Visual, Verbal and Balanced Processing Styles: Exploring the Effects of Attentional Biases on Decision Making Under Conflict

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Introduction

- People show different biases towards visual vs. verbal information[1]; however, this bias is not all or nothing
- Some people show a strong bias towards visual (blue bars) or verbal (red bars), while others show a much more even split (purple box)
- **Information Processing Style**: Individual differences in the way people perceive and internally represent information.
- **Attentional Bias**: The strength of a person's attention toward a card sort modality.

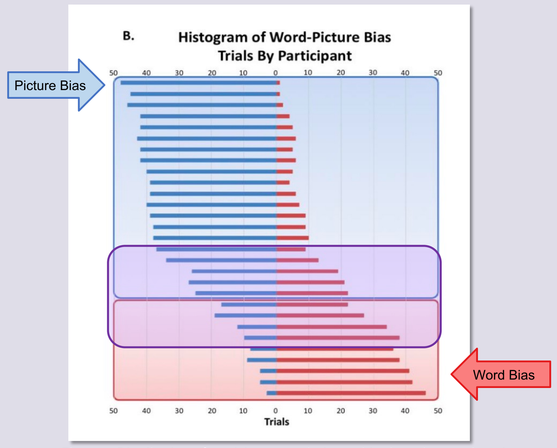

Figure 1. Distribution of participant word-picture bias based on card sorting task responses. Adapted from 1.

Methods

Participants

Data were analyzed from 185 participants. 140 participants were female (M = 40.05, SD = 14.52) and participants completed the tasks asynchronously online.

Visual and Verbal Attentional Bias Task

Participants completed 4 blocks of 48 trials. 75% of trials were congruent (picture and word match) and 25% were incongruent (picture and word mismatch).

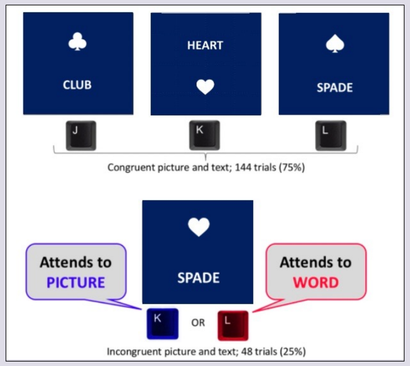

Figure 2. Upper panel shows keys that corresponded to each suit. Lower panel shows an example of an incongruent trial where the word and picture did not match. Adapted from 1.

Research Question:

- How does stronger attentional bias towards one's preferred information processing style in the card sorting task affect the degree of conflict experienced on incongruent trials?

Hypothesis

- People who have a *greater* attentional bias will have a *smaller* incongruency effect on the card sorting task as a result of experiencing less conflict.

Pre-Analysis

Bias Score Calculation:

- Scale from +1.0 (word) to -1.0 (picture)
- Score = $\frac{\#\ word\ response - \#\ picture\ response}{\#\ correct\ trials}$
- Incorrect trials ignored

Bias Categorization:

- Biased Attenders: Bias score > 0.8 or < -0.8 (more than 90% of trials picked in one modality)
- Neutral Attenders: Bias score <= 0.8 and >= -0.8 (90% or less trials picked in one modality)

Incongruency Effect Calculation:

- Mean Incongruent RT – Mean Congruent RT

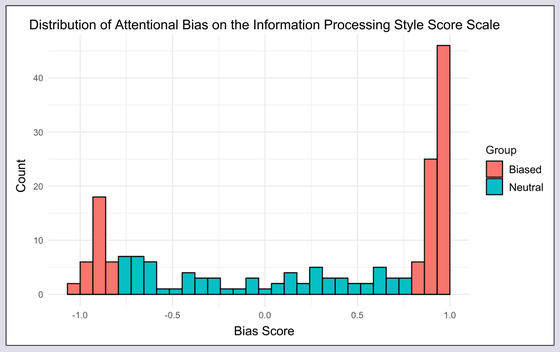

Figure 3. Histogram showing the bias score distribution on the visual-verbal information processing style score scale.

Outlier Removal:

- N = 185 before outlier removal
- Statistical outliers: M +/- 3 SDs
- 4 outliers met this criteria
- N = 181 after outlier removal

Statistical Analyses:

- Group: Mixed 2(bias group) x 2(congruency) ANOVA
- Individual: Pearson's R Correlation

Results

Descriptive Statistics:

	Group Size	Incongruency Effect RT Mean	Incongruent Trial RT Mean	Congruent RT Mean
Neutral	52	126.53	1087.48	960.95
Biased	129	55.46	901.57	846.11
Difference	77	71.07	185.91	114.84

Group Analysis

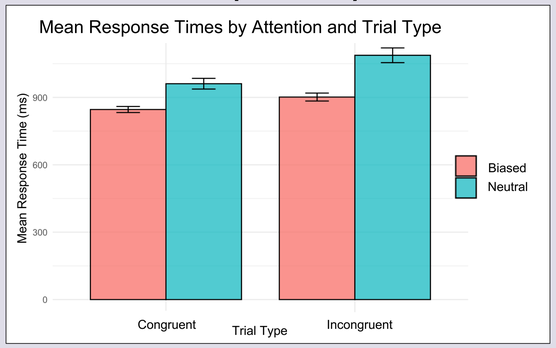

Figure 4. Bar graph showing the differences between response times for biased and neutral attention groups, separated by trial type.

Main Effect of Congruency

Incongruent RTs were slower than congruent RTs.

$F(179) = 99.40$, $p < 0.001$

Main Effect of Attentional Bias

Biased group has faster response times than the Neutral group.

$F(179) = 26.27$, $p < 0.001$

Interaction

The effect of incongruency was larger in the Neutral group than the Biased group.

$F(179) = 15.16$, $p < 0.001$

Individual Differences Analysis

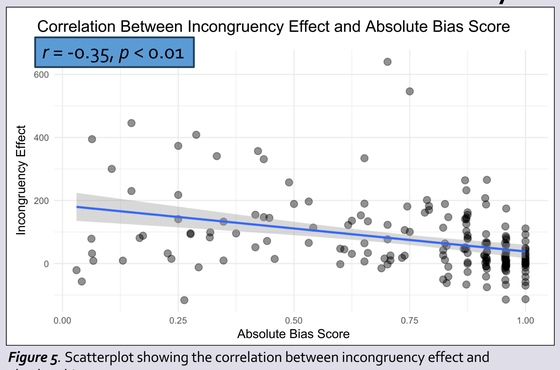

Figure 5. Scatterplot showing the correlation between incongruency effect and absolute bias score.

Discussion and Conclusions

Summary:

- More Biased attenders showed a smaller *incongruency effect*
  - Taking less time, automatic, less conflict
- More Neutral attenders showed a greater *incongruency effect*
  - Taking more time, considering at all options, more conflict
- In both congruent and incongruent trials:
  - Biased attenders had faster response times
  - Neutral attenders had slower reaction times
- Same strategy used in both trial types

Limitations:

- Difference in attentional bias group sizes
- Statistical power may not be as good in the neutral group
- All outliers were found in neutral group
- Made the group even smaller

Conclusion:

- The individual differences in the degree of attentional biases people have impact how much and what kind of information they attend to.

References

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