

Factors Affecting the Perception of Transparent Motion

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It is possible to create a perception of transparency by combining patterns having different motions. Two particular combination rules, have specific interpretations in terms of physical phenomena: additive (specular reflection) and multiplicative (shadow illumination). Arbitrary combination rules applied to random patterns generate percepts in which the motions of the two patterns are visible, but have superimposed noise. It is also possible to combine the patterns (using an exclusive-OR rule) so that only noise is visible. Within a one-dimensional family of combination rules which include addition and multiplication, there is a range where smooth motions are seen with no superimposed noise; this range is centered about the additive combination. This result suggests that the motion system deals with a linear representation of luminance, and is consistent with the analysis of motion by linear sensors.

This research gives tentative validation the use in beam splitters (which combine images additively) in the construction of heads-up aviation displays. Further work is needed to determine if the superiority of additive combination generalizes to the case of full-color imagery (there are results in the literature suggesting that subtractive color mixture yields the best legibility of overlapping alphanumeric).