Face Recognition by Humans: Nineteen Results All Computer Vision Researchers Should Know About

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Themes

- Recognition as a function of available spatial resolution
- The nature of processing: Piecemeal verses holistic
- The nature of cues used: Pigmentation, shape, and motion
- Developmental progression
- Neural underpinnings

1. Humans can recognize faces in low resolution images



2. The ability to tolerate degradations increases with familiarity





3: High-frequency information by itself is insufficient for good face recognition performance



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4: Facial features are processed holistically



5: Of the different facial features, eyebrows are among the most important for face recognition



6: The important configurable relationships appear to be independent across the width and height dimensions





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7: Face-shape appears to be encoded in a slightly caricatured manner



8: Prolonged face viewing can lead to high-level aftereffects, which suggest prototype-based encoding



Prolonged viewing of a face within a green circle will cause the central face to be misidentified as the individual within the red circle along the same "identity trajectory."

9: Pigmentation cues are at least as important as shape cues



10: Color cues play a significant role, especially when shape cues are degraded



11: Contrast polarity inversion dramatically impairs recognition performance, possibly due to compromised ability to use pigmentation cues



12: Illumination changes influence generalization

Illumination from left

Illumination from right



Shadows

No Shadows

13: View-generalization appears to be mediated by temporal association



14: Motion of faces appears to facilitate subsequent recognition



"Lester"

"Stefan"

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15: The visual system starts with a rudimentary preference for face-like patterns



16: The visual system progresses from a piece-meal to a holistic strategy over the first several years of life



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17: The human visual system appears to devote specialized neural resources for face perception

	Faces	No Eyes	Eyes	Houses
		(1)8-1	1	
% MR Signal	1.8	1.7	1.3	0.6

18: latency of responses to faces in inferotemporal (IT) cortex is about 120 ms, suggesting a largely feedforward computation



19: Facial identity and expression might be processed by separate systems.



Bruce & Young (1986)

Conclusion

- Should recognizers have ears?
 - Hermansky says "progress should be made by the knowledge of the principle guiding a process rather than by copying the appearance of the process."
 - Airplanes do not flap their wings.