INTRODUCTION

Reading disabilities were first proposed to be related to deficiencies in hemispheric specialization by Orton in 1937. He utilized hand and eye preference to determine the degree of cerebral lateralization because of the prevailing belief that this preference indicated hemispheric dominance, and that a large proportion of the reading disabled are left handed or ambidextrous. Benton and Kemble (1980) suggested that handedness is an unreliable indicant of cerebral dominance, which has been confirmed by numerous empirical studies. Therefore, it is necessary to find a valid measure of differential hemispheric processing.

Visual half field studies may provide such a measure. This method is based on the anatomical fact that each lateral visual half field projects to the contralateral occipital lobe. Stimuli which are presented tachistoscopically to the right visual field (RVF) will be conveyed directly to the left hemisphere and vice versa.

It has been demonstrated that normal readers show a RVF advantage and LVF advantage for faces (Pirozzolo, 1977; 1979). Stimulus parameters can be manipulated and presentations may be made unilaterally or bilaterally. The duration of exposure varies from study to study but ideally should be less than the time required to initiate and execute a saccadic eye movement (150-200 msec). The stimuli used in the studies reviewed here have been words, letters, numbers or faces. Size, complexity, contrast and position can be changed.
HEMISPHERIC ROLES IN READING

Reading is often presumed to be exclusively a left hemisphere activity because of its linguistic nature. However, the right hemisphere may be extremely important in reading. Psycholinguistic theories state that perceptual analysis of the printed material (i.e., shape, orientation) is more prominent in early unskilled readers. As the perceptual analysis became automatized, linguistic analysis predominates (Fries, 1963; Smith, 1971).

The right hemisphere is specialized in discriminating difficult visuospatial relationships. Bryden & Allard (1976) demonstrated that the right hemisphere is predominant when unusual, novel or complex print types are presented. As Bakker (1979) points out, all printed material is unusual novel and complex to the novice reader. Gibson (1968) theorizes that unskilled readers attend to the graphic orthographic and phonological aspects of words. This would indicate a large involvement of the right hemisphere in beginning readers.

The left hemisphere begins to gain an advantage when visuospatial perceptual analysis becomes automatized. Linguistic processing, including grapheme to phoneme translation and semantic analysis, takes precedence in the skilled reader. Fluent readers of all ages show a left hemisphere (RVF) superiority in word recognition.

EARLY VISUAL HALF FIELD STUDIES

Mishkin & Forgays (1952) found that English speaking fluent readers had a RVF advantage, while bilinguals showed a LVF advantage. They attributed these results to the overlearned scanning mechanisms used in each language (left to right in English, right to left in Hebrew). Kimura (1961) postulated that the differential field asymmetries are due to the functional specialization of the two hemispheres. Barton et al., (1965) demonstrated that the RVF advantage is independent of scanning mechanisms by presenting vertically arranged words. Kinsbourne (1970) and Dimond (1972) hypothesized that the RVF superiority is due to attentional bias caused by the selective "priming" of the left hemisphere by the linguistic nature of the task, and concurrent suppression of the right hemisphere. Hines (1975) and Pirozzolo & Rayner (1977) have shown that subjects presented with words in the right visual field -- faces in the left visual field can process both simultaneously, which argues against the attentional hypothesis.

Once it was established that fluent speakers showed these asymmetries, investigations of poor readers were inevitable. Marcel, Katz & Smith (1974) found that the poor readers in their study had a decreased RVF advantage in comparison to normals, but the superiority still existed. They interpreted this as a result of greater differential lateralization in good readers. Yeni-Komshian et al.,