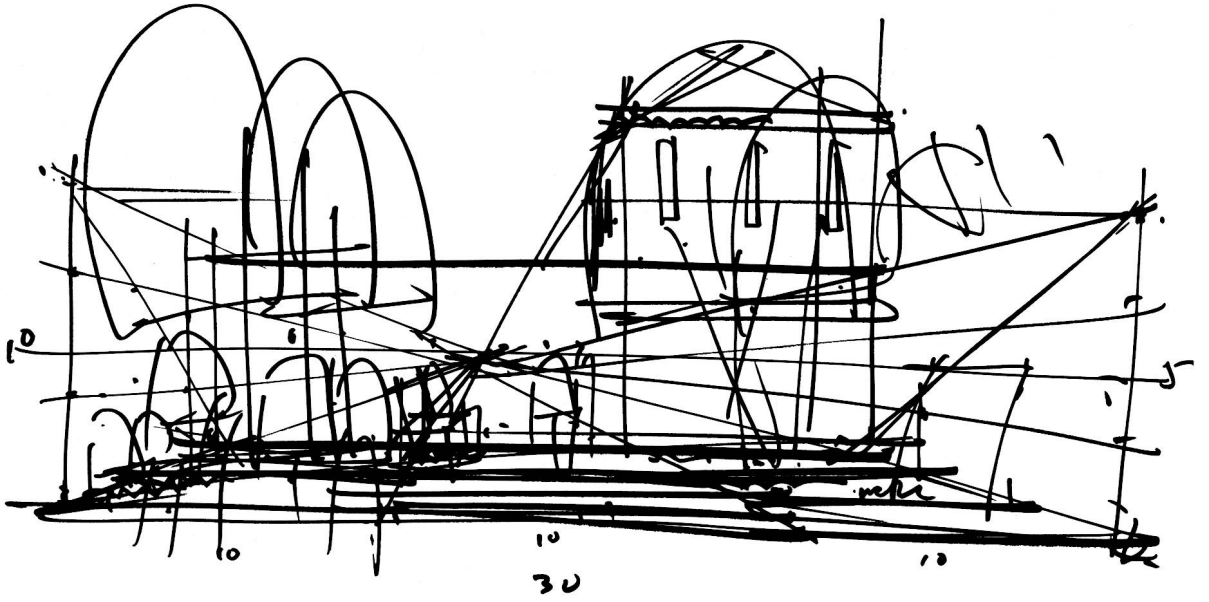


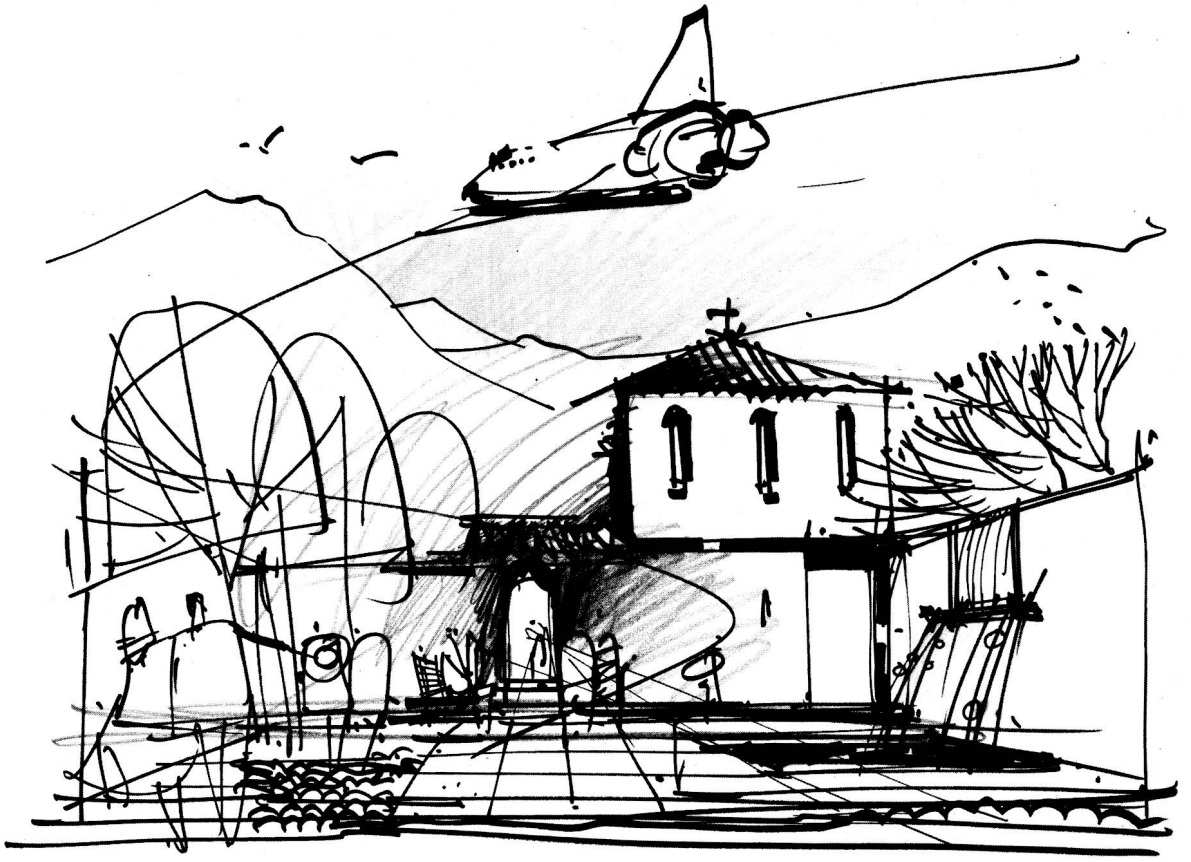
Sketch of a courtyard (B)

The art of drawing (sketching) involves the eyes, the brain, and the hands in a dynamic cycle that produces better ideas one after another. If a designer can master the art and can graphically speak the language, better design can be generated in a shorter period of time. The critical point here is the ability to do it well; since drawings are pictorial representations of the real thing to be, and the real thing is to be seen, the drawings must be able to simulate visual experience and sensation. They must convey depth in space and their content must be proportionally accurate. The angle of projection must correlate with the actual viewing angle of prospective viewers.

In order to simulate the experience of seeing the real product, the designer must be familiar with the projection system and must know when and how to apply it. Most publications separate projection from the art of sketching. It is handled in a very technical fashion, which creates a mystique that in many ways hampers the

effective learning of such methods, and of sketching as well. The primary objective of this book is to discuss these two aspects of drawing for design together and to emphasize the ease with which they can be learned.

This book is directed toward all entry-level design students. By laying the foundation for a better and more creative visualization process, I hope that better designers will be produced.

