Face processing and the expression of race bias: Effects of between- and within-person variability in motivation to engage control

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Background

- Person construal is a dynamic process that occurs iteratively over just hundreds of milliseconds[1]. Person construal also facilitates behavior. For example, measured by the face-elicited P2 ERP, stronger activation of social category information (i.e., greater P2 amplitudes) leads to faster categorization of faces by race and gender[2].
- Person construal has implications for the regulation of race bias: Stronger activation to Black vs. White faces leads to more race-biased responding[3]. Thus, we should see that a larger P2 relative to one's average P2 should predict more behavioral bias on that trial (Hypothesis 1A/B).
- However, the regulation of race bias is also a dynamic process that could have implications for person construal. For example, stereotype-congruent errors lead to more response conflict, indexed by larger medial-frontal negativity amplitudes (response-locked MFNs)[4].
  - This is especially true for those motivated to control prejudice by internal (egalitarian) rather than external (social) reasons (IMS and EMS, respectively)[5].
- Thus, larger MFNs on a given trial should signal how attention to the face on the subsequent trial is directed (i.e., lead to smaller P2 amplitudes; Hypothesis 2).
- Both Hypotheses 1 and 2 could be moderated by between-person motivation to control prejudice (IMS*EMS – Hypothesis 3A = RT bias, 3B = Accuracy Bias, 3C = MFN -> P2 Amplitude).
- While commonly accepted both processes vary within-person moment-to-moment, little research has tested this directly.

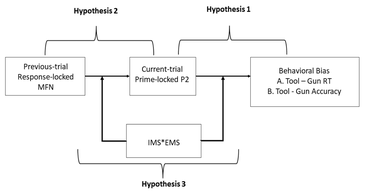


Figure 1. The analytic model to be tested in this study.

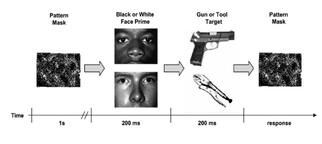
Results: Hypotheses 1 and 2

- Hypothesis 1A was not supported: The interaction between the within-subject P2 and target type did not predict RT, $t(16984.21) = 0.05$, $p = .962$.
- Hypothesis 1B was not supported: The interaction between the within-subject P2 and target type did not predict accuracy, $Z = 1.59$, $p = .112$
- Hypothesis 2 was not supported: The previous-trial, within-subject MFN amplitude did not predict current-trial P2 amplitude, $t(22305.44) = -1.17$, $p = .242$.

Method and Analytic Approach

- **Participants**: $N = 139$ from a previously reported sample[6]; 130 White, 6 Black, 9 Asian, 4 Hispanic, Age $M(SD) = 19.74(1.81)$, 82 Male.
- **Bias Task**: The Weapons Identification Task (WIT)[7] (**Figure 2**) contained 384 experimental trials with a 500ms response deadline.
- **The Internal and External Motivation to Respond Without Prejudice scale**[8] contains 5 items per subscale (e.g., "Being nonprejudiced toward Black people is important to my self-concept" [IMS; α = 0.81], "I try to act nonprejudiced toward Black people because of pressure from others" [EMS; α = 0.78]).
- **Response-locked ERPs (MFN)** were derived -25 to 130ms post-response at fronto-central electrode sites, sampled at 500hz, with baseline correction from -400 to -200ms **(Figure 3).**
- **The face-elicited P2 ERP** was derived 130 to 280ms post-stimulus at an average of central-parietal sites sampled at 1,000hz with 200ms baseline correction **(Figure 4).**
- **The within-subject ERP** was calculated by subtracting the amplitude on a given trial from the subject's average ERP amplitude.[9, 10]
- Data were submitted to **multilevel models** with random intercepts by subject and random slopes of Target type where applicable.[10, 11] Best-fitting models were determined by X^2 comparisons. **Slopes were estimated from the models** by selecting values representative of the range of scores (± 2 *SD*s of the mean for IMS/EMS, and ± several *SD*s of the mean for continuous within-subject ERPs to represent the range of amplitudes in the data). **White-prime trials were excluded** to reduce the number of terms in the model, and there is no analogous "anti-White bias" response in the WIT. RTs +/- 3 *SD*s were removed as outliers (< 0.6% of trials) prior to analyses. EEG amplitudes +/-75 μV were removed prior to averaging ERPs and conducting disaggregation of within- and between-subject components. Slope estimates were Tukey-corrected. Continuous IVs were grand-mean centered.

