Picture Perception Explored by Comparing Multiple Photographs of Perspective Scenes

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A picture is a powerful and convenient medium for inducing the illusion that one perceives a three-dimensional scene. The relative invariance of picture perception across viewing positions has aroused the interest of visual scientists for decades. This study explores variables that may underlie the invariance. To that end, sizes and distances of objects were analysed in sets of photographs of perspective scenes taken from different camera positions. Focal lengths of the lens were chosen such that one of the objects was depicted equally large in the two equally sized photographs. Manipulation of viewing distance and picture size showed that perceived distance is fully determined by angular size. Based on angular size, perceived distances of a near and a far object in a photo- graph were computed as function of viewing distance and compared with distances of the real objects. For real objects, differences between distances are constant as a function of viewing distance, however, ratios between distances change. The opposite is true for depicted objects: Ratios of distances are constant whereas differences between distances change. Constant ratios signal standstill in the real world. Constant ratios are proposed as the reason for invariance of picture perception over a range of viewing distances.