THE INFORMATION VALUE OF STEREOPSIS INFORMATION DETERMINES ITS CONTRIBUTION TO SHAPE CONSTANCY.

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Introduction: This study assessed the contribution of stereopsis to shape constancy and how it interacts with perceptual expertise in three experiments using a sequential matching task in witch bent paperclips with variable depth rotations were displayed either with normal stereopsis, reversed-stereopsis, or null binocular disparity.

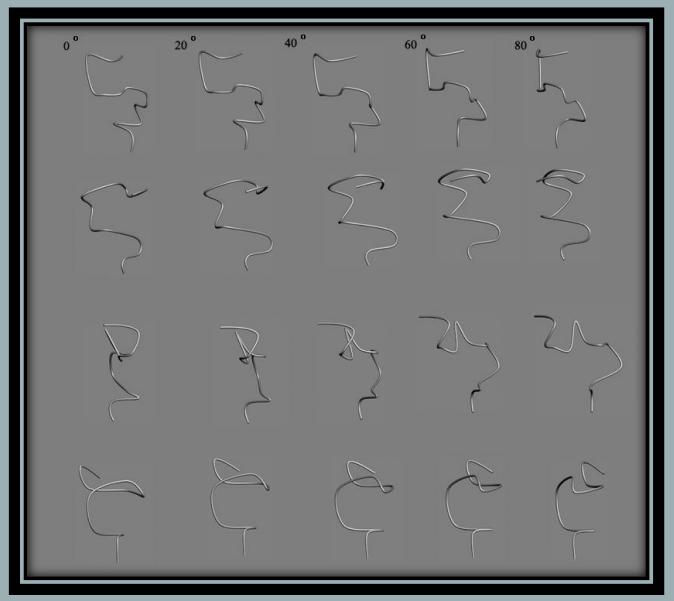

Fig 1: Stimuli used throughout Exps. 1 and 2 and for session 1 of Exp. 3. The latter experiment used a new set of stimuli of the same class for session 2.

Experiment 1: display mode manipulated as a **within-subject** factor and **constant set of stimuli** was used throughout.

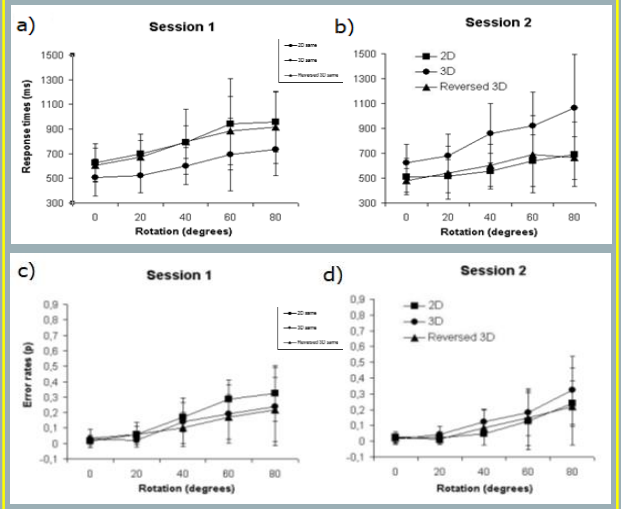

Fig 2: Mean RTs (a and b) and error rates (c and d) for Exp. 1; experimental sessions 1 and 2.

Results: In session 1, RTs shorter with 3D than 2D or r3D (reversed 3D). This effect was reversed in session 2. Across sessions 1 and 2, rotation cost on ERs weaker with 3D than 2D. R3D does not differ from either.

Experiment 2: display mode manipulated as a **between-subject** factor and **constant set of stimuli** was used throughout.

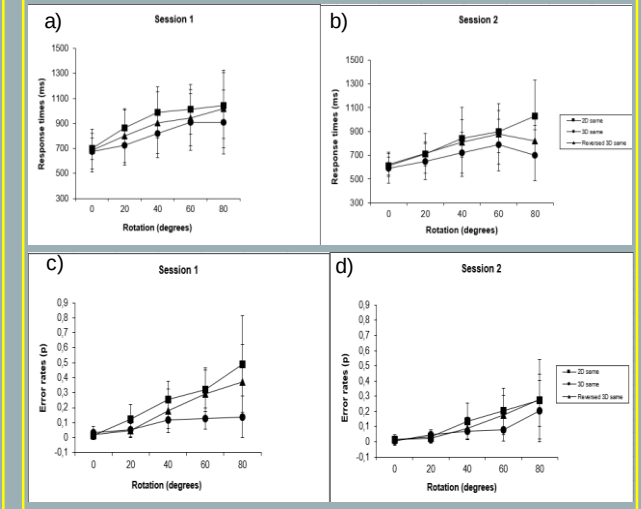

Fig 3: RTs (a and b) and error rates (c and d) for Exp. 2; experimental sessions 1 and 2.

Results: In session 2, weaker rotation effect on RTs with 3D than 2D while R3D (reversed 3D) does not differ from either. Across sessions 1 and 2, rotation cost on ERs weaker with 3D than 2D or r3D, which do not differ.

Experiment 3: display mode manipulated as a **within-subject** factor and **different stimulus sets for sessions 1 and 2**.

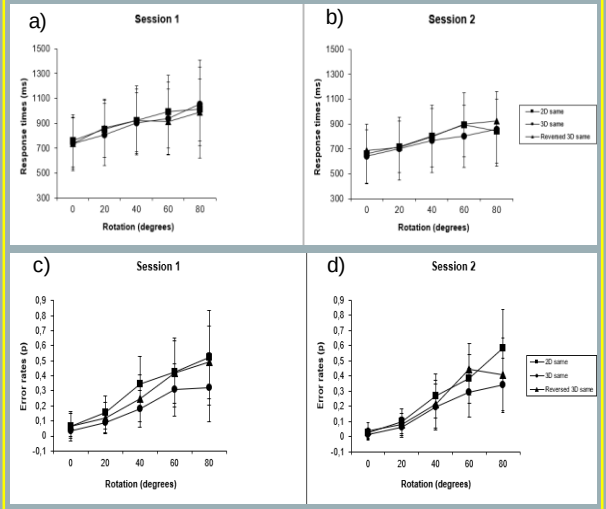

Fig 4: RTs (a and b) and error rates (c and d) for Exp. 3; experimental sessions 1 and 2.

Results: For RTs, only rotation cost is significant. For ERs, rotation cost weakest with 3D. Also weaker for r3D (reversed 3D) than 2D. Effects stable across sessions 1 and 2.

DISCUSSION: Stereoscopic information may contribute to shape constancy (i.e. reduction of rotation costs) and this appears to be the default mode for the human visual system. If the information value of binocular disparity is high (Exp. 2; valid on each trial if available), this contribution remains stable with expertise. If the information value of binocular disparity is low (Exp. 1; valid only on 1/3 trials), its contribution to shape representation may be nullified (as in session 2 of Exp. 1). This is done in an « object-specific » manner, such that if a new stimulus set is encountered (as in session 2 of Exp. 3), the 3D advantage is maintained/reinstated. Reversed 3D may occasionally benefit shape perception performance, suggesting that the magnitude of binocular disparity may be used independently of its sign.