Supplementary Material 1

Perceived rigidity

Observers in Experiment 1 reported that specular objects occasionally appeared non-rigid or even fluid like. Thus we investigate whether there was a systematic relationship between perceived rigidity and perceived bumpiness for specular objects.

Methods. In a separate experiment we used a subset of stimuli from Experiment 1. Specifically specular and matte-textured objects of bumpiness levels 1, 3, and 5. Objects either rotated either in depth around the vertical axis or around the viewing axis. All other presentation details are as in Experiment 1. Six observers compared test objects to a mixed-material reference object of the same bumpiness. On a given trial observers saw two objects (one test, one reference) on the screen and they had to indicate which of the two objects looked more rigid.

Results. A 2 (material) x 3 (bumpiness level) x 2 (rotation axis) ANOVA showed: even though specular objects are perceived as less rigid than matte-textured ones \((F(1, 5) = 55.68, p < 0.001)\), this was true at all levels of bumpiness magnitudes (no main effect of bumpiness, no interaction between material and bumpiness), and for both rotation axes (no main effect of rotation axis, no interactions). Also see Fig. 1.

We conclude that perceived rigidity can not explain the perceived bumpiness of specular objects (no interaction between material and bumpiness).
Figure 1: **Perceived rigidity.** Shown are the proportions of the test object perceived more rigid than the reference object for matte-textured and specular objects. The left and right panels show results for in-depth and viewing axis rotations, respectively. Colored lines depict data for three different bumpiness levels. Errorbars are 2SEMs.