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Abstracts

◆ **Temporal characteristics of stereoscopic slant perception**

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Perception of stereoscopic slant and inclination depends on gradients of horizontal and vertical disparity (shear and size disparities). It has been proposed that the vertical mechanisms serve to protect stereopsis from spurious horizontal disparities arising from cyclo-disparity, aniseikonia, and eccentric viewing. We hypothesised that vertical disparity is processed more slowly than horizontal disparity. Given this, we expect that the contribution of vertical disparity gradients will be diminished at high temporal frequencies or for brief presentations.

In five of seven subjects, suprathreshold perceived slant and inclination measured by a matching task declined with increased temporal frequency for modulations of horizontal, vertical, and deformation shear or size disparities. Two subjects who also showed slant-reversal effects did not show this pattern clearly. For rotation or dilation disparities, perceived inclination or slant was small at low frequencies and increased for the mid-frequency range. With modulated dilation disparity, all subjects saw slant in the direction of the vertical component. This was opposite to the direction of slant seen with static dilation disparity. Note also that this is opposite to the direction we hypothesised. With static or modulated rotation disparity, all subjects saw inclination in the direction of the horizontal component. The time-course of the buildup of the slant or inclination percept was also studied by having subjects match the final slant or inclination seen in a test surface containing a disparity gradient as exposure time was varied.

◆ **Effects of surface orientation and number of surfaces on perceived slant in a 3-D scene**

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Our previous research has shown that judged depth and surface slant in some 3-D scenes is greater for compression textures than for convergence or grid textures. For scenes containing a ground and ceiling plane, the relative effectiveness of compression depended on the simulated slant of the surfaces and the presence of a horizontal gap. In the present study we examined the relationship between type of texture, orientation of the surfaces in the scene, and the number of planes present in the scene in determining judged surface slant. Subjects were presented with computer-generated scenes containing surfaces receding in depth, with each surface specified by either a compression, convergence, or grid pattern. The orientation of the surfaces (horizontal or vertical) and the number of surfaces (one or two) were varied. In addition, the effects of surface slant (40° or 80°) and gap size (0, 1, or 2 cm) were examined. Subjects adjusted the slope of a line on a response monitor to match the apparent slant in depth of a surface in each scene. The effectiveness of compression depended on the magnitude of the simulated surface slant, with greater slant reported for compression when the surface slant was closer to that of a ground plane (80°) than to that of a frontal plane (40°). The relative effectiveness of compression in determining judged slant was greater when the surfaces were oriented horizontally, suggesting an effect of an implied horizon, and when two planes were present in the scene.

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