Postural Orientation Modifications in Autism in Response to Ambient Lenses

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ABSTRACT: Autistic children often display abnormal postures, head tilts, and other spatial management dysfunctions. Methods were introduced to measure spatial orientation in tasks in a group of fourteen autistic children in Montreal, Canada. Ambient lenses were found to improve posture, correct head tilts, and improve ball catching abilities. A model of spatial orientation is described and recommendations are made to incorporate ambient lenses in treatment programs.

KEY WORDS: Spatial Management; Spatial Organization; Ambient Lenses; Autism.

Spatial Orientation Adjustments in Autistic Children

Autistic children often display abnormal postures such as toe walking, arching of the back, and hyperextension of the neck as well as abnormal use of face-to-face gaze in social and affective relationships, head tilts, and looking from the corners of eyes. Such dysfunctions often interfere with the child’s ability to attend to social stimuli, including attempts made by therapists, teachers, and caretakers. Play, school, and family interactions are compromised by the visual dysfunctions which prevent the child from experiencing an integrated visual percept of events and objects in their environment. When severe enough, children lose track of their own position in space, compromi-
ing their posture as well as recognition of the consequences of their own actions.

An explanation for many of the symptoms is offered and involves how the spatial action visual system of humans is reliant on the ambient aspect of vision. Investigation of the ambient aspect of vision has led to the emergence of techniques which offer a more complete assessment of the visual system.\textsuperscript{7,8} The concept of two visual systems, focal and ambient, has been reported by a number of investigators.\textsuperscript{9,10} The ambient mode of vision is used for orientating oneself to the environment, movement, and depth. Evaluation of the ambient aspect of vision extends beyond the identification of fine details, a function of the focal system. Ambient vision is involved in spatial orientation, that is the maintenance of body posture, perception of self-motion, and locomotion. Studies have shown that resolution of fine detail is unnecessary for many visually controlled tasks.\textsuperscript{11}

One tool for modification of spatial vision is the prismatic lens. Early experiments of the relationship between the displacement of an optical image and the adaptation in human behavior were reported by Helmholtz.\textsuperscript{12} Gibson\textsuperscript{13} studied adaptations to wedge prisms and reported figural after-effects characterized by a tendency of contours to appear displaced from their actual position. There is a gradual adaptation to normalize configurations with initial prism use and a re-adaptation when the prisms are removed. Other experimental studies using prisms were conducted by Welch\textsuperscript{14} and Dolezal.\textsuperscript{15} Welch described how wedge prisms not only affect displacement of objects, but the visual field is compressed on the base side and expanded on the apex side. One experiential effect is to see vertical contours appearing curved, with an increase in the effect towards the apex of the prism. Dolezal reports how the rate and extent of adaptation to prisms are determined by different eye movements, whether saccadic, compensatory, or pursuit.

The conventional use of prisms in experimental psychology has concentrated on the displacement of the focal aspect of vision. Clinical optometry has also investigated prisms but has examined the modifications to the ambient system as well. Interventions in optometry include the use of ambient lenses also identified in the literature as conjugate prisms, yoked prisms, and performance glasses.\textsuperscript{16,17} Ambient lenses are prism lenses of equal power with their bases placed in the same position for both eyes, for example, both bases oriented down. The effect of ambient lenses is a shift in the binocular field of gaze.