Key Note

# Chapter 15: Changes in perception through the life-span

## Key note 15A: Development of stereopsis

Using preferential looking, Birch et al. (1985) tested infants of between 1 and 6 months on a variety of measures of binocular combination. Although a few infants could fuse random dot stereograms at an earlier age, it was at 4months that 80% of infants could achieve this. It was also at 4months that infants began to detect the inverse of stereopsis, that is, binocular rivalry produced by stimuli of opposite contrast polarity in each eye. Held et al. (1980) measured stereoacuity (the smallest binocular disparity, and thus difference in depth that can be detected) with preferential looking. The stimuli were two patches of vertical grating, in one of which the two outer bars had a disparity which caused them to appear slightly in front of the central bar. The average age at which the largest disparity tested (58minutes of arc) could be detected was 16weeks (as reported by Birch et al.). However, performance rapidly improved, and by 21weeks disparities of 1minute could be detected by most infants.

The development of stereopsis depends on having eyes which are appropriately aligned, and in some children who have a squint (strabismus) they are not. Squints can be surgically corrected, and it is important to know how early in life this should be done to give the best chance of developing good binocular vision. Fawcett et al. (2005) tested stereopsis in a group of children whose ages ranged from 3 to 15 years (thus they could understand instructions and give verbal responses on tests of the type used with adults). The experimenters noted the age of onset of squint and the age at which surgical correction was carried out. From this they could calculate the critical period for developing stereopsis (the period during which a squint has its greatest disrupting effects). They suggest that this begins at 2.4 months, peaks at 4.3months and continues until the age of nearly 5 years. Note that the critical period peaks at around the time at which stereopsis first appears in normal infants, and begins several weeks earlier.

Birch EE, Shimojo S, Held R (1985) Preferential-looking assessment of fusion and stereopsis in infants aged 1–6 months. *Investigative Ophthalmology and Visual Science* 26(3): 366–370.

Fawcett SL, Wang Y-Z, Birch EE (2005) The critical period for susceptibility of human stereopsis. *Investigative Ophthalmology and Visual Science* 46(2): 521–525.

Held R, Birch EE, Gwiazda J (1980) Stereoacuity of human infants*. Proceedings 640 of the National 641 Academy of Sciences* 77(9): 5572–5574. https://doi.org/10.1073/pnas.77.9.5572