

Image Memorability in the Eye of the Beholder: Tracking the Decay of Visual Scene Representations

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Some images you have seen stick to your mind for days, weeks, or even years, while others are fleeting and seem to vanish quickly from memory. Recent work has shown that the memorability of an image is consistent across context and observer, suggesting that intrinsic image features determine how well an image will be later remembered (Isola et al., 2011). In this study, we tested whether differences in image memorability are 1) stable over time, 2) affected by image rotation (impeding semantic access), and 3) whether the retrieval of images with different memorability scores affords differential degrees of cognitive load mirrored by differential pupillary responses. We tracked participants' pupillary responses while they viewed a sequence of >1200 images for 2 sec each with the instruction to press a key whenever they noticed that an image had repeated. 240 target images from 3 non-overlapping memorability classes (low, medium, high) were repeated at 4 different lags (8, 16, 64, and 256 intervening images). Overall, performance over time decreased log-linearly. Differences in memorability were already clearly visible at the shortest lag (~8 intervening images or 20 sec) and became more pronounced as time passed on (~256 intervening images or 11 min). Further, images shown upside down resulted in performance decrements, but interestingly, memorability rank orders remained unaffected with little performance decrements for high memorable compared to low memorable images. This suggests that image semantics promote successful memorization especially when an image is difficult to keep in mind. Importantly, we found that pupils dilated significantly more to correctly identified targets than correctly rejected distractors. This "pupil old/new effect" (Võ et al., 2008) increased with increasing number of lags and decreasing image memorability suggesting that during memory retrieval of scenes image inherent semantic and visual features pose differential degrees of cognitive load on an observer.

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