

PREFACE

The study described in this manuscript reflects an evolution of approaches towards the study of visual perception. When I first became intrigued by the phenomena of visual perception, I hoped to approach them through the study of the anatomy and physiology of the visual system. For reasons which will be mentioned in the introduction, it became increasingly clear that a more abstract study of the computations performed in the course of visual analysis might help to supplement, and sometimes guide, the study of the visual system. The "do it yourself" methodology employed in the field of Artificial Intelligence seemed to offer potential advantages. The underlying motivation was to use the construction of workable schemes, that can actually perform certain tasks which are performed by the visual system, as vehicles for investigating the problems faced by the system and its methods for solving them.

When I came to the Artificial Intelligence Laboratory of the Massachusetts Institute of Technology, I was fortunate to meet D. Marr who, during that period, laid the foundations for the computational study of Vision. I am deeply indebted to him for his invaluable help ever since, and for close and stimulating interactions. The computational study of Vision at M.I.T. gradually gave rise to an informal, but highly interactive group, both at M.I.T. and elsewhere. I have benefited from interactions with many "members" of this group: T. Poggio of the Max-Planck Institut fur Biologische Kybernetik at Tubingen, W. Richards of the M.I.T. Psychology department, K. Stevens, E. Grimson and E. Hildreth of the M.I.T. A.I. Laboratory who made many valuable comments on drafts of this manuscript, K. Nishihara, and others. This work would not have been possible without the unique environment and facilities available at the Artificial Intelligence Laboratory.

I thank the Institute for Advanced Computation at Sunnyvale, California, for their invitation and support during the summer of 1977, the Proceedings of the Royal Society for

permission to reproduce parts of [Ullman, 1978b] including Figures 1 and 2 there, and Karen Prendergast for preparing the drawings.

Finally, I wish to express my gratitude to my wife, Chana, for her encouragement and support.

This report describes research done at the Artificial Intelligence Laboratory of the Massachusetts Institute of Technology. Support for the laboratory's artificial intelligence research is provided in part by the Advanced Research Project Agency of the Department of Defence under Office of Naval Research contract N00014-75-C-0643. The work was also supported by NSF grant 77-07569-MCS.