Facial age estimation in AIs: a longitudinal study

Ohad Aizic, Shiri Yam and Tzvi Ganel

Department of Psychology, Ben Gurion University of the Negev, Beer-Sheva, Israel

Introduction

- Humans and AIs are remarkably skilled at extracting visual cues from faces to estimate age.

- These estimations, however, suffer from systematic biases and limited accuracy.

- More than 3 years ago, research from our lab[1] showed that while AIs mimics human bias patterns in age estimation, biases are often stronger in AIs.

- Such biases include the ABC (age-bias correspondence) effect, the Aging Effect of Smiling (AES), as well as others.

The current study

- This study aims to examine whether AI-based age estimation systems have improved over the years, by comparing data from 2022 and 2025 for the same AIs and for the same faces.
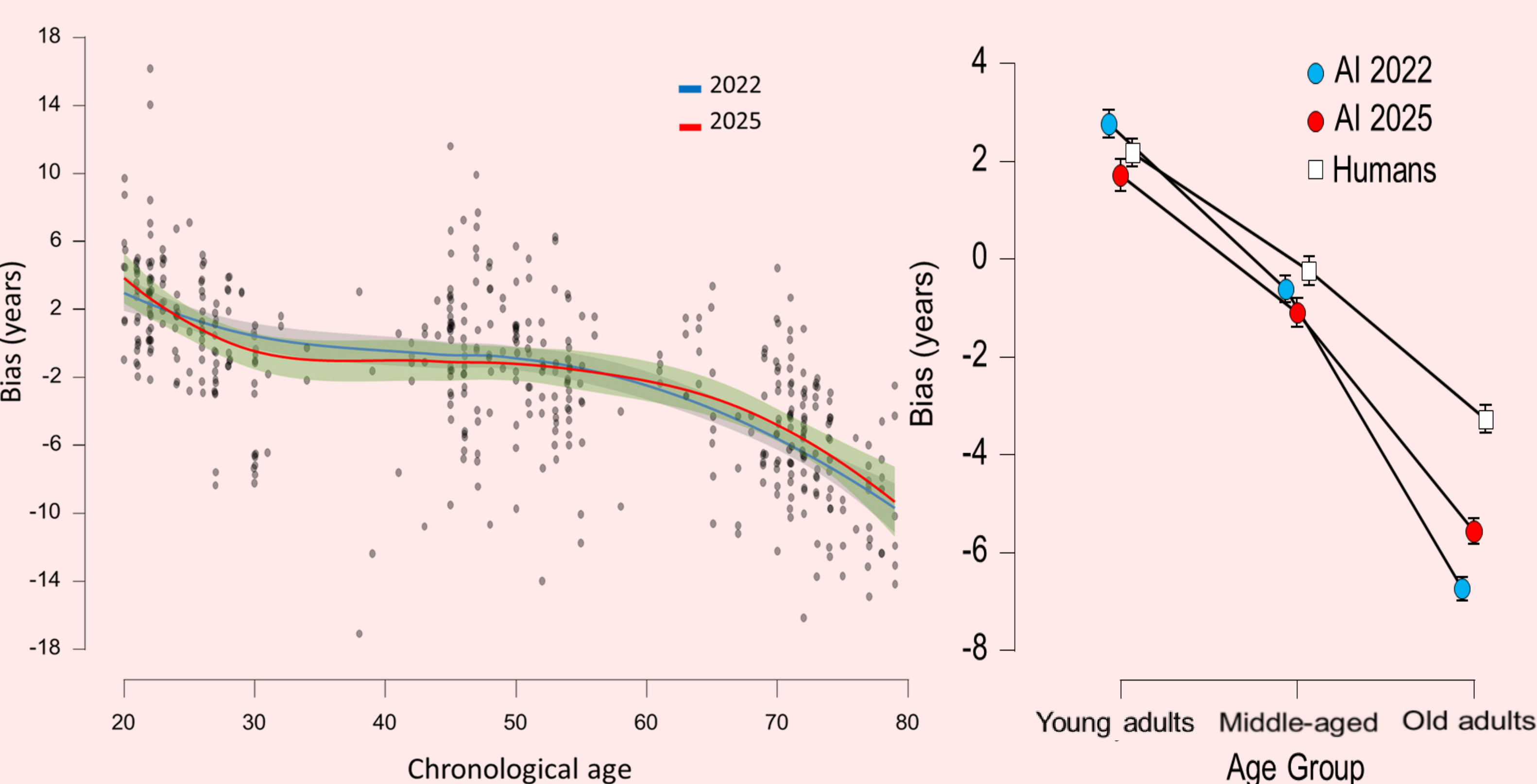
Results

