Published in final edited form as:

Optom Vis Sci. 2014 June ; 91(6): e157–e158. doi:10.1097/OPX.0000000000000277.

Authors' Response: Stereoacuity of Preschool Children with and without Vision Disorders

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We thank Dr. Cooper for taking the time to write a thoughtful Letter to the Editor on our paper 'Stereoacuity of Preschool Children with and without Vision Disorders'.¹ We also appreciate his work as a pioneer in the area of stereopsis testing which helped lay the foundation for random dot stereo testing of children. We did in fact acknowledge and cite his related work with preschool children in the introduction of our paper.² The purpose of our paper was to evaluate the association between stereoacuity as measured with the Stereo Smile II and the presence, type and severity of vision disorders in preschool Head Start children and to determine testability and expected levels of stereoacuity in an exam setting for this test.

Dr. Cooper questioned our choice of 20/40 as within the range of normal vision for preschool children. Our choice is well supported by the work of the Vision in Preschoolers (VIP) Study as well as the Multi-Ethnic Pediatric Eye Disease Study (MEPEDS) and others.^{3–6} Our paper looked at stereoacuity with regard to four major categories of vision disorders; amblyopia, strabismus, significant refractive error and reduced visual acuity. Dr.

Cooper raises questions with regard to the specific type of strabismus or amblyopia present. Our results showed that, overall, children classified with strabismus or amblyopia did in fact perform more poorly on stereoacuity testing than children without vision disorders^{1,7}. However, a small subset of children (~9%) with these disorders was able to achieve the best stereoacuity level of 60 sec arc.¹ It is possible that one or more of these children may have had intermittent deviations or other anomalies sometimes associated with better levels of stereoacuity. Furthermore, the findings presented in our paper showed that most children without vision disorders were more likely to have one of the two best levels of stereopsis on the Stereo Smile II test. In contrast, children with one or more vision disorders detected during a comprehensive vision exam had significantly worse stereoacuity and children with the most severe vision disorders had worse stereoacuity than children with milder disorders. Children who could only complete the demonstration card were 16 times more likely to have a vision disorder. Overall testability for all children was greater than 99%.¹

We agree that improvement of stereopsis with age is not new and indeed stated this in our paper. We reported the results of stereoacuity testing using the Stereo Smile II from a large sample of 3- to 5-year children without vision disorders in order to establish normative data for each age group using this particular test. Our data showed improvement in stereopsis with age; whether this is due to continued development or other factors related to use of this test is not known.

Dr. Cooper also questioned our choice of stereoacuity levels for testing, as the VIP study did not include finer degrees of disparity, specifically 20 sec arc. While stereo thresholds of 20 sec arc may have been established for adult populations using the Randot and other tests, this is not the case for stereo thresholds in the preschool population. Our choice was reasonable based on results from earlier studies using the Stereo Smile and other tests supporting a 60 sec arc threshold.^{2,8-15}

Dr. Cooper concluded his Letter to the Editor by stating that ‘all one needs to pick up the time sensitive visual anomalies is a Cycloplegic automated refraction and a large disparity RDS. Fast, inexpensive, and sensitive’. The VIP Study evaluated tests of visual acuity, stereopsis and refraction in a large scale study of over 4000 preschool children with and without vision disorders at five clinical centers throughout the country. All children underwent a comprehensive cycloplegic vision examination by study trained and certified pediatric optometrists and pediatric ophthalmologists to ascertain the sensitivity and specificity of each screening test as well as combination of tests.^{7,16,17} Non-cycloplegic autorefraction (using the Retinomax or SureSight Vision Screener) or a 5 foot LEA crowded symbol test were among the best tests with sensitivity for strabismus increased by adding the Stereo Smile. These and other findings from the VIP study are reported in a number of papers.^{1,3,4,7,16-18}

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