

## DARRELL BOYD HARMON (1898-1975)

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It is likely that many, if not most, of today's optometrists know about the Harmon distance, a recommendation for the appropriate working distance for nearpoint visually-centered tasks, but probably there are not many who know much about its originator, Darrell Boyd Harmon (1898-1975).<sup>1,2</sup> Harmon was born in Wisconsin, and received A.B. and M.A. degrees from Colorado College and a Ph.D. in experimental education from New York University.<sup>3,4</sup> During his career he worked in teacher education, followed by serving as director of the Division of School Services for the Texas State Department of Health (1937-1947), then as a consultant for school systems, manufacturing companies and architects, and later, as acting director of the Department of Environmental Design at the University of Wisconsin.<sup>3,4</sup>

During his time as director of the Division of School Services in Texas, he received "screening surveys of the health and educational problems of some 160,000 elementary school children, and measurements of the physical aspects of over 4,000 classrooms in which these children were attending school."<sup>5</sup> Data were collected by technical staff trained to recognize signs of "physiological, physiopathological, psychological, and educational significance."<sup>6</sup> The findings were checked in some groups of children by pediatricians, clinical psychologists, clinical educationists and social workers.<sup>6</sup> Harmon reported that visual and postural problems

were often found together. He also correlated various visual, physical and educational problems with the characteristics of the classrooms and concluded that the most important factors leading to those problems were improper seating, improper lighting and improper placement of working materials.<sup>5</sup>

Based on that work and other studies, Harmon drew up recommendations for a properly designed classroom and published them in 1949 and again in a revised version in 1951 in a 48-page booklet titled *The Co-ordinated Classroom*. He gave specific recommendations on design and arrangement of seating, windows, artificial lighting and chalkboards, and on reflectances of walls and surfaces. In *The Co-ordinated Classroom* Harmon also specified proper posture and working distance for visually centered nearpoint tasks. He suggested that the proper nearpoint working distance, now known as the Harmon distance, should be equal to the distance from the middle knuckle on the hand to the point of the elbow.<sup>7</sup>

In 1954, Harmon published a book titled *Notes on a Dynamic Theory of Vision*. He published revisions in 1955, 1957 and 1958. The following summarizes aspects of that theory based on an examination of the third revision.<sup>8</sup> Harmon articulated the need for a dynamic, holistic theory of vision which included developmental processes, learning theories, human performance, adaptations and human behavior. The high prevalence of vision problems, which he observed in his studies in Texas, adversely affected children's educational achievement. Many of the problems which appeared

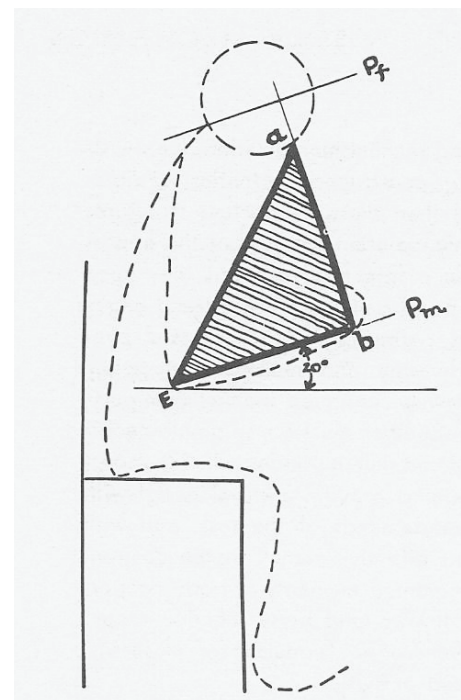


Figure 1: Schematic diagram of Harmon's recommended posture for a sustained nearpoint visual task. The letter *b* represents the knuckle of the middle finger, and *E* represents the point of the elbow. The distance from the eyes, *a*, to the fixation point should be equal to the distance from *b* to *E*, the distance now commonly known as the Harmon distance. (from Harmon DB. *Notes on a Dynamic Theory of Vision*, 3rd revision. Austin, TX: the Author, 1958, page A24)

to be non-visual turned out to be related to visual tasks or the visual surroundings of the classroom. An example was poor posture.

Harmon noted that vision functioned in gathering and using information, in determining spatial frames of reference and in guiding movement. Vestibular and proprioceptive inputs are significant for orientation, but not as important as vision. "Because of the close linkage of the visual mechanisms determining spatial direction and direction of movement with other mechanisms



Figure 2: Photograph of a child in the balanced posture recommended by Harmon for a sustained nearpoint visual activity. The slant of the desk was part of that recommendation. This photograph can be compared to the schematic diagram of the recommended balanced posture. (from Harmon DB. *Notes on a Dynamic Theory of Vision*, 3rd revision. Austin, TX: the Author, 1958, page A24)

determining posture, posture plays an important role in vision and in visual perception.<sup>9</sup> Good body posture is achieved by minimal effort, while bad posture occurs from excess or improper effort. Deviations of postural or visual orientation can have adverse effects on visual efficiency and school performance.

Harmon suggested that particular deviations of orientation of the head could be correlated with different refractive errors. He said children with astigmatism tend to tilt the head laterally, myopic children tend to tilt the head backward, hyperopic children to tilt the head forward, and children with anisometropia tend to rotate the head in the horizontal plane. These head tilts and rotations cause

typical distortions in handwriting. He recommended a test he called the Square Test, sometimes known as Harmon Squares,<sup>10</sup> in which children drew rows of squares. Distortions in the drawings could demonstrate a relationship "between the combined forces of restraining seating equipment and improper distribution of light and functional visual difficulties, postural defects, or other health problems from which the children were suffering."<sup>11</sup>

Regarding optimal learning conditions for children, Harmon recommended that sustained near visual tasks should be conducted with the point of fixation being at a distance from the eyes equal to the distance from the knuckle of the middle finger to the point of the elbow (the Harmon distance as noted above). He also said that proper posture for near work is more likely when the surface of the desk is inclined 20 degrees and the elbows and forearms rest on the desk.<sup>12</sup> His work was embraced by behavioral optometrists.<sup>13-16</sup> According to Sutton,<sup>15</sup> Harmon became aware of optometric thinking in the 1930s through Texas optometrists Nelson Greeman and Sol Lesser and later through A.M. Skeffington. Harmon made presentations at many Optometric Extension Program regional seminars, some of them in the 1950s being based on his book *Notes on a Dynamic Theory of Vision*.<sup>8</sup>

At the time, Harmon's research work was somewhat controversial. Hirsch,<sup>17</sup> for example, was highly critical of his research methods. Despite the criticism, Harmon's work has been highly influential in optometry and education. Flax<sup>16</sup> stated that "much of the current behavioral optometric treatment practiced by many clinicians is derived from his interaction with Optometric Extension Program

leaders."

Sheldon Rappaport, author of books such as *How to Teach Your Child to Read and Spell Successfully* and *Teacher Effectiveness for Children with Learning Disorders*, described Harmon as a "quiet, shy man," and said that Harmon "pioneered how the environment affects learning."<sup>18</sup> Rappaport credited Harmon with various innovative ideas adopted in schoolrooms, such as the slant-top desk, overhangs above windows and diffusers to yield more even illumination, and improved overhead lighting, and he praised Harmon's dynamic theory of vision which he used daily in "efforts to help educators help children."<sup>18</sup>

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