Spatial-Temporal Characteristics of Perceptual Organization Following Acquired Brain Injury
Daniel D. Kurylo, Ph.D.*, Richard Waxman, Ph.D.**, and Ozlem Kezin*
*Psychology Department, Brooklyn College; ** Psychology Department, Touro College

Introduction
Perceptual organization is a basic component of visual processing in which individual elements of a visual scene are resolved into a series of unified forms. Perceptual organization is an essential process that serves to organize stimuli in preparation for high-order visual functions. Disruption at the level of perceptual organization will thereby interfere with the subsequent processing of object recognition [1], or exacerbate deficits in other cognitive processes, such as memory [2].

The focus of this study is to determine characteristics of perceptual organization following brain injury. To accomplish this, performance by a group of persons with brain injury was compared to age-matched control subjects. Because some components of perceptual organization are compromised with age [7,8,9], brain injury may exacerbate functional decline found in normal aging. Therefore a group of young control subjects was also tested to track the effects of normal aging on perceptual measurements made here.

General Procedure
Participants viewed stimuli that could be perceptually grouped as either vertical or horizontal lines. Participants received four tests of perceptual organization that were based upon either Proximity or Flicker. For each condition, perceptual measurements were made of grouping thresholds (the limits of perceptual organization) as well as masking thresholds (time necessary to complete the process).

Stimuli
Stimuli were briefly presented on a computer monitor. Stimuli were composed of a grid of elements that subtended a 19.3° square field. Stimulus elements were organized either vertically or horizontally, selected randomly on each trial, which elicited the perception of a series of either vertical or horizontal lines.

Proximity condition: Stimulus elements were solid squares, 0.35° on a side. Elements were aligned and spaced at regular intervals, differing in separation between the vertical and horizontal orientation.

Flicker condition: Stimulus elements were solid squares, 0.35° on a side, that either flickered or remained on. Square wave modulation of flickering elements cycled three times at 7.5 Hz.

Results
Analysis of variance (ANOVA) indicated subject groups differed significantly for proximity and flicker grouping thresholds (Proximity: F(2,27) = 7.31; p < 0.01; Flicker: (F(2,27) = 19.96; p < 0.01) ). In addition, the patient group required significantly greater relative separation, as well as time to perceive grouping, compared to the EC group (M = 1.11%). Young and elderly subjects did not differ significantly on proximity or flicker grouping thresholds.

Summary and Conclusion
Relative to age-matched control subjects, patients were impaired on all measures, with greatest deficits in conditions that contained a temporal component. Impairment did not occur with normal aging. Conclusions: These results reflect cognitive impairment resulting from reduced cortical integrative function as well as reduced information processing speed. Such deficits at this level of processing likely impact subsequent perceptual function, such as object recognition.