The Effect of Peer Interaction on Sustained Attention During the Flanker Task

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Introduction

- Children are faced with peer interactions in a variety of competitive contexts, including the classroom.
  - Peer interactions can differ in valence; some children may come across as mean in a competitive context while others come across as nice and supportive.
  - Interactions with other children during competition may elicit an emotional response that could affect performance based on the type of input (e.g., nice or mean) received.

- Specifically, peer interactions may affect cognitive performance through the experience of emotion.
  - Blair's (2014) psychobiological model of self-regulation suggests that intense, heavily valenced emotions can have a bottom-up effect on regulatory abilities, such as attentional control.
  - Negative emotions can interfere with children's abilities to delay gratification (Moore, Clyburn, & Underwood, 1976) and inhibit prepotent tendencies (Lapan & Boseovski, 2017).
  - Positive emotions can have a facilitatory effect on children's problem-solving abilities (Greene & Noice, 1988) and goal perseverance (Smiley & Dweck, 1994).

- The current study explored the effect of mean and nice peer input on children's performance on the Flanker task (Eriksen & Eriksen, 1974), which was framed as a competitive game.
  - We expected that input from a mean peer would hinder children's abilities to sustain their attention throughout the task, while input from a nice peer would facilitate sustained attention.

Method

Participants

- Forty-four 7- to 8.9-year-olds (24 girls) and 47 9- to 10.9-year-olds (24 girls)

Design

- A 3 (peer input group) X 2 (age group) X 2 (Flanker task block) mixed design was used for the current study, with peer input group and age as between subject variables and Flanker task block as a within subject variable.
  - Participants were divided into one of three peer input conditions: mean input, nice input, or neutral input.
- The dependent variable of interest was response time coefficient of variation (COV), an index of sustained attention and overall attentional control (Barkley, 1997), on the Flanker task.

Procedure

- Upon arrival to the lab, participants were told that they were going to play a computer game (the Flanker task). They were also told that another child was playing the same game in a nearby room and that the winner of the game would get a special prize.
- Following introduction and practice for the Flanker task, participants completed four blocks) of 20 trials (collapsed into two blocks for analysis) for a total of 80 trials.

Method (cont.)

Procedure (cont.)

- Participants received prerecorded verbal input from the other child via a baby monitor after the peer "won" the practice task and before each block of the Flanker task. The recorded voices were matched by participant gender (see Figure 1 for example dialogue).
  - *Mean Peer:* Took half of the participant's points following practice and provided overly competitive dialogue
  - *Nice Peer:* Shared half of his points with the participants following practice and provided encouraging dialogue
  - *Neutral Peer:* Neither took points nor shared points and provided neither competitive nor encouraging dialogue

Figure 1: Example dialogue for each type of peer

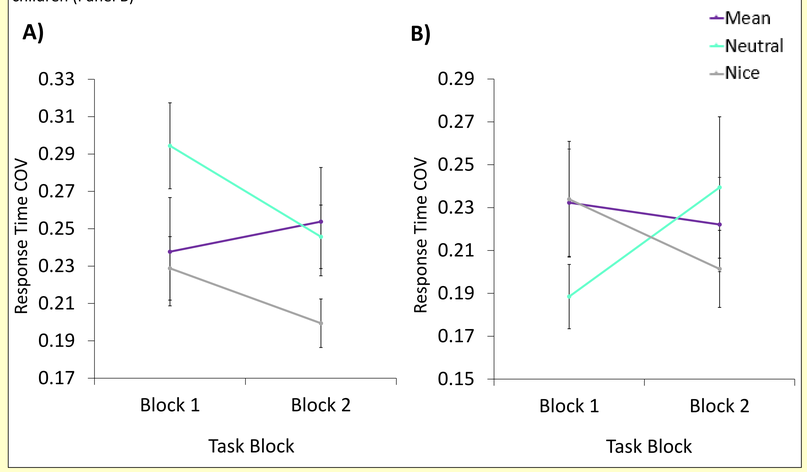
Results

- The first two task blocks were combined to create Task Block 1 and the second two task blocks were combined to create Task Block 2.