Figure 2: The WIT



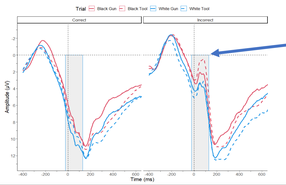


Figure 3: The response-locked MFN waveforms. Stereotype-congruent errors (i.e., Black-tool errors) elicited the greatest (most negative) amplitudes (Prime x Target x Response ANOVA: $F(1, 130) = 12.12$, $p < .001$, $\eta_p^2 = 0.09$). Shaded area represents the ERP quantification window.

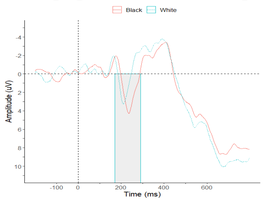
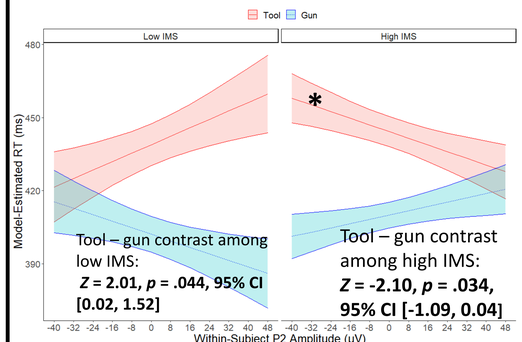


Figure 4: The face-locked P2 waveforms. Amplitudes elicited by Black faces were greater (more positive) than amplitudes elicited by White faces, $t(130) = 12.06$, $p < .001$, d = 1.05. Shaded area represents the ERP quantification window.

Results: Hypothesis 3A

IMS * P2 * Target interaction on RT (Figure 5), ***Z* = -2.39, *p* = .017, Semipartial R^2 = 0.0003.**

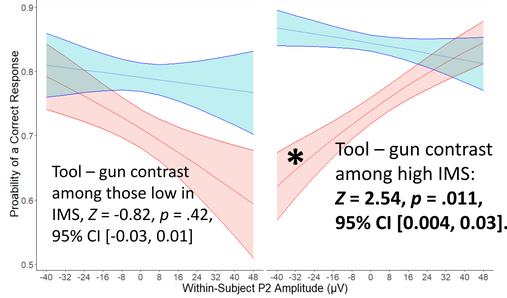


- The difference in RT to tools vs. guns as a function of P2 amplitude was larger among those low vs. high in IMS, ***Z* = 2.39, *p* = .017, 95% CI [0.24, 2.42].**
- When participants extracted more information for Black faces on a given trial, those high in IMS responded in a less biased manner, while those low in IMS responded in a more biased manner- partial support for hypothesis 3A.

Figure 5. *Only the high IMS-Tool simple slope approached significance, ***Z* = -1.77, *p* = .079, 95% CI [-0.73, .04].** Error bars = standard error (SE).

