Stimulus Memorability as a Unique Determinant of Memory Independent from Attention, Priming

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Various forces influence what we ultimately remember - such as how attention-grabbing an image is, how much effort we put into remembering that image, or how primed we are for that image. Recent work has identified an intrinsic, high-level perceptual stimulus property – *memorability* – that is highly consistent across viewers and predictive of whether an image is likely to be remembered or forgotten. Can memorability effects be explained by these other phenomena, such as attention, known to influence memory? We explore this question through a series of psychophysical experiments using classical paradigms well-tested in the literature (i.e., visual search, directed forgetting, perceptual priming) but using face and scene images pre-determined to have high and low memorability. These stimuli are controlled for any possible confounds, including low-level attributes (e.g., color, spatial frequency) and high-level attributes (e.g., gender or emotion for faces; indoor/outdoor or number of objects for scenes). We find that memorability remains resilient despite manipulations of attention and priming: memorability does not cause automatic bottom-up attention capture; one cannot intentionally forget a memorable face or remember a forgettable face; and memorability and perceptual priming are two separate phenomena. In sum, these results provide evidence for memorability as an independent, intrinsic attribute of an image that works in conjunction with other phenomena such as attention and priming to determine if an event will be ultimately remembered.

Supplementary Material

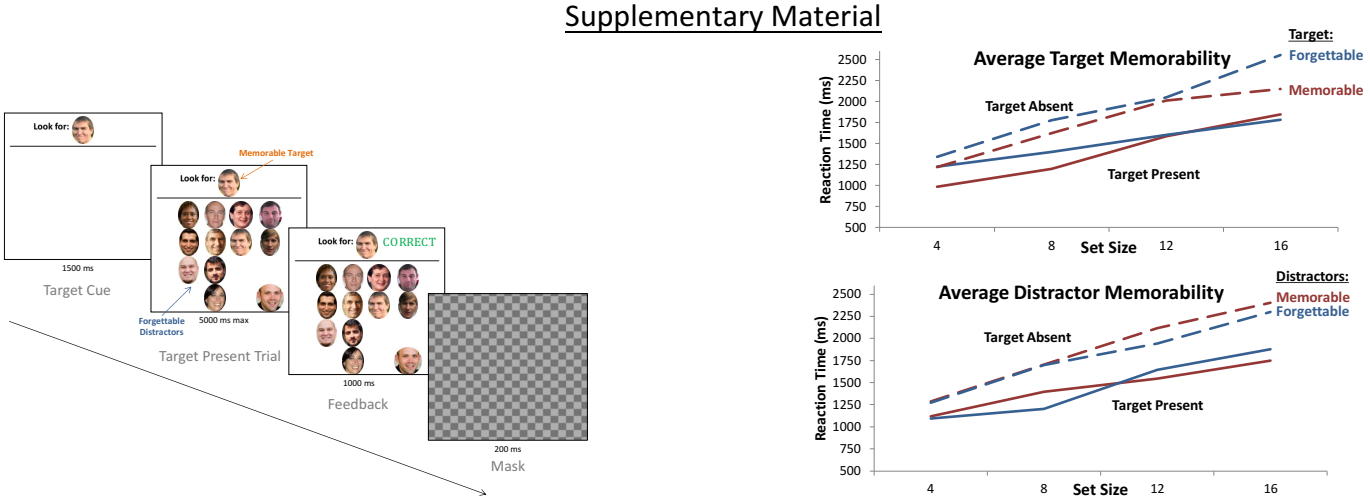

Fig. 1 – Methods (left) and results (right) from a visual search experiment (N=74) with memorable and forgettable faces. As expected, there is a significant effect of set size ($p<10^{-36}$) and target presence ($p<10^{-39}$), and no effect of distractor memorability ($p>0.1$; red and blue lines at the right are not significantly different). There is a significant effect of target memorability ($p<0.001$), but only for small set sizes, and even when the target is absent, indicating that memorability effects cannot be due to visually-driven attentional capture.

