STEREOACUITY IN KINDERGARTEN CHILDREN

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'Stereoscopic vision', said Hermann Von Helmholtz in 1857, 'is the necessary foundation for all our actions, from threading a needle . . . to leaping from cliff to cliff when life itself depends on the right measurement of distance.' Early records show an interest in the phenomenon by Euclid in the fourth century B.C., Leonardo da Vinci, and Oliver Wendell Holmes in the nineteenth century.[1]

The physiology and neurophysiology of stereopsis has been widely discussed over recent years. The aim of this paper is not to look at these aspects of stereopsis but to look briefly at the gross features in a school screening survey of over 5,000 kindergarten children.

Stereoscopic vision, according to Lyle and Wybar, is 'the ability to fuse with the appreciation of depth, similar images falling on points of the retinae which are slightly disparate laterally.'[2] Steroacuity is the smallest amount of horizontal retinal image disparity that gives rise to a sensation of relative depth.[3] Normal stereoacuity according to Ogle and Parks is 40 seconds of arc. Romano, Romano and Puklin[3], Brown and Jones[4] and Dunlop[5] have all described an Age-Stereoacuity link.

The statistics used for evaluation were provided by the Division of Health Services Research, Health Commission of New South Wales. The personnel, sample and tests performed have been described by Brown and Jones[4].

RESULTS AND DISCUSSION

The scores were determined on the Titmus (R.) Test, and have been divided into the following groups for comment.

Key to Stereoacuity Levels

	Test Level	Stereoactuity level
Group 1 	No Score.	
	Wirt Fly	At least 1000 " of arc
Group 2 	Circle 1	800 " of arc
	Circle 2	400 " of arc
	Animal A	400 " of arc
	Circle 3	200 " of arc
	Animal B	200 " of arc
Group 3 	Circle 4	140 " of arc
	Circle 5	100 " of arc
	Animal C	100 " of arc
	Circle 6	80 " of arc
Group 4 	Circle 7	60 " of arc
	Circle 8	50 " of arc
	Circle 9	40 " of arc

Figure 2 shows the range of scores. It can be seen that nearly 60% of the children scored in Group 4 (60" of arc or better). In fact, 31.8% of the children scored 40" of arc. This compares favourably with the findings of Romano, Romano and Puklin.[3]

FIGURE 2

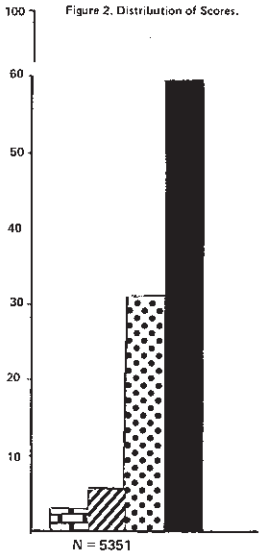


FIGURE 3

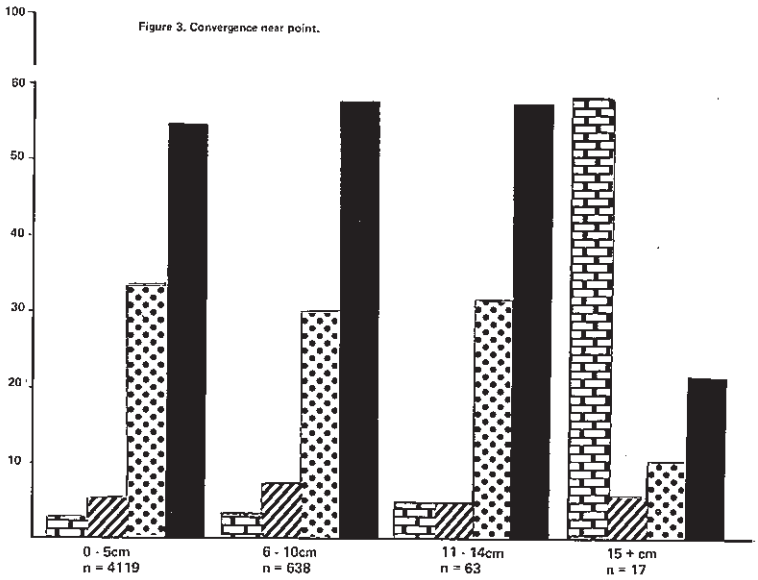


Figure 3 shows the relationship between the convergence near point and stereoacuity. More than half of those whose convergence near point was 15cm or more remote showed stereopsis on the Wirt Fly only, or none at all. These were presumably children with manifest strabismus for near vision. The figures indicate that for all who converge past 15 cm, whether to 14 cm, 5 cm, or anywhere between, the probability of good stereoacuity is equally high.

Figure 4 compares the stereacuities of children with and without defective ocular movements. The large number of group 1 and group 2 scores among those with defective movement are probably related to loss of bifoveal fixation in the primary position.

