Perception is successful at its job if it gives us accurate knowledge of the world and access to physical representations. Without these representations, perception is trapped in the here and now, the literal and the actual. Representation frees us from the present.

Representations take us far afield in many ways. It will be an important day in many disciplines, not just perception psychology, when we can confidently say that we understand physical representations--the pictures, images, reliefs, sculptures, charts, medical and technical displays that challenge us with scenes, some contemporary, some ancient, some plausible, some impossible.

Among the new avenues of perception and representation are "raised" pictures that can be perceived by touch and hence are accessible to blind people. The new can only be appreciated fully if its connection with the old is clear. In this case, the bridge from the old to the new is the fact that raised drawings by blind people sketching pictures for the first time are much like drawings made by sighted people who are also novices at drawing. And blind people can often identify a raised picture without any instruction in how to do so.

Trying to understand these basic abilities has led me into virtually every cranny of modern perceptual and cognitive psychology, philosophy of depiction, art history, communication theory, and rhetoric. Lime wonder: perception is concerned with everything we can perceive, and pictures are concerned with what we can perceive not only in the world of material objects but also in that special world of matter governed by the intent to communicate.

I first began this work following a thesis I wrote for James J. Gibson, my
mentor, a man whose life and work I treasure more each year. Eleanor J. Gibson was my adviser, too, and she provided me with more than I can put into words. I have tried to give my graduate students something of the Gibsonian heady mixture of freedom, stimulation, hard work, and straight thinking I found at Cornell. My experience at Ithaca with Mr. and Mrs. Gibson was possible because of the encouragement I got in Belfast, at Queen's University, with Peter McEwan, a warm, careful observer of psychology and students. After Cornell, I went to Harvard and fell in with a vigorous group gathered by Nelson Goodman. I taught in the Department of Social Relations at Harvard, alongside Roger Brown, Jerome Kagan, and Marshall Haith. Dr. Brown may especially appreciate the analysis here of the claim that metaphors in pictures are intelligible without explanations; Dr. Kagan may respect the large-scale investigation of drawing development leading toward consistent use of a vantage point; and Dr. Haith may value the finding that outline cannot portray black-white contours of a scene with natural illumination. Brown, Kagan, and Haith set me examples in each of these directions. The Goodman group- "Project Zero"--included David Perkins, who taught me about cubic corners and caricature, and Howard Gardner, who vitalized my interests in the arts and human development. At Project Zero I also learned a good deal from Barbara Leondar (literature), Jeanne Bamberger (music), and Diana Korzenik (description).

At Harvard I got to know Rudolf Arnheim personally. His work and his presence are extraordinary. He is able to teach people to see what is in a picture by way of value and meaning as well as shape. His example has given me courage to speak up for "figures of depiction" on a par with "figures of speech." I know too that he is a premier critic of the account I give of axes and outlines, vantage points and perspective, and touch and depiction.

Most of the colleagues who influenced the work presented here are acknowledged by mentioning their publications. But not everyone who deserves to be acknowledged has pertinent work to be cited. I would like to take the opportunity, then, to single them out here.

In chapter 1, the claim that touch is spatial developed in part through discussions with the tactile research group of the Psychonomics Society fostered by Carl Sherrick and James Craig. The International Society for Ecological Psychology, of which I served as a director, has many members who warmly endorsed this direction of my research.

In chapter 2, I argue that outline stands for relief edges, not brightness differences or related borders found in the optic array. Steen Folke Larsen, Albert Yonas, and Susan Petry have asked me keenly about this idea.

In chapters 3 and 4, I show that blind people can understand and produce raised pictures. The Blind Organization of Ontario with Self-help Tactics (BOOST), the National Federation of the Blind, the Canadian National Institute for the Blind, and Art Education for the Blind (especially Elizabeth Saltzhauber-Axel and Lou Giansante) have offered encouragement and opportunities to pursue these ideas. The North York Board of Education (particularly Frances Paling), the Holywood School (Scarborough), and the Scarborough Board of Education have been helpful.

Chapter 5 lays out the developmental progression in drawing. The Ontario Science Centre provided facilities for a great deal of the testing in studies on drawing development I undertook with Andrea Nicholls, ably aided by Carol Flynn. Studies on the blind were conducted at the St. Vincent School for the Handicapped, Port-au-Prince, Haiti. The Haitian research was made possible by assistance from Diane Girard and Vanessa Tourangeau, both of whom gave extraordinary aid at critical times. The Foundation for Blind Children, Tucson and Phoenix, and the Brentwood School, Calgary, have also been extremely helpful. I must thank especially Margaret Healey and the Parents Group in Calgary for their aid. The Helen Keller Institute of New York provided further opportunities to work with blind teenagers and adults.

In chapter 6, I contend that pictures can be metaphorical. The Toronto Semiotic Circle (especially Paul Bouissac, Marcel Danesi, Paul Perron, and David Savan) provided an important forum for discussions of this idea. During my term as president of the Circle I was fortunate to have spirited discussions of the role of metaphor in meaning change and in Renaissance emblematics, and I learned a great deal from Pat Vicari.

In chapter 7, I propose that perspective is pervasive in tactile perception. Fragile pictures conform to the performance of objects with a large angular subtense. John Willats explained Brunelleschi's demonstration to me. Helen Rosenthal and my son Robert helped with some of the calculations. Kim Veltman kept me informed about this history of perspective.

In chapter 8, I consider how there may be music in touch. I am grateful to the American Psychological Association, Division 10, Psychology and the Arts, for the opportunities it has given me as an invited speaker and as president of the organization to explore ideas about pictures and music with a deeply interested audience. I thank particularly Charlotte Doyle, Stephanie Dudek, Margery Franklin, Howard Gruber, Nathan Kogan, Lawrence Marks, Colin Martindale, and Ellen Winner.

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