

Novelty Preference in Visual Paired Comparison Tasks in Monkeys Is Based on View-Invariant Face Recognition

Kelly N. Brooks, K. M. Spitler, Pe. E. Zimmerman, and K. M. Gothard

When viewing novel and familiar faces or objects in a visual paired comparison task (VPC), humans and monkeys show a looking preference for the novel image. The classical VPC task consists of the presentation of a sample image followed by a delay period and a second presentation of the sample image in conjunction with a novel image. Looking preference for the novel image implies successful recognition of the familiar, match-to-sample image. The sample and match images are typically identical, which reduces the demand of the task to mere picture matching. In primates tested under conditions of head immobilization, the sample and match images are retinotopically identical. We hypothesized that novelty preference for faces and complex objects is based on a view-invariant representation of these stimuli rather than on lower level, retinotopically organized visual recognition. To test this hypothesis, we measured the looking preference of an adult male monkey (*Macaca mulatta*) who performed a VPC task with sample and match images that were different views of the same face or object. Head and gaze orientation of stimulus faces were varied up to 60° while objects were rotated up to 180°. The monkey viewed a familiarization pair of images consisting of two spatially rotated views of the same unknown human face or object. After a delay, the test pair, comprised of a third view of the same face or object adjacent to a novel face or object, was presented. Eye position was sampled at 500Hz using an ISCAN infrared eye tracker. A two-way analysis of variance on looking time, using stimulus type (face or object) and familiarity (novel or familiar) as factors, revealed that the monkey explored preferentially the novel face or object. Monkeys, therefore, form a view-invariant representation based on a single previous visual exploration of a face and use this representation to differentiate between familiar and novel faces.