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# Visual perception of 3D-mirror and 3D-rotational symmetry

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Visual perception in our everyday life is almost always veridical. We can see shapes and positions of objects in a scene as they are. However, it is theoretically an ill-posed problem. The scene out there is three-dimensional while a retinal image of the scene is two-dimensional. The visual system resolves this ill-posedness by using a priori constraints. I and my colleagues have shown that 3D mirror-symmetry of an object is especially an effective constraint for detecting the object and recovering its 3D shape from a single 2D retinal image. It is because mirror symmetry introduces redundancy to the shape of the object and introduces some model-based invariants to its 2D image. Besides, similar geometrical properties exist also for 3D rotational symmetry. In this study, I will discuss those types of 3D symmetry, their roles in visual perception, and difference between them for the visual system.

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