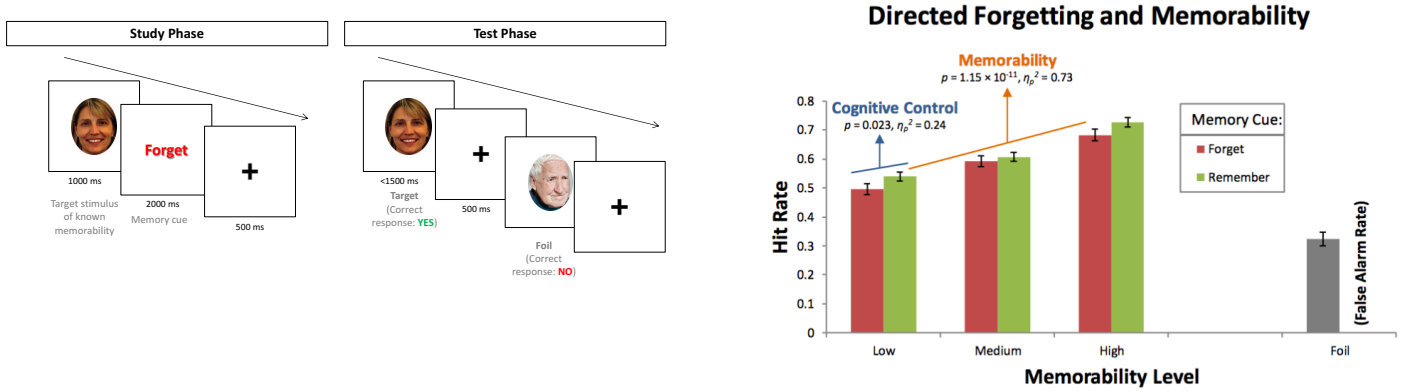

Fig. 2 – Methods (left) and results (right) from a directed forgetting experiment (N=72) where participants saw face images of low, medium, and high memorability (unbeknownst to them) and were then asked to either remember or forget them with a monetary incentive. While participants tended to remember those they were told to remember better than those they were told to forget, stimulus memorability was a much stronger determinant of what they ultimately remembered. There was no statistical interaction between these two factors, indicating that memorability is separate from top-down cognitive control of memory.

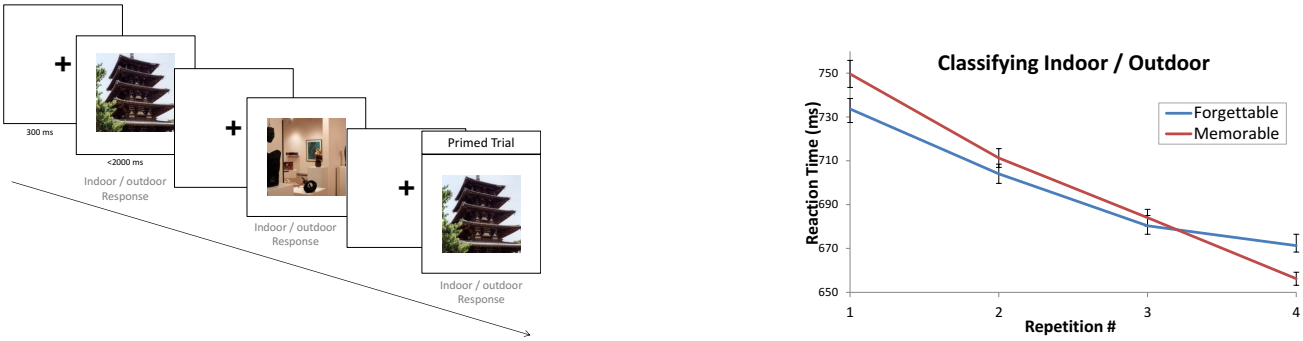

Fig. 3 – Methods (left) and results (right) from a perceptual priming experiment (N=49) where participants saw scenes of low and high memorability and were asked to quickly categorize them as indoor/outdoor, with each scene repeated 4 times in a randomized order. There was a significant perceptual priming effect ($p<10^{-11}$), but no main effect or interaction with memorability ($p>0.2$, confirmed by Bayesian null hypothesis testing). Memorability effects are thus different from those of perceptual priming.