

The influence of implicit associations on the perception of faces from different races: an event-related potential study

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INTRODUCTION

Human faces are rich sources of information in interpersonal interaction. Race is a salient cue, and cross-race face perception and recognition have been widely studied. Such studies might help in our understanding of the mechanisms underlying the formation and influence of stereotypes and prejudice, and might also help in understanding and preventing cross-race eyewitness misidentification.^{1, 2, 3}

Event-related potentials (ERP) can be used to investigate the time course of cross-race face perception. Several studies have reported race-associated differences in ERP amplitudes, suggesting possible attention driven mechanisms and processing depth differences that might lead to differential face memory.^{4,5,6} It is not known whether these race-associated differences in ERPs are due to the unfamiliarity of the other-race (OR) faces, or to racial attitudes. There is only one study that observed a correlation between the race-associated ERP difference and an explicit racial attitude measure.⁵ The current study was conducted to determine if cross-race ERP differences are influenced by implicit racial associations and, if so, over what time range racial associations influence the ERP. In this study, two other-races were used in order to see if the ERP differences across race was associated with in-group/out-group differentiation or were associated with a specific race.

METHODS

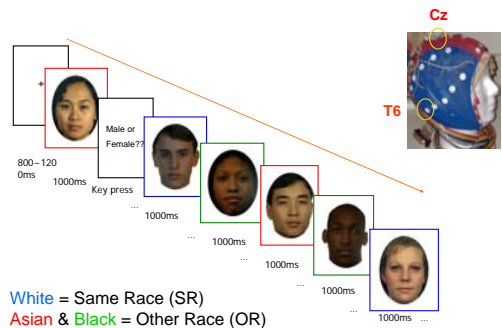
❖ **Participants and Task:** 21 Caucasian participants (7 Males, Average age 20.00, 2 left-handed) performed Gender Identification Task when viewing faces.

❖ **Stimuli:** 50 **Asian**, 50 **Black**, 50 **White** faces (in color, without hair, half male and half female), presented in 2 runs

❖ **Procedure:** Gender task (Accuracy and EEG recorded) Implicit association test (IAT)

❖ **EEG recording:** using a sampling rate of 250Hz, recording from 32 scalp locations

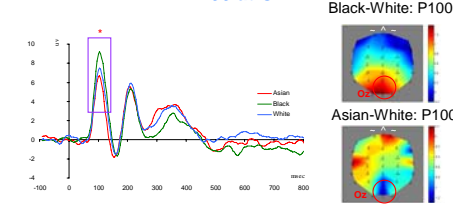
❖ **ERP processing:** Trials with large eye movements and blinks were removed. Epochs starting from 100ms before stimulus onset to 1000ms after onset were extracted and averaged by stimuli types (Asian, Black, and White).



White = Same Race (SR)
 Asian & Black = Other Race (OR)

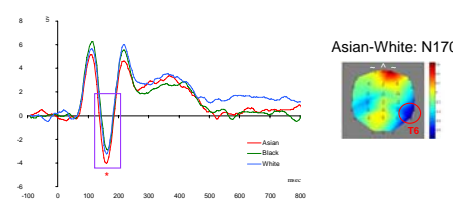
ERP time waves and Topographies

P100 at Oz



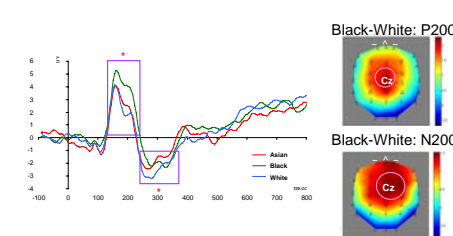
Black > White, White > Asian (around 116ms), largest at Oz
 Not correlated with IAT-Asian at this time period

N170 at T6



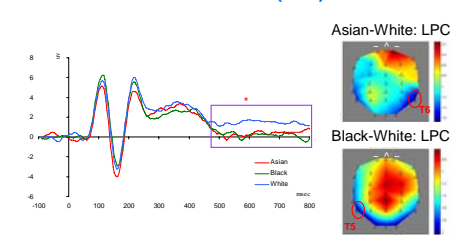
Asian > White (at around 160ms), largest at T6
 Not correlated with IAT-Asian at this time period

