

**Recognition of non face objects, designed to require the same stimulus processing as that for faces, show only minimal effects of differences in contrast polarity or orientation direction.**

Marissa Nederhouser (USC, [mnader@usc.edu](mailto:mnader@usc.edu))

Michael C. Mangini (MIT, [mangini@mit.edu](mailto:mangini@mit.edu))

Irving Biederman (USC, [bieder@usc.edu](mailto:bieder@usc.edu))

Face recognition is markedly impaired when the stimuli differ in contrast polarity (negation) and upside-down orientation (inversion). However, these costs are not found for matching objects in the same subordinate class, such as chairs, even when the mismatching faces and objects are equivalently dissimilar, as assessed by a Gabor jet similarity metric (Subramaniam & Biederman, 1997). The relative invariance of object matching to negation and inversion could arise from differences in parts and nonaccidental properties. In contrast to most object distinctions, faces may be processed using the metrics of their shape as defined by their smooth surfaces, as well as the pigmentation (or albedo) of these surfaces. To create non-face object stimuli that would vary in a manner similar to that of faces, variations in the amplitudes of the harmonics of a sphere generated asymmetrical, smooth, blobby volumes visually similar to teeth. Variations of surface texture on these blobs were created by converting face images to non-face textures (Portilla & Simoncelli, 2002; Figure 1). Stimuli differences were equated using a Gabor jet similarity metric which simulates face representation in terms of hypercolumns of gabor filters found in V1 (Lades et al., 1993).

Subjects performed a forced-choice, match-to-sample task on blobs varying in shape, albedo, or both. The matching and sample blobs were negated or inverted on half the trials. The Gabor-jet similarity of the distractor to the target bracketed the range of similarities typically used in Greeble and face matching experiments. Unlike face matching, neither differences in contrast polarity nor inversion resulted in sizable matching

costs. Overall, these non-face blobs, designed to mimic the stimulus processing demands of faces, fail to show the large costs of inversion and negation so evident with faces. Supported by Human Frontiers Science Program Organization RG0035/2000B, MURI ARO DAAG55-98-1-0293, James McDonnell Foundation 99-53.

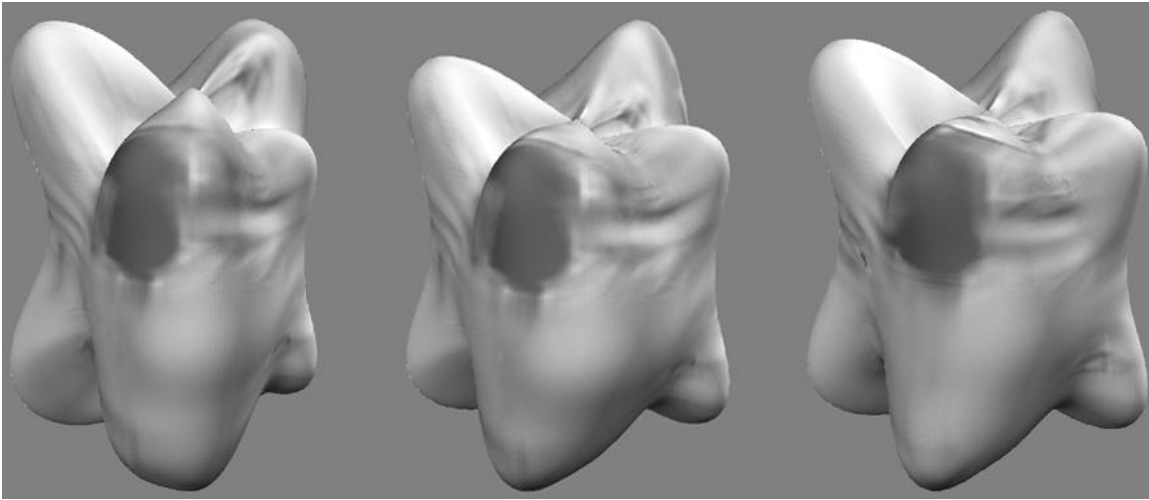


Figure 1: An example of three “blob” stimuli, the blob on the left differs from the center blob in its 3-D shape only, the blob on the right differs from the center blob in its albedo only. Both differences are scaled to be equal according to a gabor jet wavelet metric.