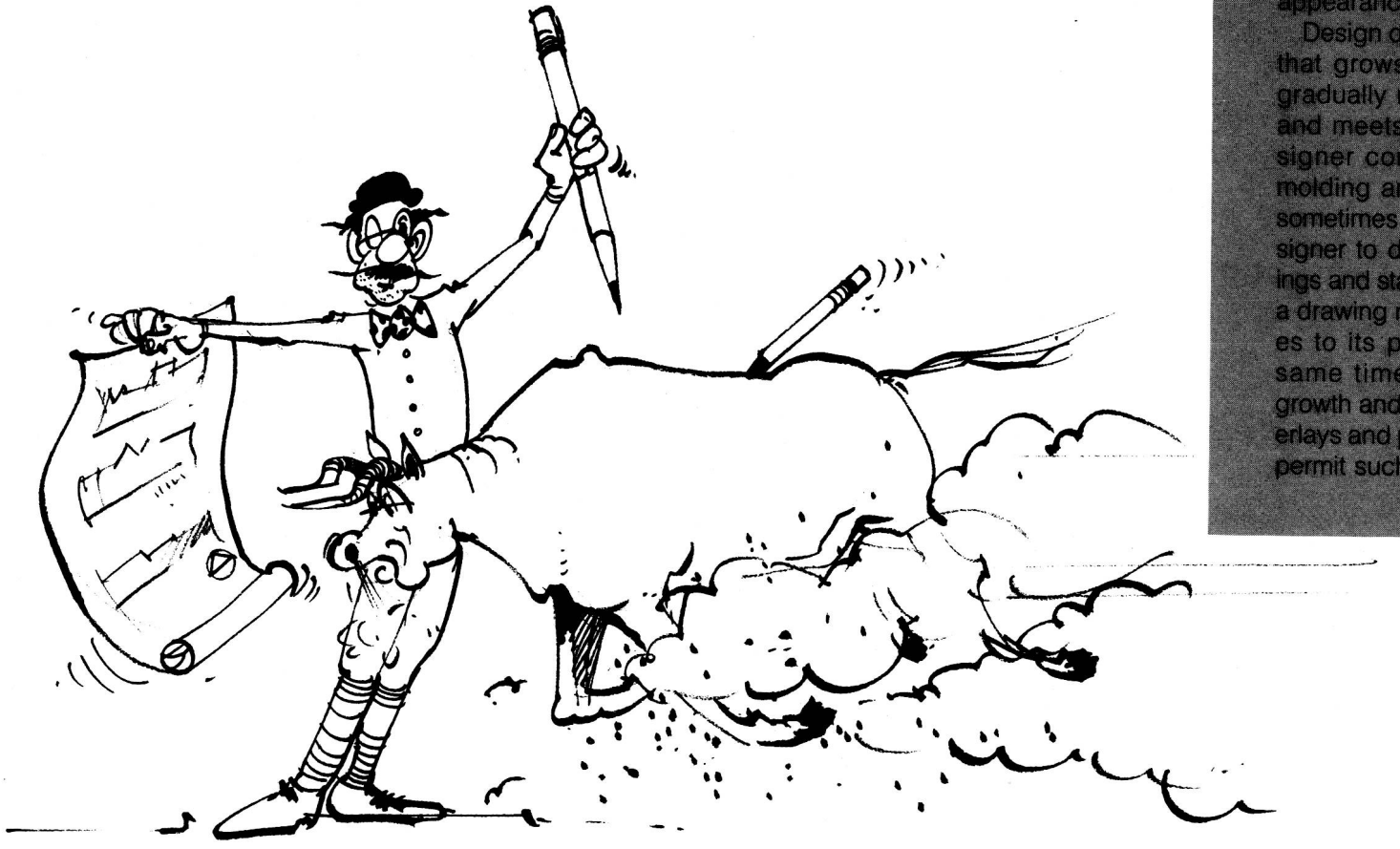


Sketch of a courtyard (C)

DESIGN DRAWING

The primary purposes of design drawings are to document the design process and to describe the design product. Here I am referring not to the different kinds of design drawings but to one category of drawing, which can metamorphose and take on different appearances.

