



Impact of Sleep Quality and Relationship Styles on Emotional Detection



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Introduction:

- The classic Stroop effect is seen to reflect a reduction in performance between incongruent, as compared to congruent stimuli (Stroop, 1935). The effect has been used to create a psychological test (the Stroop test) that is widely used in to study automatic vs more controlled processing in several cognitive domains. The emotional Stroop we will be using in this study specifically taps into emotional awareness and perception and possibly affective bias in our participants.
- Our Emotional Stroop stimuli utilized two sets of 30 items, one set of complimentary statements and the other a set of insulting statements. All statements are recorded in a real human voice in either happy or angry prosodic tones. Thus, for half of the statements that participants hear, the prosodic tone and the semantic content is matching (i.e. compliments said in a happy tone of voice) while in the other half of the statements, there is a conflict between the two sources of emotional information (i.e. a compliment said in an angry tone of voice). Including these conflict/Stroop trials allows us to measure participants' ability to modulate selective attention for either emotional prosody or emotion related semantics.
- Impact of Sleep Quality on emotion processing: Prolonged sleep dept leads to an increased reactivity towards aversive emotional information. Together with the decrease in medial prefrontal activation, the capacity for emotion regulation becomes dysfunctional when we experiences sleep deprivation (Vadkerkhove & Wang, 2018). Inadequate sleep also disrupts higher-order, socio-emotional functioning, decreases prosocial behaviors, and increases social withdrawal (Simon, et al., 2020) .While there is a good deal of research that discusses how poor sleep can lead to negative mood and irritability, less work has looked at how acute and prolonged sleep dept can change our ability to detect emotional information in our environment.
- Impact of Attachment Style on emotion processing: According to Ainsworth's research based on Bowlby's theories, there are three types of attachment styles: secure attachment, anxious-resistant or ambivalent attachment, and avoidant attachment style (Levy et. Al., 2010, p.194). Adams and colleagues (2014) discuss that based on previous literature on sleep-attachment style connection, found that individuals with insecure-anxious attachment style report poorer sleep quality. They also reported that few longitudinal children's studies have reported bidirectional relationship between sleep and attachment style. Mikulincer and Shaver (2007) explore the high correlation between attachment styles and emotional processing through the model of emotion process presented by Shaver et. Al. in 1987 and focus on how the regulatory efforts help an individual in processing emotions and how the emotional processing is affected by the different attachment styles (p.448-449).

Specific Aims:

- Specific Aim 1:** To examine if we see a classic Stroop effects when we ask participants to process complimentary and insulting statements that are said in emotionally congruent or incongruent prosodic tones.
- Specific Aim 2:** To find out how sleep quality modulates selective attention for either emotional prosody or emotion related semantics utilizing our emotional Stroop task.
- Specific Aim 3:** To determine if attachment style also acts to modulate emotion sensitivity, and so changes patterns of attention in our emotional Stroop task.

Methods:

Participants

- Twenty-nine (XX females, XX males) participants have been run to date
- Criteria for participation includes adults 18-26 years, no history of neurological disorders
- Participants will be recruited through the SONA portal

Measurements and Procedure

Qualifying participants completed:

- Sleep Questionnaire
 - Sleep Quality Scale (SQS)
 - Immediate Sleep Quality Scale (ISQS)
- Experience of Relationship Scale (ERS)
- Two Practice Blocks of Emotional Stroop Tasks
- Two Experimental Blocks of Emotional Stroop Tasks

Procedure:

- Participants were asked to complete the self-report questionnaires: Sleep questionnaires and ERS.
- Then, participants were asked to complete the Emotional Stroop tasks by focusing on either the prosodic tone or semantic content and reporting whether it was a happy/angry tone or compliment/insult.

Results for Emotional Prosody analyses

- Within-participants ANOVAs were run for both dependent variables: reaction time and accuracy
- Independent variables included:
 - Task: Detecting prosody vs. Detecting semantics
 - Stimulus congruence: Incongruent vs. Congruent
 - Valance of statement: Compliments vs. Insults

Reaction Time

No main effects or interactions were observed for reaction time (all Fs < 1).

Accuracy

For Accuracy we observed main effects for all three independent variables and all interactions (2-ways and 3-way) were significant.

Task $F(1,28)=56.64, p < .001$		
	Mean	Std. Error
Prosody	.913	.008
Semantic	.975	.003

Congruence $F(1,28)=27.09, p < .001$		
	Mean	Std. Error
Incongruent	.929	.006
Congruent	.960	.004

Valance of Statements $F(1,28)=10.36, p < .01$		
	Mean	Std. Error
Compliments	.934	.005
Insults	.955	.006

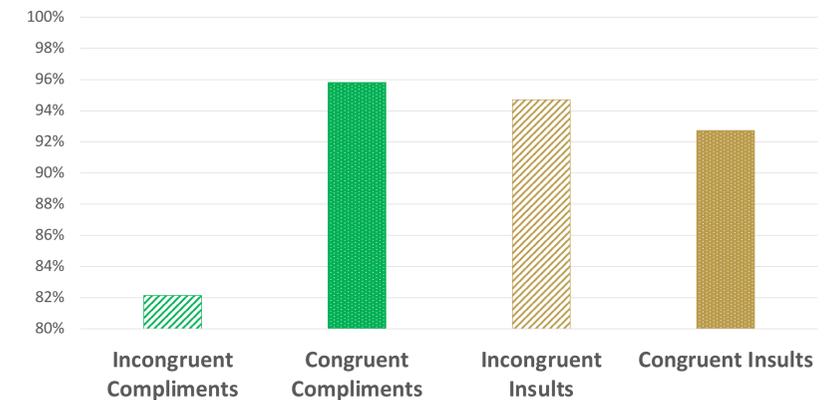
Accuracy in Semantics Detection Block

For the block of trials in which participants were asked to identify the semantics of the statements, accuracy was uniformly high for all conditions, with no main effects observed for this block and there was no interaction between congruence and valance (all F's < 1).

Accuracy in Prosody Detection Block

For the block of trials in which participants were asked to identify the prosodic tone of the statements, we observed:

- Main effect of congruence; ($F(1,28)= 21.95, p < .001$)
- Main effect of semantic valance; ($F(1,28)= 17.86, p < .001$)
- Significant interaction of congruence and valance; ($F(1,28)= 31.35, p < .001$)
- Stroop effect for compliments; ($F(1,28)= 52.14, p < .001$)
- But not for insults; ($F(1,28)= 1.13, p > .05$)



Preliminary Conclusions:

- So far, we have only collected data from about 75% (29 out of 40 participants) of the participants we need for this experiment, therefore we are only reporting on our preliminary results for Specific Aim 1.
- Overall, we are seeing that participants in our emotional Stroop task are able to accomplish the task with a high rate of accuracy (overall accuracy is above 90% given current task parameters).
- We do see reliable and theoretically interesting results from using this task, particularly when participants are asked to make judgements about the prosodic tone used to say the emotional statements.
- We are finding that compliments are more difficult to process. Also, we see a strong Stroop effect (incongruent stimuli show 14% more errors as compared to congruent stimuli) with complimentary statements. We do not see a Stroop effect for insults.
- These current results are compatible with a Motivated Attention model of emotion processing (Schupp, et al., 2004; Brady, Crockett, & Bavel, 2020), which argues that we are more effective at detecting and comprehending negative, threat-related information in our environment. Insults are clearly a form of social threat and so we are effective at detecting these statements even when they are communicated in an incongruent prosodic tone.