Results: Hypothesis 3B

Marginal IMS * P2 * Target interaction (Figure 6), ***Z* = 1.81, *p* = .07, Semipartial R^2 = 0.0003;**
Also, a marginal EMS * P2 * Target interaction (Figure 7), ***Z* = -1.82, *p* = .07, Semipartial R^2 = 0.0001.**



- The difference in accuracy to tools vs. guns was marginally bigger among those high vs. low in IMS as a function of P2 amplitude, ***Z* = -1.81, *p* = .07, 95% CI [-0.05, 0.002] (Figure 6).**
- The difference in accuracy to tools vs. guns was marginally bigger among those high vs. low in IMS as a function of P2 amplitude, ***Z* = 1.85, *p* = .06, 95% CI [-0.002, 0.1] (Figure 7).**
- When participants extracted more information for Black faces on a given trial, those high vs. low in IMS, and low vs. high in EMS, responded in a less biased responded manner- Partial support for hypothesis 3B.

Figure 6. Only the High IMS-Tool simple slope was significant, ***Z* = 2.80, *p* = .005, 95% CI [0.004, .02].** Error bars = SE.

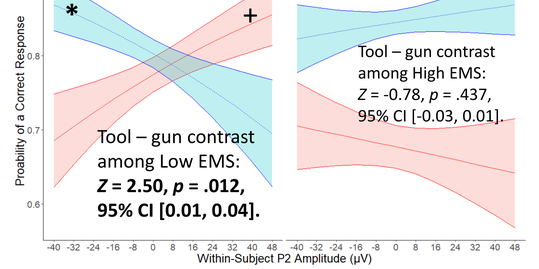
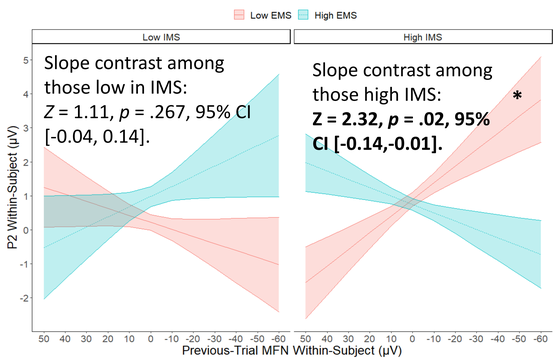


Figure 7. There were two simple slopes of interest: ***Z* = -1.78, *p* = .005, 95% CI [0.004, .02]; +*Z* = 1.76, *p* = .07, 95% CI [-0.001, 0.02].** Error bars = SE.

Results: Hypothesis 3C

IMS * EMS * Previous-trial MFN interaction on current-trial P2 amplitude (Figure 8),
***t*(21962.29) = 2.01, *p* = .044, Semipartial R^2 = 0.0001**



- The **High IMS*Low EMS slope** was significantly different from:
  -- The Low IMS/Low EMS slope (***Z* = -1.97, *p* = .049, 95% CI [-0.14, -0.0004]**)
  --The High IMS/High EMS slope (***Z* = 2.32, *p* = .02, 95% CI [-0.14, -0.01]**)
- After experiencing response conflict, those more internally motivated and less externally motivated (High IMS * Low EMS) attended ***more*** to the Black prime. Other IMS/EMS combinations did not reliably follow this pattern.

Figure 8. *Only the high IMS/Low EMS simple slope was significant, ***Z* = -2.37, *p* = .018, 95% CI [-0.09, -0.009].** Error bars = SE.

Discussion

- Without accounting for top-down motivation to control prejudice (IMS/EMS), the effects of person construal on race bias (Hypotheses 1A and 1B) and the effects of conflict monitoring on person construal (Hypothesis 2) are not immediately obvious.
- When we account for IMS and EMS (Hypothesis 3), we can see that those who are differently motivated, particularly those internally motivated to control bias, adopt different strategies to attempt to regulate bias.
- High IMS individuals utilize race as a "vigilance cue," to direct attention and exert control over bias, consistent with theory[12]; on a given trial, attention was directed *toward* Black faces, and *less* biased was expressed.
  - Additionally, following the experience of conflict, high IMS*low EMS individuals were especially likely to attend to Black faces.
- Overall, these result elucidate the role of motivation in face processing, bias regulation, and conflict monitoring sequentially, accounting for trial-to-trial fluctuations in these highly dynamic processes.

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