The intrinsic memorability of pictures is associated with both recollection and familiarity

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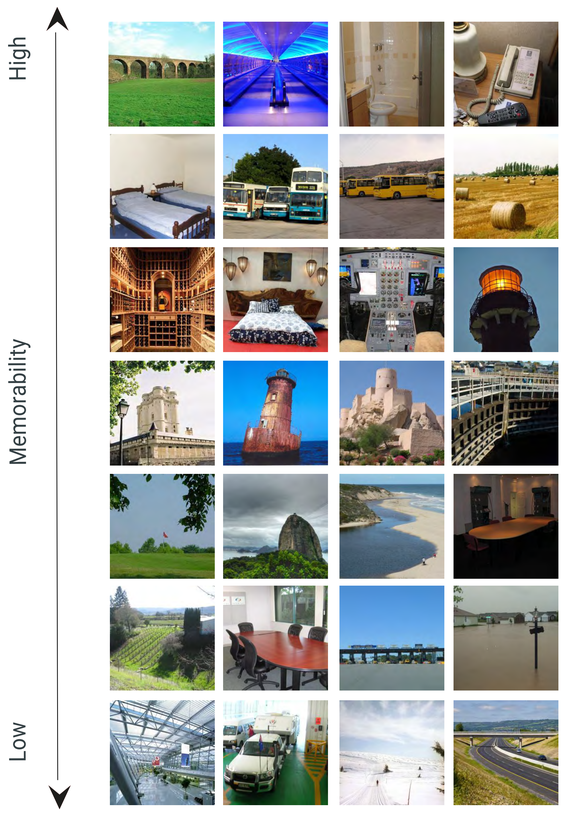
Background

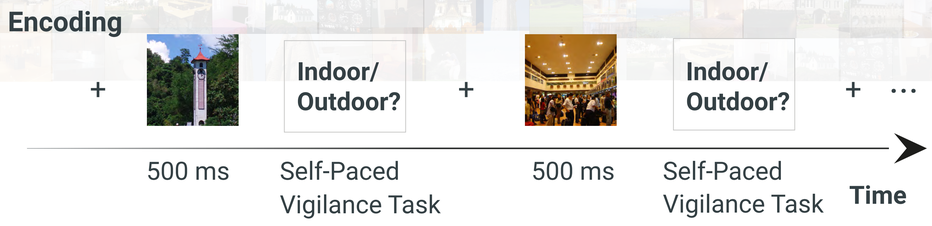
Recent research has shown that many images are consistently remembered or forgotten by most people (Isola et al, 2014).

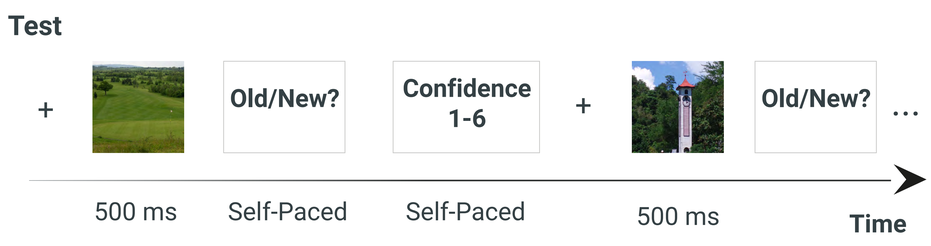
Any theory about the memorability of information should take into account the phenomenology of remembering: it has long been acknowledged that old items can be recognized based on a feeling of familiarity or recollection of specific details of the studied item.

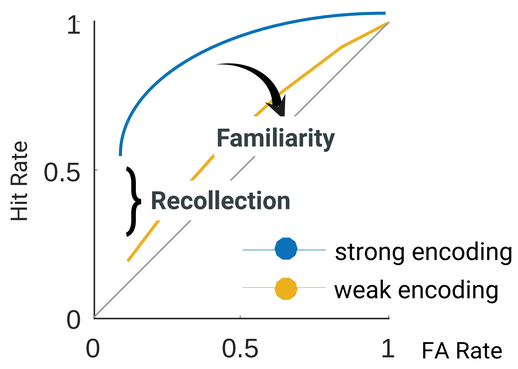
This notion is supported by dual process signal detection (DPSD) models, which assume separate contributions of familiarity and recollection to receiver operating characteristics (ROCs) (e.g. Yonelinas, & Parks, 2007). Is the intrinsic memorability of an image associated with a general surge in familiarity or also an increase in recollection of the studied item?



