2024

Does Handedness Affect Lateralization of Facial Emotion Processing

Shairy Jimenez Delgado
sj1045@humboldt.edu

Alice Zhang
alz15@humboldt.edu

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Alice L Zhang | Shairy Jimenez-Delgado | Nick Summers | Nathan Boone | Amanda Hahn
California Polytechnic Institute Humboldt

Background

Behavioral and neuroimaging work on the visual processing of facial stimuli has consistently demonstrated a right hemisphere bias in face perception generally as well as in emotion perception[1]. However, this research has primarily been conducted on strictly right-handed individuals. Given that research on the lateralization of other cognitive functions, such as language and spatial attention, has found differential patterns of lateralization between right-handed and left-handed individuals[2], there may also be a difference in affective visual processing for faces when left-handed individuals are taken into consideration. Indeed, several neuroimaging studies have found evidence for a relationship between handedness and the degree of lateralization for generalized face processing[3]. Bourne[1] found that degree of handedness was a significant predictor of lateralization of emotional face processing using chimeric faces (i.e., faces where one half is emotionally neutral, while the other half is emotionally expressive) displaying positive affect. Individuals who were less strongly right-hand dominant were also more strongly lateralized to the right hemisphere for emotional face processing. The current study seeks to extend this work by investigating the relationship between degree of handedness and degree of hemispheric lateralization for the processing of faces displaying positive and negative affect.

Participants

107 participants (mean age = 21.2 years, SD = 4.98) were recruited via the Psychology Department SONA system. The majority of participants were female (77.6%).

Methods

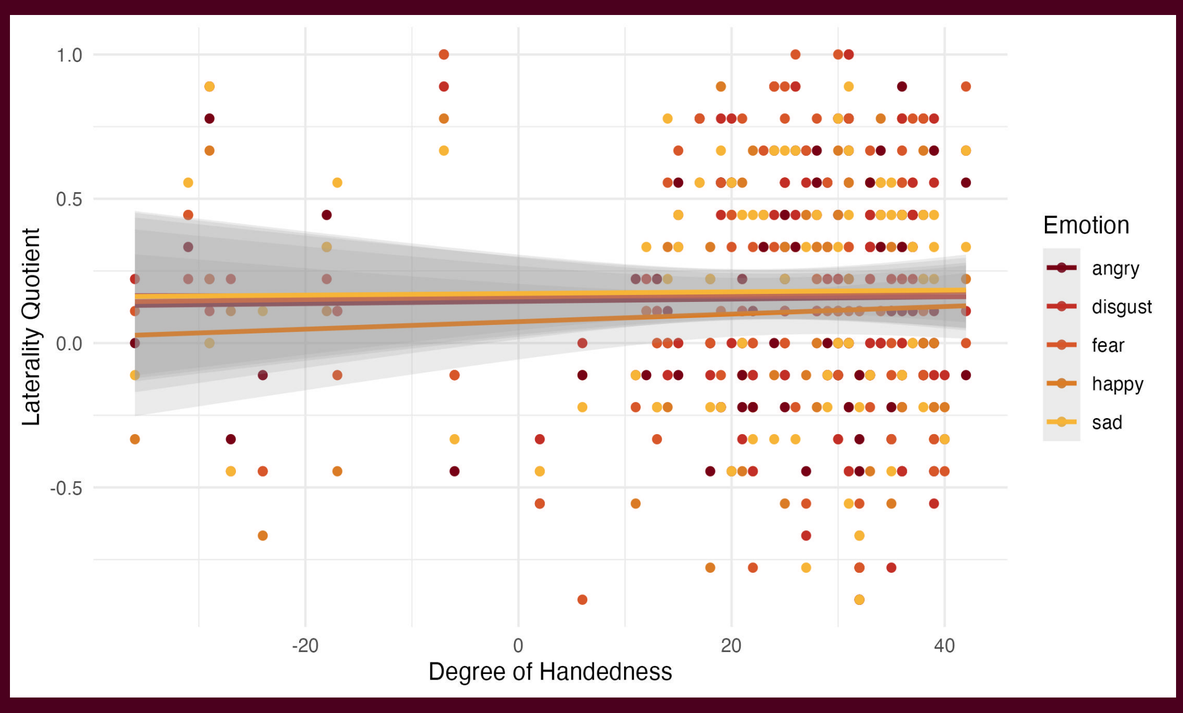
Participants answered a 14-item handedness questionnaire[1] to determine their degree of handedness (scores range from -42 for strong left-hand dominance, +42 for strong right-hand dominance). Next they completed a Chimeric Faces Test (CFT, a measure of lateralization for processing facial affect); they were presented with a series of vertically split chimeric faces where one half shows a neutral expression and the other shows an emotional expression. The emotional side (L/R) varies across trials. Five different emotions were used (happy, angry, disgusted, afraid, sad). On each trial, participants were asked to choose as quickly and accurately as possible which face was more emotional.

Analysis

Responses on the CFT were coded to determine a laterality quotient for each participant[1] (-1 for choosing the right-side emotional face for a left-hemispheric bias, +1 for choosing the left-side emotional face for a right-hemispheric bias). Thus higher scores represent stronger right-hemisphere lateralization. Linear regression was then used to determine whether degree of handedness predicted the degree of lateralization of affective face processing for each emotion, as well as the average laterality quotient across all emotions.

Results

There was a general right hemisphere bias in our data (i.e., significant positive laterality quotient, $t(106) = 4.64$, $p < .001$). We found no overall effect of degree of handedness on the laterality of affective face processing averaged across all emotion types ($p = .81$). There were also no effects of degree of handedness for any of the individual emotion types (all $p > .56$).



Discussion

Contrary to our predictions, we found no significant relationship between a participants' degree of handedness and lateralization of affective visual processing for emotions generally, or any individual emotion. Previous work[1] exploring this issue has used happy faces as affective stimuli, however even when restricting our analysis to the happy faces only, we failed to find any impact of degree of handedness. These findings suggest that regardless of degree of handedness and valence of emotion, affective visual stimuli is primarily processed in the right hemisphere, as evidenced by a significant right hemisphere bias in the overall data. It is important to note, however, that the majority of our participants showed stronger right-hand dominance so left-hand dominant individuals may be underrepresented.

References

❶ Bourne (2008) *Neuropsychology*; Kanwisher et al. (19997) *Journal of* Neuroscience; Nakamura et al. (1999) *Journal of Neuropshysiology*
❷ reviewed in Willems et al. (2014) *Nature Reviews Neuroscience* ❸ Willems et al. (2010) *Cerebral Cortex*; Bukowski et al. (2013) *Cortex*