P200 and N200 at Cz



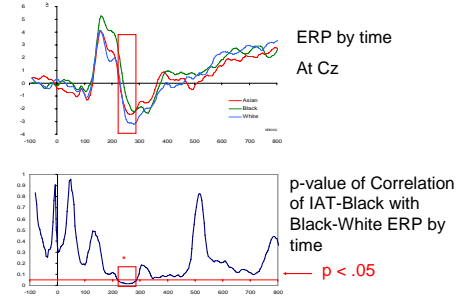
P200: Black > White (~ 192ms), largest at Cz
 N200: White > Black (~ 244ms), largest at Cz
 Correlated with IAT-Black at this time period!

Late Positive Potential (LPC) at T6/T6



White > Asian, White > Black (~ 592ms), largest at T5, T6
 No correlation with IAT at this time period

Correlations

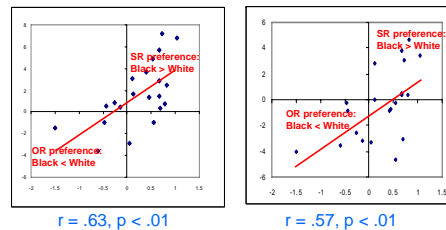


The Black-White ERP differences were correlated with IAT-Black between 220-284ms (ps < .05).

Correlations for IAT-Black

Observed consistently around 250ms and 400ms at multiple frontal and temporal electrodes

Black-White at Frontal (~228ms) by IAT-Black
 Black-White at Temporal (~224ms) by IAT-Black

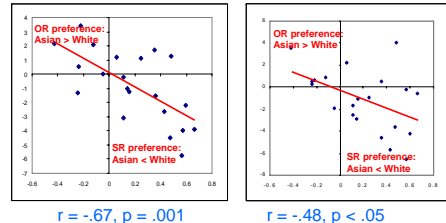


Implication: More difficult to associate Black faces with positive words, larger the Black-White ERP difference in one direction (e.g., Black > White in P200), and vice versa.

Correlations for IAT-Asian

Significant correlations for Asian-White with IAT-Asian were also observed consistently around 500ms, at multiple frontal and temporal electrodes

Asian-White at Frontal (~516ms) by IAT-Asian
 Asian-White at Temporal (~496ms) by IAT-Asian



RESULTS

❖ Behavioral results:
 More accurate in judging the gender of **White** (97.5%) than **Asian** (95.9%) ($p < .05$);
 No sig. diff. between **Black** (97.2%) and **White**.

❖ IAT-Asian = .19 ($p < .05$) and IAT-Black = .23 ($p = .10$): The participants were generally biased toward their same-race (SR).

❖ ERP amplitude differences between races were observed. Some ERP differences were significantly correlated with IAT measures (see figures).

DISCUSSION

❖ **P100 differences:** *The brain is sensitive to the race difference as early as 116ms* after face onset, but it is not influenced by racial evaluations at this latency. This difference likely reflects the physical differences between faces or familiarity with different races rather than an in-group/out-group differentiation.

❖ **N170 differences:** Suggest some difference in the structural encoding of Asian vs. White faces rather than an in-group/out-group differentiation.

❖ **P200 and N200 differences** were associated with IAT scores: *The influence of implicit associations on cross-race face processing occurs as early as 200ms* (after the initial differentiation of structural differences across race, ~116ms)

❖ **LPC difference:** May suggest a deeper processing of SR faces (like greater FFA activation to Same-Race in fMRI studies^{8,9}), or an attention drawn to Other-Race faces.

SUMMARY and CONCLUSIONS

❖ Black faces evoked a larger positive ERP than White faces that peaked at 168ms over frontal scalp, while White faces evoked a larger negative ERP than Black faces that peaked at 244ms. These Black/White ERP differences were significantly correlated with scores on the IAT-Black.

❖ ERPs also differentiated White from Asian faces and a significant correlation was obtained between the White-Asian ERP difference waves at ~500ms and the IAT-Asian.

❖ A positive ERP at 116ms differentiated all three races, but was not correlated with either IAT.

❖ A late positive component differentiated the same-race from both other-races.

❖ These results demonstrate the influence of a racial related associations that may reflect early automatic and later controlled processes.

REFERENCES

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