Two types of errors in age estimation:

Bias $= \Sigma(\text{estimated age} - \text{chronological age})/n$

Absolute error $= \Sigma |\text{perceived age} - \text{mean perceived age}| / n$
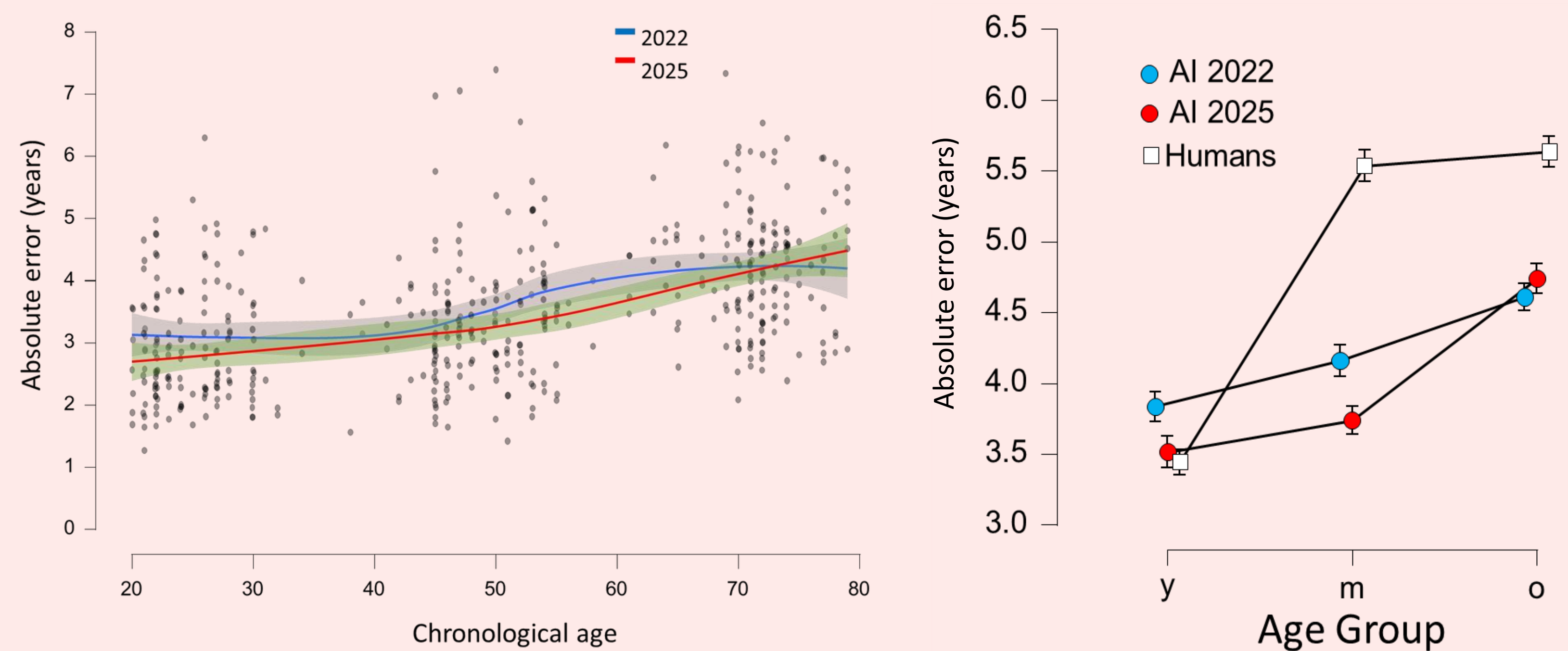
Mean bias

- Bias in age estimation shows a clear age-related pattern: younger faces tend to be overestimated, while older faces are underestimated (the ABC effect). This could reflect a classic regression-to-the-mean bias.

- Between 2022 and 2025, AIs showed a significant reduction along the ABC effect, suggesting modest but consistent improvements in age estimation accuracy over time.

Absolute error

- AI age estimation accuracy decreases with age.

- Across most age groups, AI systems in 2025 showed improved performance compared to 2022.

