Perceptual Learning of Discriminating Features for Facial Recognition

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Purpose
Various studies have shown humans preferentially utilize certain facial features in identity discrimination (Schyns et al., 2002). However, there has not been thorough investigation into the ability of humans to learn which features are more discriminating.

The goal of this study is to measure human perceptual learning in comparison to an optimal Bayesian face identification task.

Tasks
Meet Al, Bill, Carl and Dave, the original faces used to create stimuli.

The stimuli are the average face with discriminating information in single features.

Verification of feature information (Ideal Observer and humans)
Stimuli: Randomly selected faces and blocked out features.

Procedure (human): 8 sessions/feature set, 200 trials/session with feedback.

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Prior updating process: After trials 1, 2 and 3

Take associated feature templates

Feedback (Al, Bill, Carl or Dave)

• $\pi_x$ refers to the prior probability of feature $x$ being the relevant set on trial $t$.

• $\pi_x^{1, i}$ refers to the prior probability of feature $x$ being the relevant set on trial $t$.

Discussion & Conclusions

• Human efficiency in face identification tasks is very low (Gold et al., 1999), but human learning efficiency is very high compared to previous perceptual learning studies (Eckstein et al., 2004).

• Humans use discriminating information from the nose the most efficiently, while information in the eyes and, especially, the mouth, is consistently used the most efficiently.

• Humans thus preferentially use information from certain features more than others. Furthermore, humans increase their efficiency sharply as they trim the number of potentially relevant features.

We speculate that humans are not good at integrating information across multiple features.

References

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