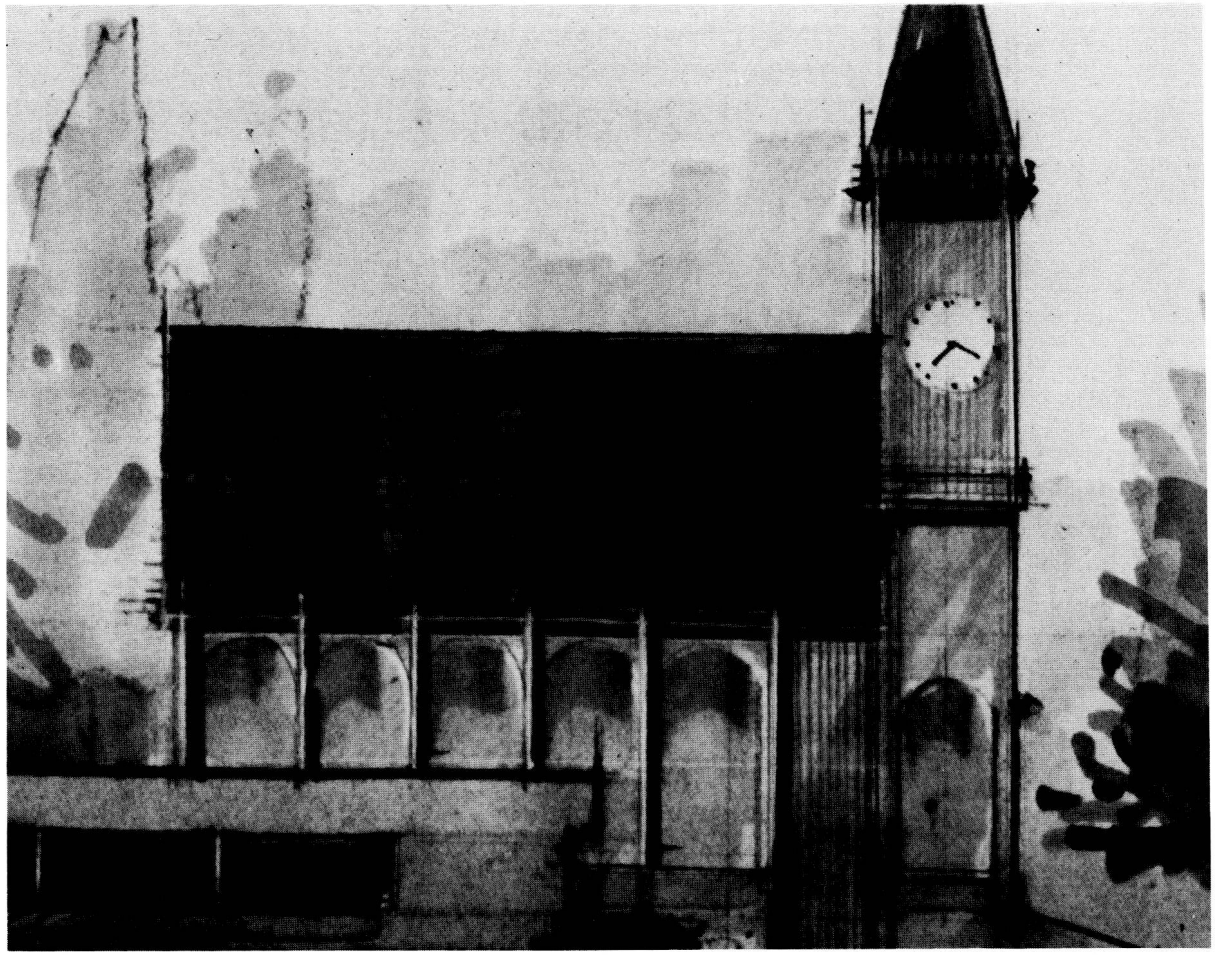
Design drawing is a living organism that grows in time. It matures and gradually reveals its characteristics and meets its purposes as the designer continues the nurturing by molding and reshaping it. Although sometimes it is important for the designer to discard the previous drawings and start afresh with a new image, a drawing must bear certain likenesses to its predecessors and, at the same time, allow room for future growth and transformation. Use of overlays and photographic reproduction permit such a process of evolution.