Effect of similing
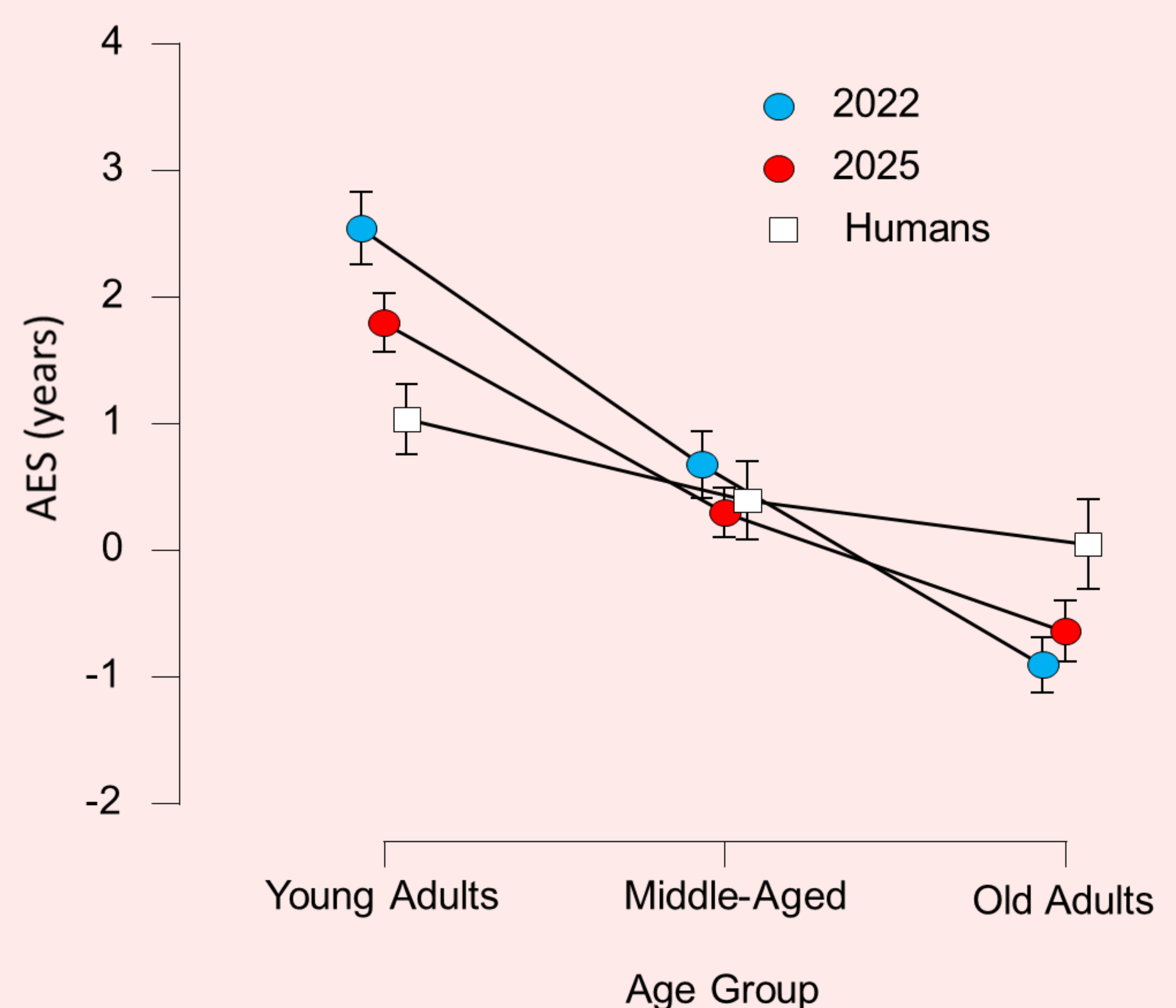
- The Aging Effect of Smiling (AES) decreases with face age and is most pronounced for faces of young adults.

- Across all age groups, AES was reduced in 2025 compared to 2022, suggesting that AIs became less susceptible to smile-related biases.

Conclusions

- AI age estimation systems improved over the last 3 years, with reduced biases and lower absolute errors. Bias patterns in current AI technology more closely resemble human performance.

- For absolute accuracy, AIs show superior performance compared to humans, especially for faces of middle-aged and old adults, while the opposite pattern is found for age estimation biases.

- Out of the 12 AIs tested, 9 showed an improvement in absolute error over time.

References

[1] Ganel, T., Sofer, C., & Goodale, M. A. (2022). Biases in human perception of facial age are present and more exaggerated in current AI technology. *Scientific Reports*, 12(1), 22519.