FIGURE 4

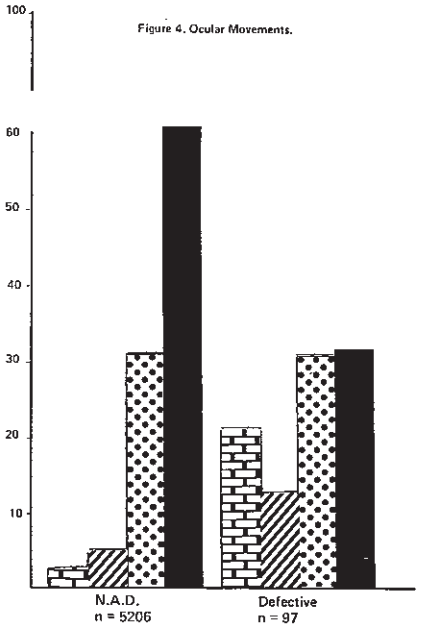
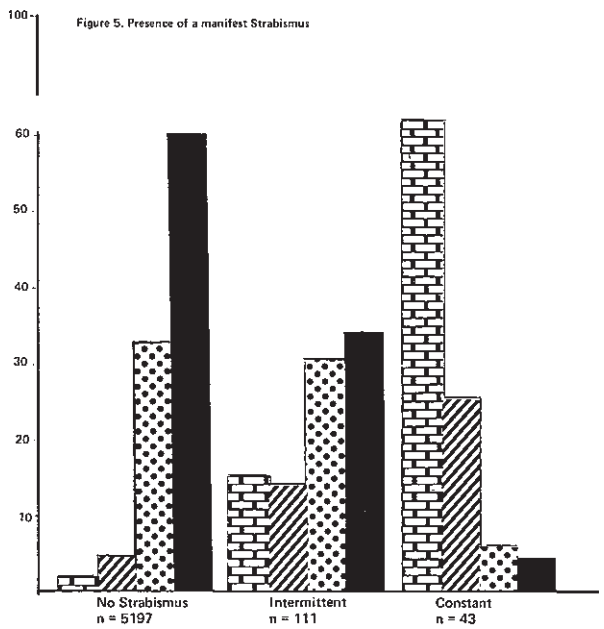


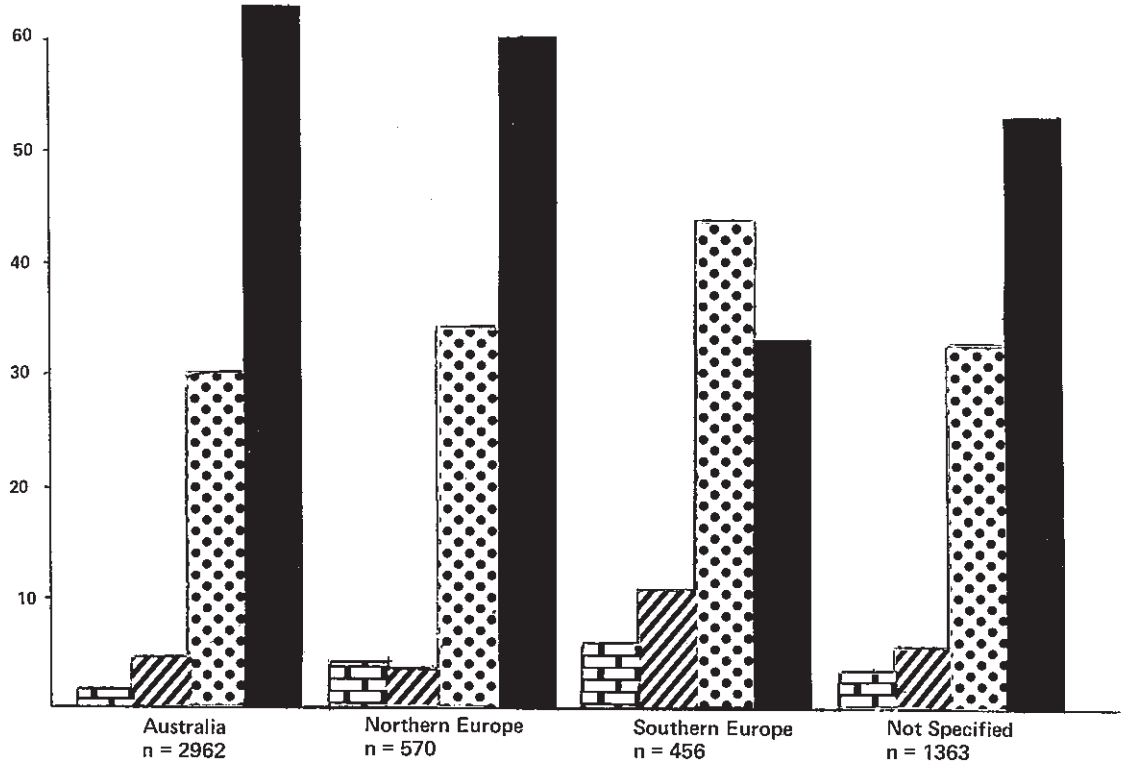
FIGURE 5



As might have been imagined, presence and constancy of manifest squint have considerable effect on steroacuity (Figure 5). A number of microsquints were included in the figures for constant deviations, in the survey. The 8 constant cases with stereoacuity of 140" or better are probably microsquints.

As regards the stereoacuity patterns among children grouped according to birthplace of parents, the most obvious group is the European one (Figure 6). It may be that the children concerned are culturally less equipped to deal with the English language and/or with the individual testing situation.

FIGURE 6 – Birthplace of Parents



CONCLUSIONS

Although most of these findings are in line with popular orthoptic thoughts on stereoacuity, there are perhaps areas where more investigations may prove interesting; for example a more detailed look at the effects of convergence on stereoacuity, and the difficulties of migrant children in test situations.

ACKNOWLEDGMENT

The author would like to thank Shayne Brown for all her generous help.

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