

# AUGMENTING GROUP PERFORMANCE IN TARGET-FACE RECOGNITION VIA COLLABORATIVE BRAIN-COMPUTER INTERFACES FOR SURVEILLANCE APPLICATIONS

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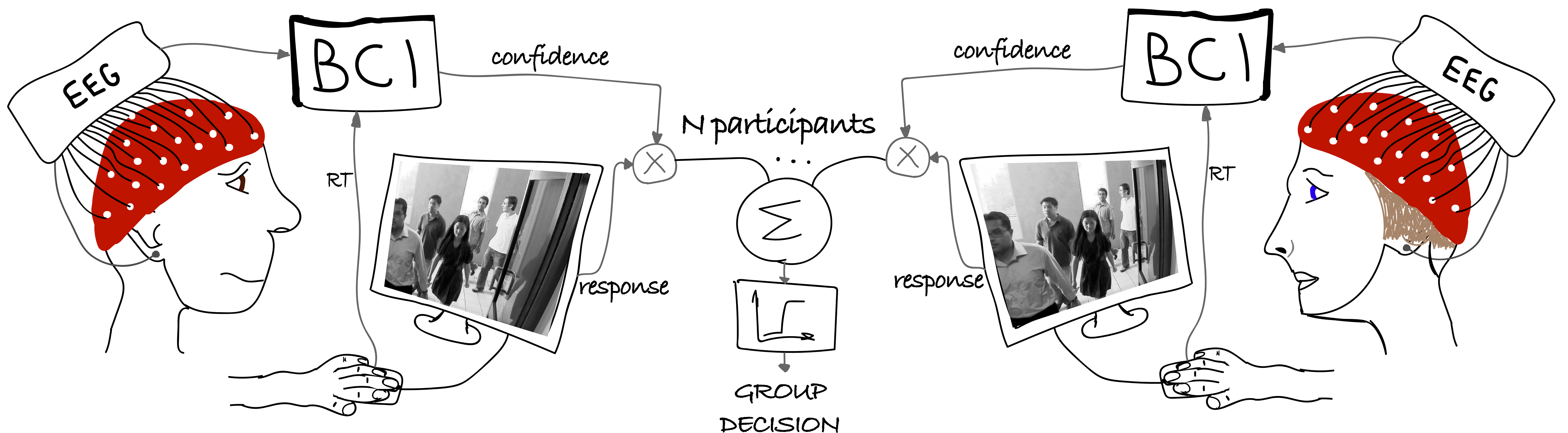
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## 1. Problem: realistic face recognition

- Realistic target-face recognition may involve recognising **partially-occluded faces in crowded scenes**
- Computer vision algorithms require a large number of examples of the target face
- Brain-Computer Interfaces (BCIs) have been used to boost human performance in **single-face** recognition
- How can we use BCIs to augment face recognition performance in realistic crowded environments?

## 2. Solution: use Collaborative BCIs (cBCIs)

- Use EEG signals and response times (RTs) to estimate the **decision confidence** of the users [1]
- Weigh individual responses according to these confidence estimates to obtain **group decisions**
- Compare the cBCI confidence with the **confidence reported by participants** after each decision