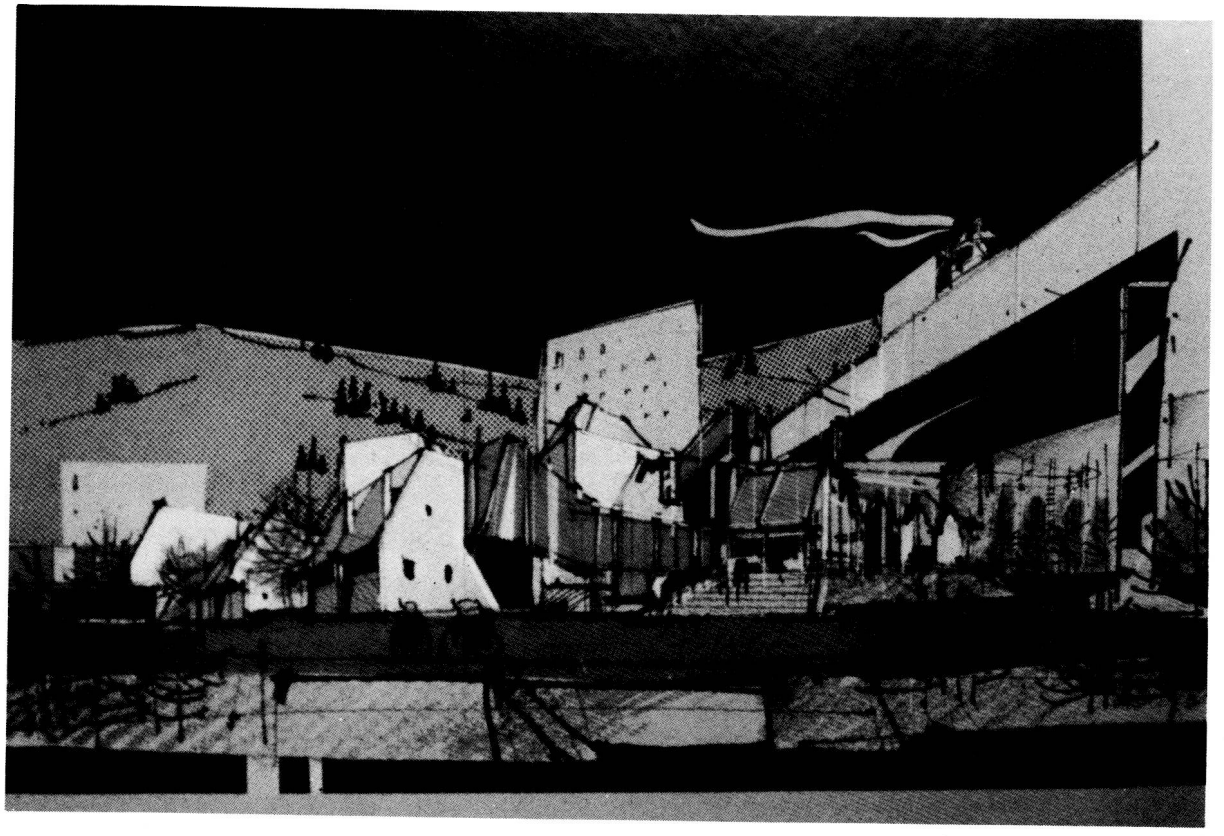
Design drawing

Physical Description

The first function of a design product drawing is to accurately record the measurements of the product's physical structure. These dimensions are often recorded in plans, sections, elevations, and other forms of parallel projections. These projections were chosen because of their ability to retain time measurements (through scaling) and right angles. They eliminate pictorial distortion and are considered to be true projection. All the dimensions and some of the angles from these drawings can be measured to the scale to which they are drawn.



Title: Building Study
Projection: elevation
Medium: color markers on brownline print



Qualitative Description

The second function of design drawings is to describe graphically the design quality and atmosphere. These intangible characteristics are usually very difficult to express in parallel projection because of its inability to simulate the sensation of spatial depth, so perspective projections are used. These projections, together with accurate expression of materials, texture, color, and composition, can become a very effective graphic essay. Perspective is an illusion that allows the viewer to interact freely with the drawing. On the other hand, parallel projections separate the viewer from the picture because they do not take into account the viewer's position.

Title: Riverfront Development (I)
Projection: two-point
Medium: black felt-tip marker on illustration board, garnished with color Zip-a-tone and white pencil

