Human observers can compare the physical velocities of objects (cm/sec) moving at different distances quite well, although the objects' retinal velocities (deg/sec) may vary considerably. This perceptual ability is called velocity constancy. We conducted a number of experiments to investigate what mechanisms observers use to attain this constancy and if pure motion signals can also be matched according to their physical speeds. Subjects were asked to match the velocities of two moving stimuli presented at different viewing distances. The stimuli consisted of sparse random-dot kinematograms or drifting Julesz patterns. The subjects matched the true physical velocities of the stimuli provided that the two visual scenes contained identical size references. Knowledge of the actual viewing distances proved to be irrelevant for evaluating the physical velocities of the stimuli. We conclude that velocity constancy is based upon a relative scaling algorithm.

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