

## The Contribution of Lower Visual Channels and Evolutionary Origin of the Tunnel Effect

**Authors :** Shai Gabay

**Abstract :** The tunnel effect describes the phenomenon where a moving object seems to persist even when temporarily hidden from view. Numerous studies indicate that humans, infants, and nonhuman primates possess object persistence, relying on spatiotemporal cues to track objects that are dynamically occluded. While this ability is associated with neural activity in the cerebral neocortex of humans and mammals, the role of subcortical mechanisms remains ambiguous. In our current investigation, we explore the functional contribution of monocular aspects of the visual system, predominantly subcortical, to the representation of occluded objects. This is achieved by manipulating whether the reappearance of an object occurs in the same or different eye from its disappearance. Additionally, we employ Archerfish, renowned for their precision in dislodging insect prey with water jets, as a phylogenetic model to probe the evolutionary origins of the tunnel effect. Our findings reveal the active involvement of subcortical structures in the mental representation of occluded objects, a process evident even in species that do not possess cortical tissue.

**Keywords :** archerfish, tunnel effect, mental representations, monocular channels, subcortical structures

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