- A mixed 2 (task block) x 3 (condition) x 2 (age group) mixed ANOVA on response time COV revealed a three-way interaction between task block, condition, and age, F (2, 90) = 4.86, p = .01 (Figures 2 & 3).
  - Younger Children:
    - COVs in the neutral condition (M = 0.29, SE = 0.02) were significantly higher in Task Block 1 than COVs in the nice condition (M = 0.23, SE = 0.03), and marginally higher than COVs in the mean condition (M = 0.23, SE = 0.03).
    - COVs in the neutral condition significantly decreased across task blocks t(14) = 2.53, p = .02, COVs in the nice condition decreased marginally across task blocks, t(15) = 2.03 , p = .06, and COVs in the mean condition were not significantly different, t(12) = 0.67, p = .52.
  - Older Children:
    - There were no significant differences between conditions in either task block (all ps > .10).
    - COVs in the neutral condition increased marginally across task blocks t(15) = 1.86 , p = .08. The mean and nice conditions did not change significantly across task blocks (both ps > .10).

Results (cont.)

Figure 2: Means and standard errors for COV by task block and condition for younger children (Panel A) and older children (Panel B)



Discussion

- The results for younger children suggest that affect-laden input facilitated their abilities to sustain attention on the task from the outset.
  - The continued benefit of affective input across task blocks was only observed in the nice condition, perhaps because the presence of a friendly and supportive peer motivated children to persevere during a difficult task (e.g., Smiley & Dweck, 1994).

- The results for older children suggest that the presence of affect-laden input may have ameliorated an effect of increased distractibility throughout the course of the task, indicative of a facilitatory effect of any valenced input on children's sustained attention
  - The effect of the nice input may be similar to that observed in younger children, but mean input may also be a motivating factor for older children. Perhaps the possibility of losing to a mean peer acted as a type of aversive reinforcement for older children.
    - Indeed, Farbiash and Berger (2016) found that the introduction of aversive reinforcement in a competitive setting (i.e., being is last place) boosted performance on a cognitive task in children.

- Together, the results from older and younger children suggest that affect-laden messages in a competitive setting may help children increase their focus on the task at hand, but there could be an added facilitatory effect on sustained attention in the presence of supportive

References

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin, 121,* 65-94. doi: 10.1037/0033-2909.121.1.65
Blair, C. (2014). Stress and the development of executive functions: Experiential canalization of brain and behavior. In P. Zelazo and M. Sera (Eds.), *37th Minnesota symposium on child psychology: Developing cognitive control processes: Mechanisms, implications, and interventions* (pp. 145-180). Hoboken NJ: Wiley.
Eriksen, B. A., & Eriksen, C. W. (1974). Effects of noise letters upon the identification of a target letter in a nonsearch task. *Perception & Psychophysics, 16,* 143-149.
Farbiash, T., & Berger, A. (2016). Brain and behavioral inhibitory control of kindergartners facing negative emotions. *Developmental Science, 19,* 741–756. doi: 10.1111/desc.12330
Greene, T. R. & Noice, H. (1988). Influence of positive affect upon creative thinking and problem solving in children. *Psychological Reports, 63,* 895-898. doi: 10.2466/pr0.1988.63.3.895
Lapan, C. & Boseovski, J. J. (2017). The effects of guilt on preschoolers' cognitive flexibility and inhibition. *Early Childhood Research Quarterly, 41,* 95-102. doi: 10.1016/j.ecresq.2017.06.004
Moore, B. S., Clybum, A., & Underwood, B. (1976). The role of affect in delay of gratification. *Child Development, 47*(1), 273–276.
Smiley, P. A. & Dweck, C. S. (1994). Individual differences in achievement goals among young children. *Child Development, 65,* 1723-1743. doi: 10.1111/j.1467-8624.1994.tb00845.x