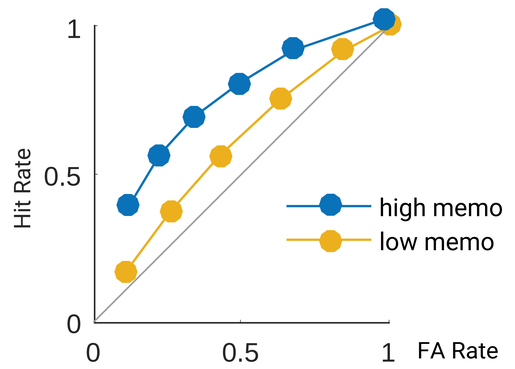
Images were extracted from the data base established by Bylinskii et al (2015). We counterbalanced the set for semantic content (e.g., humans, animals) and employed the following memorability boundaries, which were more convservative than in previous research: highly memorable: >75%, medium memorable: 55-75%, low memorable: <55% hit rate.



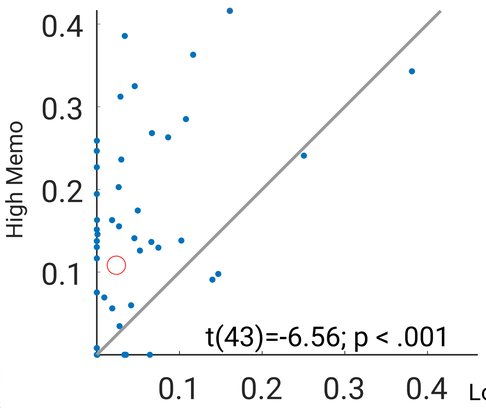




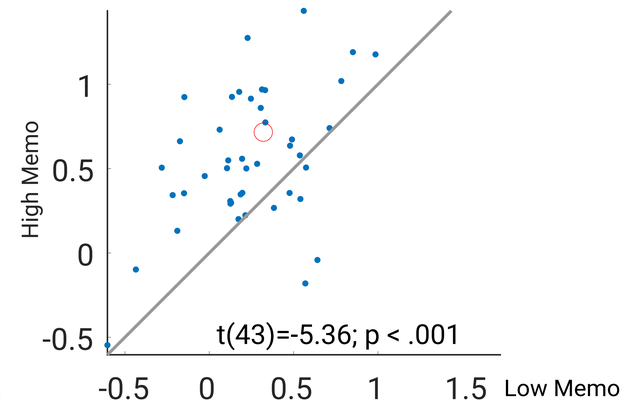
Predicted ROCs. Concave in probability space and more asymmetrical ("Hockey-Stick"shape) along the chance diagonal for strong items



Observed ROCs. Highly memorable items are more asymmetrical along the chance diagonal, indicating better recollection for highly memorable images



Recollection. DPSD-Model recollection parameter is strongly associated with high memorability. Each point represents one participant (n = 44)



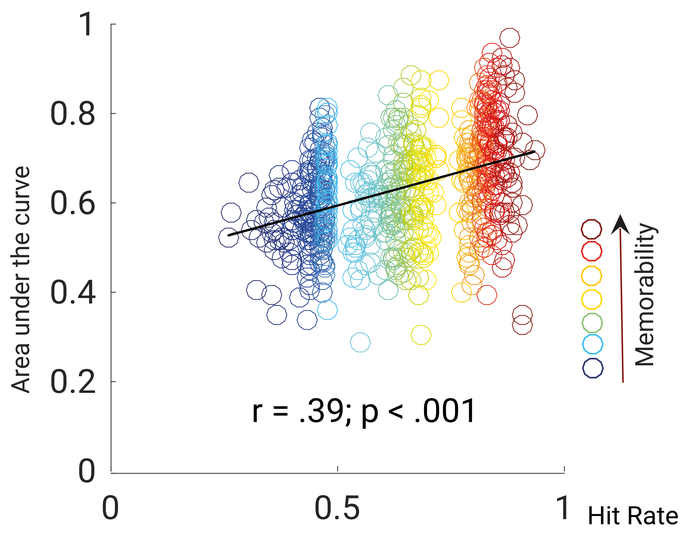
Familiarity. Larger Familiarity for highly memorable pictures in DPSD-Model. Each point represents one participant (n=44).

Conclusion

ROCs were modeled with a dual process signal detection model (Koen et al, 2016). Note that the recollection and familiarity parameters of this model were used as proxies for phenomenologically distinct ways of remembering; we remain neutral as to whether they represent distinct cognitive or neural mechanisms.

Area under the curve increased linearly with memorability. More importantly, ROC shapes indicated better recollection for highly memorable compared to non-memorable images. This effect was even stronger than the increase in familiarity for high memorability.

These findings suggest that recognition of memorable images is not only based on a feeling of having seen the image before, but on recollection of specific image details.



Area under the curve. Area under the curve increases linearly with memorability. Each point represents one image (n = 300).

Bylinskii, Z,, Isola, P., Bainbridge, C, Torralba, & A., Oliva, A. (2015). Intrinsic and Extrinsic Effects on Image Memorability

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Yonelinas, A. P. & Parks, C.M. (2007). Receiver Operating Characteristics (ROCs) in Recognition Memory: A Review

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