Eye fixation patterns are not associated with individual differences in the ability at recognizing facial expressions of emotions

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Context

- Ability in facial expression recognition is commonly assumed to be related to the effectiveness of visual strategies.
- This idea is in part based on the finding that individuals with autism, schizophrenia, and prosopagnosia show both an altered performance at recognizing facial expressions and altered visual strategies.
- A study by Yitzhak et al. (2020)[1] investigated this association in the normal population and found that eye fixation patterns did not predict performance. In their study, ability was measured with a single task.
- The present study investigated this association using a combination of five measures of facial expression recognition ability.

Method

- **Participants**: 66 Canadians of White ethnicity.
- **Ability measures**: Five tasks of facial expression recognition (see Figure 1).
- **Eye fixation patterns**: Measured during an emotion categorizing task (anger, disgust, fear, happiness).

Figure 1. a) Reading the Mind in the Eyes Test[2], b) Films Facial Expression Task[3], c) Facial Expression Megamix[4], d) Emotion categorization task performed with eye-tracker, e) Emotion categorization task performed with the Bubbles method [5]

Analyses and results

Groups of fixation patterns and Ability measures

A k-means clustering analysis was performed to divide participants with similar eye fixation patterns into separate groups, and a principal component analysis was performed in order to extract the main components of ability in facial expression recognition.

Component Matrix[a]

	Component 1	Component 2
Balanced integration score	,813	-,251
Number of bubbles[6]	,628	,324
Reading the Mind in the Eyes Test	,482	,164
Facial Expression Megamix	-,072	,812
Films Facial Expression Task	,332	,633

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Figure 2. Principal components extracted

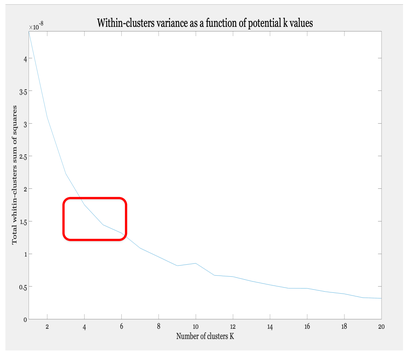


Figure 3. Result of the k-means clustering

Analyses were conducted with two scenarios: three or four groups of fixation profiles. For each of the two ability components, one-way ANOVAs were conducted to compare the ability across groups of fixations pattern.

Scenario 1: Three fixation patterns

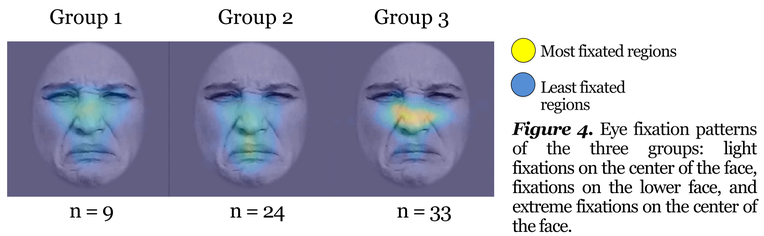
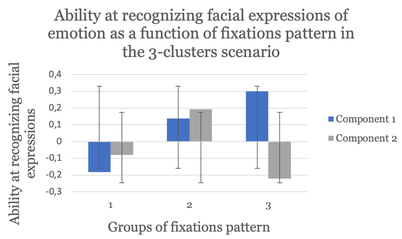


Figure 4. Eye fixation patterns of the three groups: light fixations on the center of the face, fixations on the lower face, and extreme fixations on the center of the face.



Component 1:
$F(2, 63) = 1.35, p = 0.27$
Component 2:
$F(2, 63) = 0.44, p = 0.64$

Figure 5. Performance of each group for the two components. The error bars represent standard deviations.

Scenario 2: Four fixation patterns

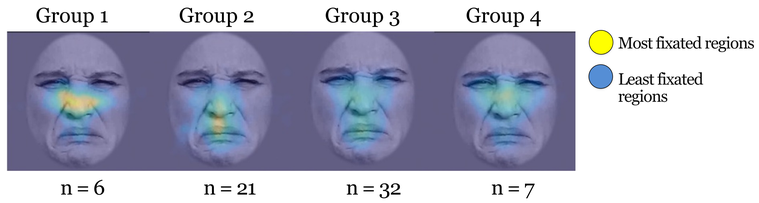
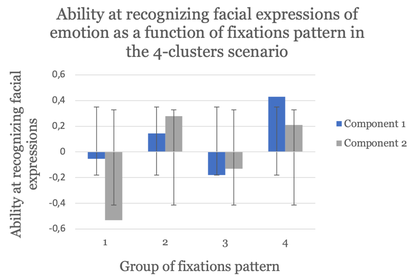


Figure 6. Eye fixation patterns of the four groups: extreme fixations on the center of the face, extreme fixations on the lower face, light fixations on the lower face, and light fixations on the center of the face.



Component 1:
$F(3, 62) = 0.92, p = 0.44$
Component 2:
$F(3, 62) = 1.42, p = 0.25$

Figure 7. Performance of each group for the two components. The error bars represent standard deviations.

Conclusion

- The results are congruent with the finding of Yitzhak et al. (2020).
- They suggest that individual differences in the ability at recognizing facial expressions are not associated with the eye fixations occuring during the task.
- Eye fixations are not a direct measure of the visual information efficiently used to perform a task – it is possible to process information parafoveally. See Poster #43307 for more information.

References

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