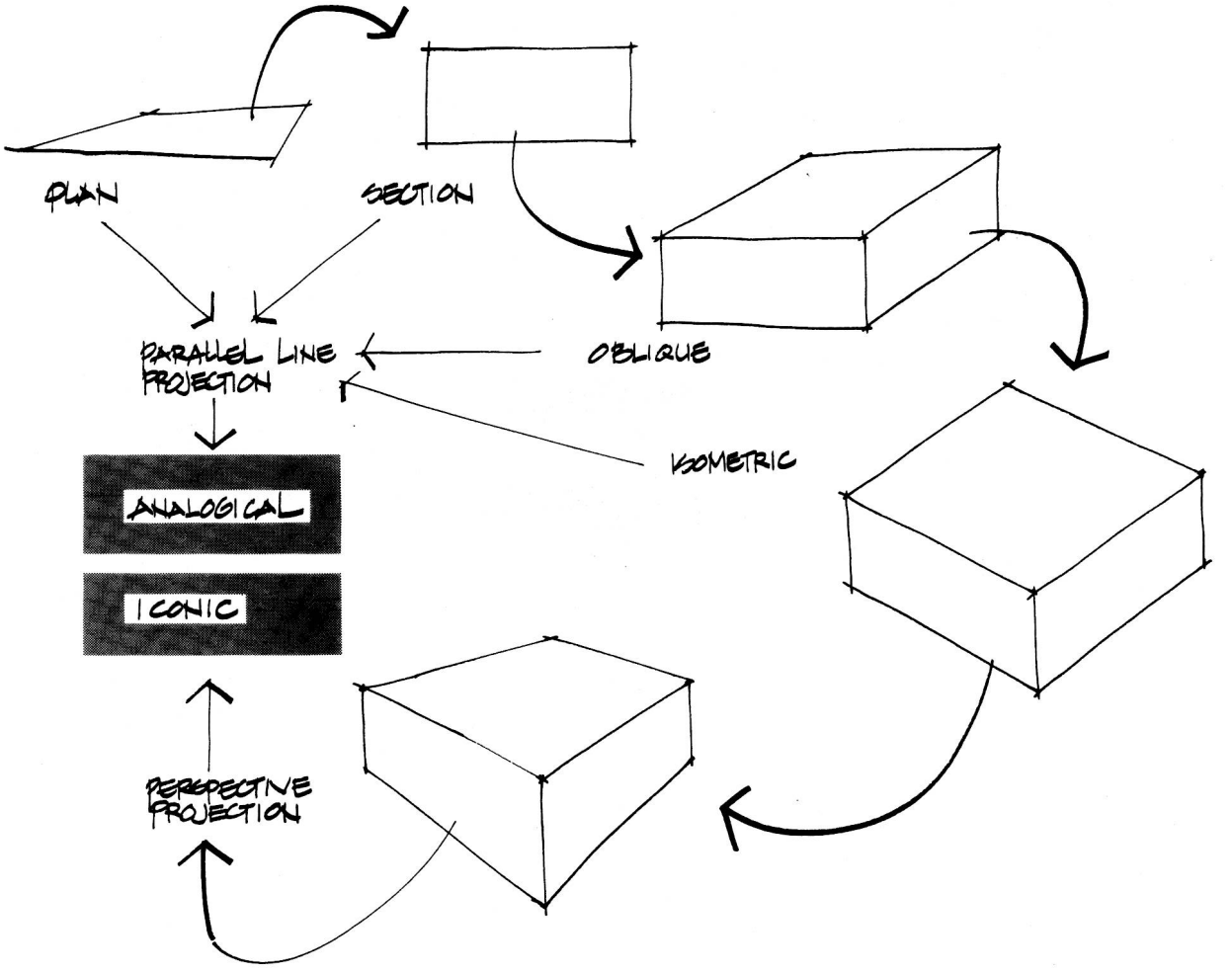
THE TYPES OF PROJECTIONS

Graphic communication is like a form of language. This picture language differs from spoken ones because of its universality. There are numerous spoken and written languages whereas there is only one graphic language. It works across cultural and ethnic barriers and delivers powerful messages by means of combinations of symbols, patterns, and colors.

Most of the picture language is based upon a picture-plane projection. The picture plane is an imaginary transparent vertical surface perpendicular to our sight line, which is basically horizontal. The picture plane intercepts all projection rays extended from the object toward the viewer. The intercepted image is therefore called a projection.

There are two major projections, parallel line and perspective. In the case of parallel-line projection, the projection rays are all parallel with each other. In perspective projection, all projection rays extended from the object converge at the viewer's eye. The converging rays vanish, creating an illusion of depth and producing an image that violates our intellect but stimulates our visual sensation.

It is this sensation that generates comparison between what we actually see (which has depth) and what we see on paper. Perspective drawings go beyond parallel graphics and are visually deceptive. But that is why they work.



Types of projections

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