

**An Investigation of Object Permanence and its
Relationship to Smooth Pursuit Eye Movement**

by

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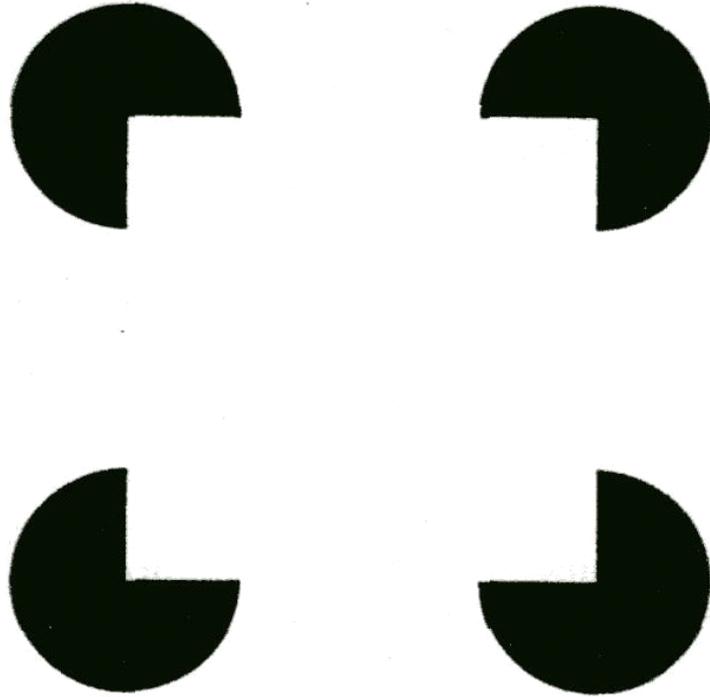
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Abstract

The aim of the present thesis was to investigate the role of ‘object permanence’ in smooth pursuit eye movement in humans. Churchland, Chou, and Lisberger (2003) found that smooth pursuit eye velocity was maintained in monkeys when target motion was occluded by an object in comparison to a condition where target motion was briefly removed, suggesting that object permanence may facilitate the maintenance of smooth pursuit velocity. In the present thesis, two smooth pursuit eye velocity intervals were measured in nine conditions. In each condition the motion of a target was interrupted for 200ms, either by removal in a series of gap-like conditions, or occlusion by a real object, a computer-generated object, or an illusory object stimulus. Baseline smooth pursuit eye velocity was also recorded without target interruption. Eye velocity was measured at two intervals: 100ms pre-interruption and 120ms post-interruption, and the difference between these intervals yielded a Mean Change in Eye Velocity value. Analyses partially supported the findings of Churchland et al., with Mean Change in Eye Velocity in the Gap condition significantly greater than Baseline smooth pursuit eye movement. However, no such difference was found between Baseline and the computer generated Object, Real Object, or Illusory Object conditions. Overall, there was a clear, though non-statistically significant, pattern in the raw data indicating that object permanence may play a role in allowing smooth pursuit eye velocity maintenance as suggested by Churchland et al., and it is proposed that the eye velocity memory component of their model may function on a continuum of engagement. It was concluded that the findings provide some evidence for object permanence promoting the maintenance of human smooth pursuit eye velocity when an object blocks the perception of target motion.

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Table of Contents

Abstract	iii
Acknowledgements	iv
Table of Contents	v
List of Figures	vii
List of Tables.....	viii
List of Appendices.....	ix
Chapter 1: Introduction to the Experiment and Overview of the Visual System.....	1
Introduction	2
Basic Anatomy of the Eye.....	3
Receptors and their Roles in the Visual System.....	4
Processing in the Lateral Geniculate Nucleus	8
Processing in Area V1 of the Visual Cortex	9
Higher Level Visual Processing	10
Chapter 2: Models of the Smooth Pursuit Eye Movement System.....	13
Types of Eye Movement	14
An Early Model of the Smooth Pursuit Eye Movement System.....	17
Maintenance of Eye Velocity During Pursuit	18
The Relationship Between Eye Movement and Cognition	19
Visual Tracking of a Disappearing Target	20
Recovery of Eye Velocity Following Transient Target Disappearance: Prediction in the Visual System.....	21
The Target Occlusion Paradigm.....	23
Additional Research on Models of Smooth Pursuit Eye Movement.....	31
Chapter 3: The Perception of Illusory Contours	33
The Perception of Illusory Contours	34
Application of Illusory Contour Theory in the Present Thesis	46
Chapter 4: Rationale, Aims, and Hypotheses.....	48
The Present Thesis: Rationale, Aims, and Hypotheses	49
Chapter 5: Method.....	54
Participants	55

Apparatus.....	56
Procedure.....	56
Practice and Calibration Trials.....	57
Experimental Conditions.....	58
Design.....	64
Data Analysis.....	64
Chapter 6: Results.....	67
Chapter 7: Discussion.....	79
Aim One: To replicate Churchland, Chou, and Lisberger’s (2003) findings.....	80
Aim Two: To determine the contribution of object permanence to the findings.....	85
Future Research Directions.....	91
Summary and Conclusion.....	95
References.....	97

List of Figures

Figure 1. Cross section of the human eye (Haines, 1997, p. 266).....	4
Figure 2. A model of the smooth pursuit system (Robinson, Gordon, & Gordon, 1986).17	17
Figure 3. Collaboration between the pursuit and saccadic systems. From Orban de Xivry and Lefèvre (2007). RS refers to retinal slip and PE refers to position error.	23
Figure 4. Churchland, Chou and Lisberger’s (2003) image motion pursuit model.	25
Figure 5. The Kanizsa object illusion (Kanizsa, 1976).	47
Figure 6. Target Stimulus conditions. Horizontal lines represent the motion of the visual fixation target. Standard Smooth Pursuit (a.), Gap (b.), Object (c.), Illusion (d.), Single Contour (e.), Double Contour (f.), Oblique Contours (g.), Gap with Contour (h.), Non-Illusion (i.), and Real Object (j.). Stimuli are not to scale.	63
Figure 7. Illustration of data extraction technique. The line between ‘Left’ and ‘Right’ represents the target motion, with a 200ms gap. The short vertical lines represent the 50ms ‘epochs’ from which gain and velocity values were extracted.	65
Figure 8. Graphical representation of the data in Table x showing Mean Change in Eye Velocity values for each experimental condition. The ‘Baseline’ condition corresponds to the Standard Smooth Pursuit condition.	70
Figure 9. Churchland et al.’s (2003) model of smooth pursuit eye movement.	82
Figure 10. ‘Object’ conditions suggested for use in future research.	93

List of Tables

Table 1. Means and Standard Deviations of Mean Change in Eye Velocity for each experimental condition.	69
Table 2. Conditions between which statistically significant post-hoc differences were found following the False Discovery Rate correction.	73
Table 3. Significance levels and Cohen's d values for each hypothesis.	74
Table 5. Cohen's d values for each comparison.	77
Table 6. Significance levels and Cohen's d values for each hypothesis.	78

List of Appendices

Appendix A	106
Appendix B.....	108
Appendix C.....	110
Appendix D	113
Appendix E.....	114
Appendix F	115
Appendix G	116
Appendix H	117
Appendix I.....	118