## 3. Task: is there a target in the picture?

Target

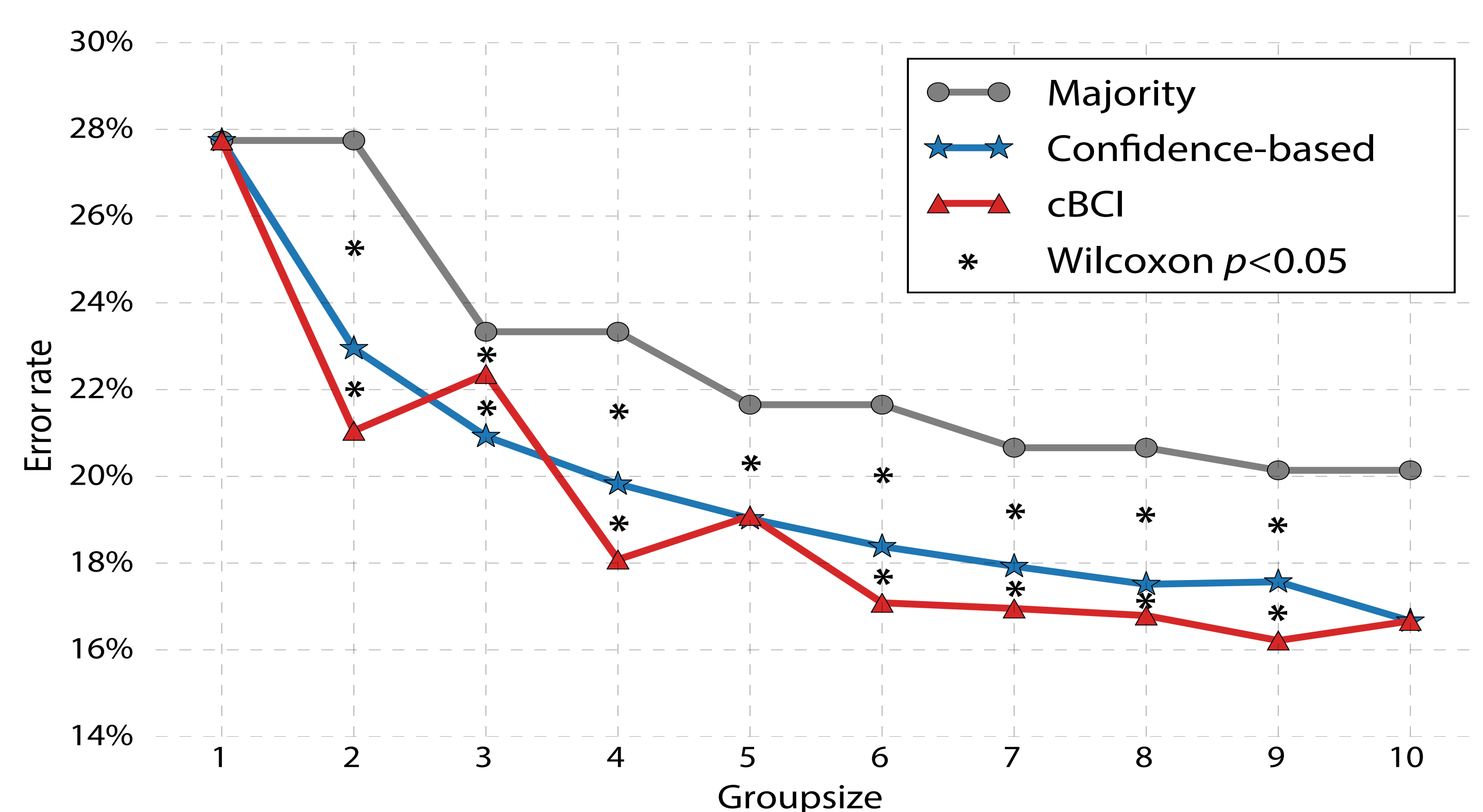


Stimulus

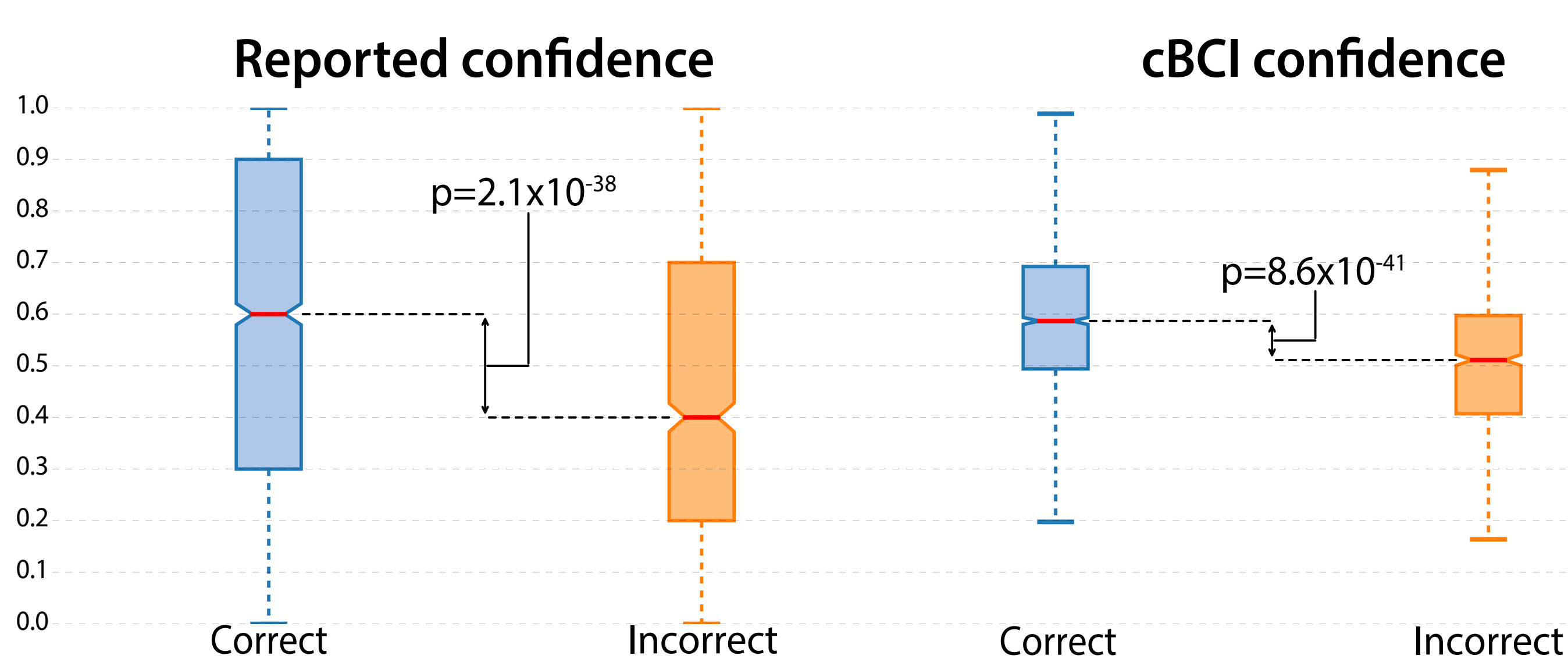


Stimuli shown for 300 ms: not that easy!

## 4. Group performance



## 5. Which confidence estimate is better?



## 6. Conclusions

- Collaborative BCIs significantly **augment group performance** in a realistic face recognition task
- The unconscious mind (cBCI confidence) is a **better predictor of correctness** than the conscious one (reported confidence)

## References

- [1] D. Valeriani, R. Poli, C. Cinel, "A Collaborative Brain-Computer Interface for Improving Group Detection of Visual Targets in Complex Natural Environments," in *7th International IEEE EMBS Neural Engineering Conference*, 2015, pp. 25–28.
- [2] D. Valeriani, C. Cinel, R. Poli, "Augmenting Group Performance in Target-Face Recognition via Collaborative Brain-Computer Interfaces for Surveillance Applications," in *8th International IEEE EMBS Neural Engineering Conference*, 2017.

## Further information

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