

# Allen-Style Optotype Size Accuracy in Five Popular Visual Acuity Testing Systems

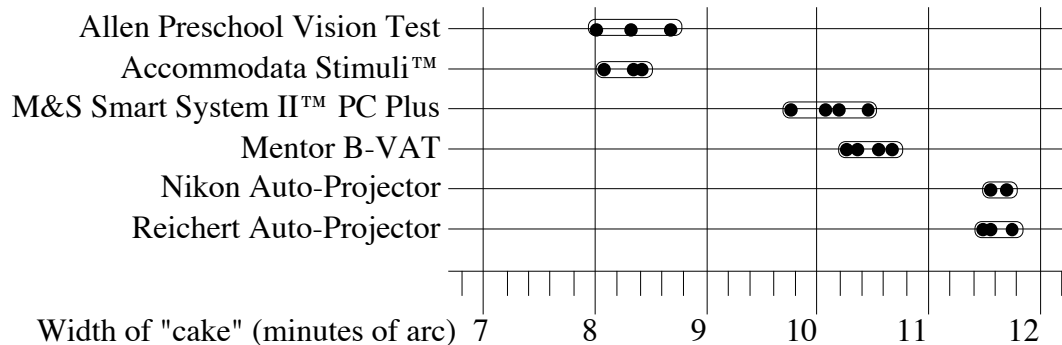
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Allen optotypes were developed by Henry Allen in 1957 by virtue of their “interest value for preschool children and the consistency of their recognition distances” (*American Journal of Ophthalmology* 1957; 44:38-41). Trials at that time indicated that the selected pictures could be recognized at a distance of 15 feet by normal 3-year olds and at a distance of 20 feet by normal 4-year olds. The pictures were sized to provide a visual acuity comparable to that of the 20/30 “E” distance target. The Allen pictures were an improvement over picture charts then and are still in common use today. Handheld Allen picture optotypes are commercially available on printed cards from several sources; they are also incorporated into several screen-based visual acuity testing systems and projectors.

We measured three commercially available computer based systems (M&S Smart System II™, Accommodata Stimuli™, and Mentor BVAT II), and two projector systems (Nikon Auto POC and Reichert Auto Projector), and compared these to Allen optotypes on printed hand-held cards from three different suppliers (Lagrange, Southern, and Cardinal).

All systems were calibrated according to the manufacturers' instructions. Measurements were made to the closest 0.1mm of the width of the Allen “cake” optotype. The visual angle of each optotype for the calibrated refraction distance was calculated for a 20-foot refraction distance. To identify variations within each system when presenting optotypes of different sizes, various size optotypes were also measured and the visual angles for these were normalized to 20/30.

The size of the Allen optotypes on the printed Allen cards from three manufacturers varied from a visual angle of 8.0 to 8.6 minutes of arc. There was less variation in the size of the Accommodata Stimuli™ “cake” optotypes than the printed cards, with equivalent visual angles of 8.1 to 8.4 minutes. Every other system tested presented Allen-style pictures at significantly larger angles than printed Allen cards, with variations ranging anywhere from 9.7 to 11.8 minutes of arc.



The use of oversized optotypes will lead to an overestimate of visual acuity. We concluded that testing with the Accommodata systems most accurately matches testing with the commercially available handheld Allen pictures.

\*Drs. Marcotty and Traboulsi have absolutely no financial interest in the Accommodata systems.