

Materials: Easy to identify but hard to find

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Abstract

Human observers are very good at deducing the material composition of an object from its visible surfaces. Sharan (2009) has shown that a 40 msec exposure is adequate to determine if an object is made of wood, cloth, glass, etc. The visual signatures that define these materials have not been identified, but it seems likely that some statistical regularities make one surface look like plastic and another like fur. Statistical properties like mean orientation can be extracted from textures without analyzing the orientation of individual contours in the texture. Are the statistical regularities or other properties that define materials used to guide attention? Can observers search efficiently for cloth among stone or glass among paper? To assess this, we used Sharan's stimuli; moderate close-up views of objects made from nine material categories: plastic, fabric, glass, leather, metal, paper, stone, water, & wood. Observers searched for targets of one category. On each trial, distractors were drawn from one other category. Search was inefficient (Hits: 35.9 msec/item, Absent: 78.4 msec/item). Perhaps Sharan's stimuli were too heterogeneous. We tried again with simpler surfaces: square, frontal patches of water, wood, skin, stone, fur, and feather. This was still inefficient. We ran three conditions with target and distractor held constant. Feather among wood and fur among water were run in grayscale. Stone among fur was run in color. Of these, only feather among wood was close to efficient (Hit: 8.2 msec/item) but this may have been an orientation artifact. Most of the wood grain was vertically oriented while feathers were horizontally oriented. Thus, while it may be possible to extract material information very rapidly and, perhaps, even to appreciate a material properties without attention, material information cannot be used to efficiently guide attention to targets of one type of material among distractors of another.