

Awareness during Cognitive Conflict: Double Blindness and Introspections about Speed of Processing

Introduction:

To investigate the hypotheses regarding that which one should and should not be capable of introspecting during cognitive conflict, in a series of studies participants introspected on a trial-by-trial basis about several aspects of experiencing response interference. Study 1, investigated the notion of 'double-blindness'—that diminished awareness occurs when two cognitive processes lead to identical action plans. Study 2 examined whether participants can provide systematic introspections about aspects of conflict (e.g., speed of processing). The research builds upon recent findings revealing that the fleeting 'urges', 'inclinations', and 'tendencies' experienced by participants in response-interference paradigms such as the Stroop and flanker tasks are systematic, reliable, and predicted by theory (Morsella et al., 2009).

Study 1: Did I read or did I name?

Little is known regarding the subjective aspects of what occurs during non-conflicting or 'harmonious' processing. Regarding the congruent condition of the Stroop task, it has been proposed that, one may not only experience no conflict, but may also be unaware that more than one process (e.g., color naming and word reading) yielded the same response. This has been explained as an instance of double-blindness (Morsella et al., 2009)—that one is unaware that two distinct cognitive operations are activated when the operations lead to the same action plan. However, there is no empirical evidence to date that participants have diminished awareness of one process (e.g., reading) when it leads to the same output as another process (e.g., naming). For example, in the Stroop congruent condition, does color-naming diminish awareness of word reading?

Study 1: Method

Participants. San Francisco State University undergraduate students ($n = 46$) participated for course credit.

Procedure. Participants responded to two blocks of Stroop stimuli. Trials proceeded as follows. A ready prompt appeared onscreen until participants indicated that they were ready to proceed. Thereafter, a fixation point (+) was shown at the center of the screen (1,500 ms) followed by a blank screen (700 ms), after which time a Stroop stimulus appeared (48-point Helvetica), remaining onscreen until the participant responded. After responding, participants were asked "How strong was your urge to make a mistake and READ the word out-loud?", which they rated on an 8-point scale, in which 1 signified "almost no urge" and 8 signified "extremely strong urge."

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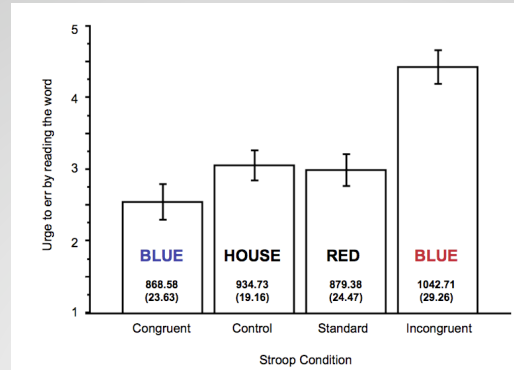


Figure 1. Mean urges to err by reading the word as a function of condition. Error bars indicate SEMs.

Results. We replicated the Stroop RT effect, $F(3, 135) = 41.76, p < .0001$ (Figure 1), with all contrasts significant ($ps < .001$) except that between congruent and standard ($p = .49$). As predicted, Stroop condition affected the urge to err by reading, $F(3, 135) = 32.707, p < .0001$ ($\eta_p^2 = .42$) (Figure 1), in which urges to err were strongest for the incongruent ($M = 4.42, SEM = .24$), followed by control ($M = 3.05, SEM = .19$), standard ($M = 2.99, SEM = .22$), and congruent conditions ($M = 2.54, SEM = .23$). Planned comparisons revealed that all contrasts were significant ($ps < .05$), except for that between control and standard ($p = .65$).

Study 2: Speed of Processing

Based on theory (Morsella et al., 2009) and empirical developments, we know that we are aware of the outputs of processes, but not of the processes themselves. Theories of consciousness (e.g., Morsella, 2005) suggest that there will be greater awareness of processes related to conflict. For instance, in Study 1, participants were more aware of their urge to read the word in high-conflict trials. But can people reliably introspect other aspects of conflict? This study examines whether people are able to reliably introspect their speed of responding in high- and low-conflict trials.

Study 2: Methods

Participants. San Francisco State University undergraduate students ($n = 30$) participated for course credit.

Procedure. Participants completed one block consisting of 40 Stroop trials (16 incongruent, 8 congruent, 8 neutral, 8 control). After responding, participants were asked "How quickly do you feel that you responded?" which they rated on an 8-point scale, wherein 1 indicated "very slowly" and 8 indicated "very quickly."

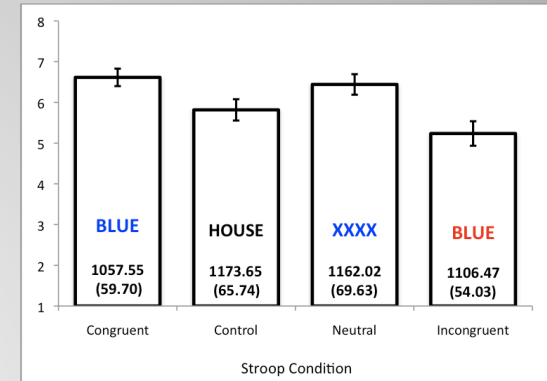


Figure 2. Mean speed ratings as a function of condition. Error bars indicate SEMs. Number values indicate RTs (SEM).

Results. We did not find a Stroop RT effect, $F(3, 116) = .735, p = .533, ns$. However, analyses did yield a Stroop effect for the subject ratings of speed, $F(3, 116) = 5.885, p = .001, \eta_p^2 = .132$ (Figure 2), in which speed ratings were slowest for the incongruent ($M = 5.24, SEM = .30$), followed by the control ($M = 5.82, SEM = .26$), and neutral conditions ($M = 6.44, SEM = .25$). Speed ratings were fastest for the congruent condition ($M = 6.61, SEM = .21$). Planned comparisons revealed that the incongruent condition was rated as significantly slower ($ps < .05$) than the congruent and neutral conditions.

Discussion:

Together, Studies 1 and 2 corroborate that participants do have reliable, systematic introspections regarding processing speed, despite phenomena such as double-blindness. Apart from illuminating the cognitive and subjective dynamics of conflict, these findings have implications for theories regarding the primary function of consciousness (cf., Morsella, 2005).

References:

- Morsella, E. (2005). The function of phenomenal states: Supramodular interaction theory. *Psychological Review, 112*, 1000-1021.
- Morsella, E., Wilson, L. E., Berger, C. C., Honhongva, M., Gazzaley, A., & Bargh, J. A. (2009). Subjective aspects of cognitive control at different stages of processing. *Attention, Perception, and Psychophysics, 71*, 1807-1824.