



Elucidating Mechanisms Underlying Hostile Interpretation Bias in Irritable Youth

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Introduction

- Irritability is an impairing symptom that spans mental disorders and is the most common presenting complaint to pediatric mental health professionals.
- Few evidence-based therapies exist for irritability. The first step towards developing interventions is to find a cognitive target the intervention may act on. One such promising target is Hostile Interpretation Bias (HIB).
- HIB is a tendency to interpret ambiguous social information as representing a threat, and is associated with irritability.
- In early training programs targeting HIB, we found that pathologically irritable youth are resistant to training against their HIB.¹
- It is unclear why irritable youth maintain HIB even when they receive feedback that ambiguous social information is benign.¹
- Prior work suggests two hypothetical cognitive processes for resistance to training against HIB:
 - Irritability is associated with impairment in detecting subtle social cues. Thus, more irritable youth are more likely to miss cues they need to learn.
 - Irritability is associated with a slower rate of learning to replace prior hostile associations with new, benign information
- In this study, we simultaneously tested the association between irritability and these proposed processes in youth with affective disorders.**

Methods

Subjects:

- 48 youth (ages 8-21, M=14.05, SD=2.98; %F=41.67) who presented for research on affective disorders at the NIMH Emotion and Development Branch.
- 8 youth were excluded for performance (accuracy <75%)

Clinical Diagnosis	N (%)
DMDD	6 (12.5%)
ADHD	15 (31.3%)
Anxiety	5 (10.4%)
Relatives of BD	6 (12.5%)
BD	2 (4.2%)
HV	14 (12.2%)

Clinical Variables	M (SD)
IQ	115.3 (11.4)
ARI	1.4 (1.8)
SCARED	12.7 (11.3)
CDI	15.1 (10.0)
CONNERS	54.5 (15.0)

ARI tests for irritability CDI tests for depression
SCARED tests for anxiety CONNERS tests for ADHD

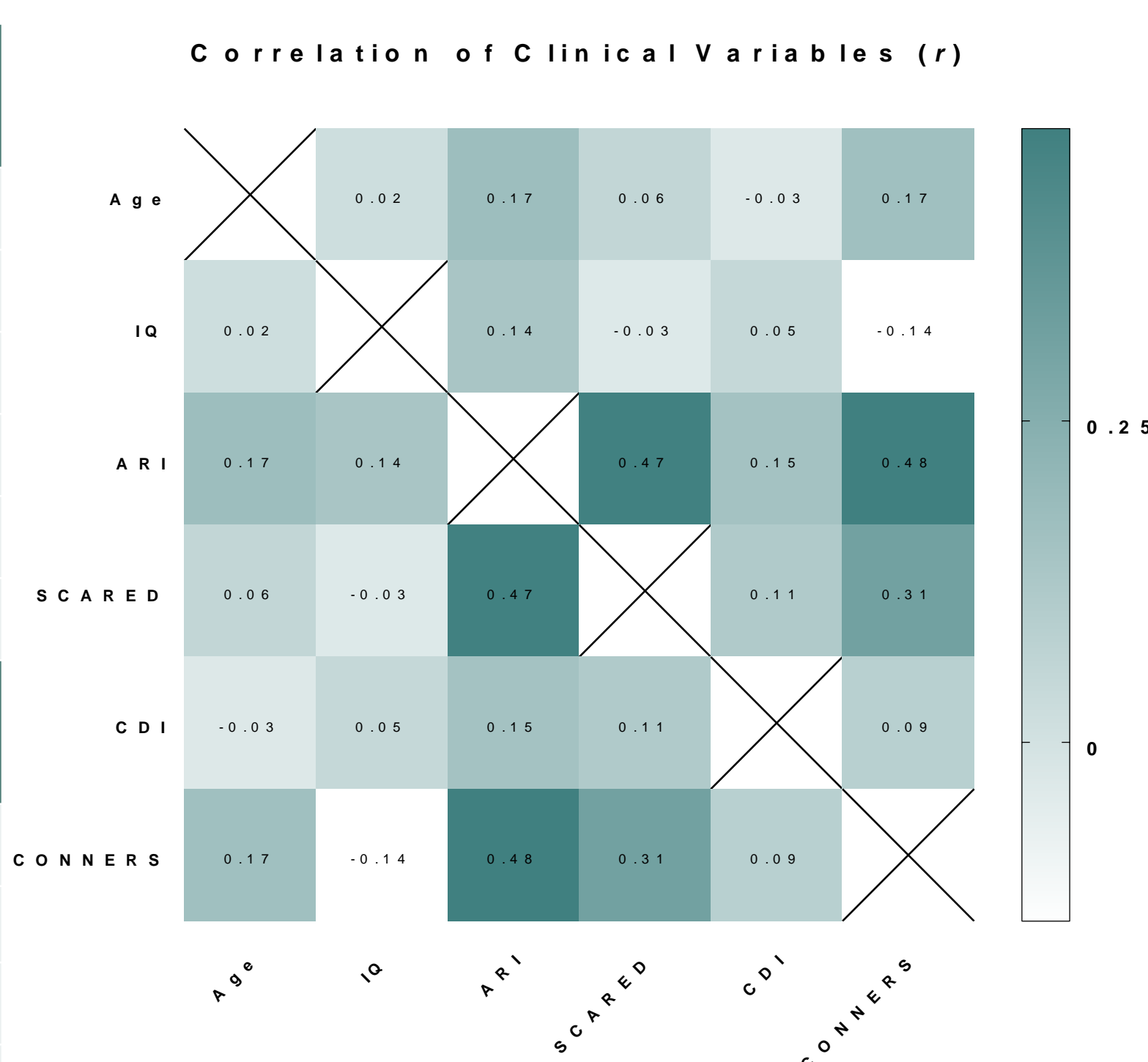


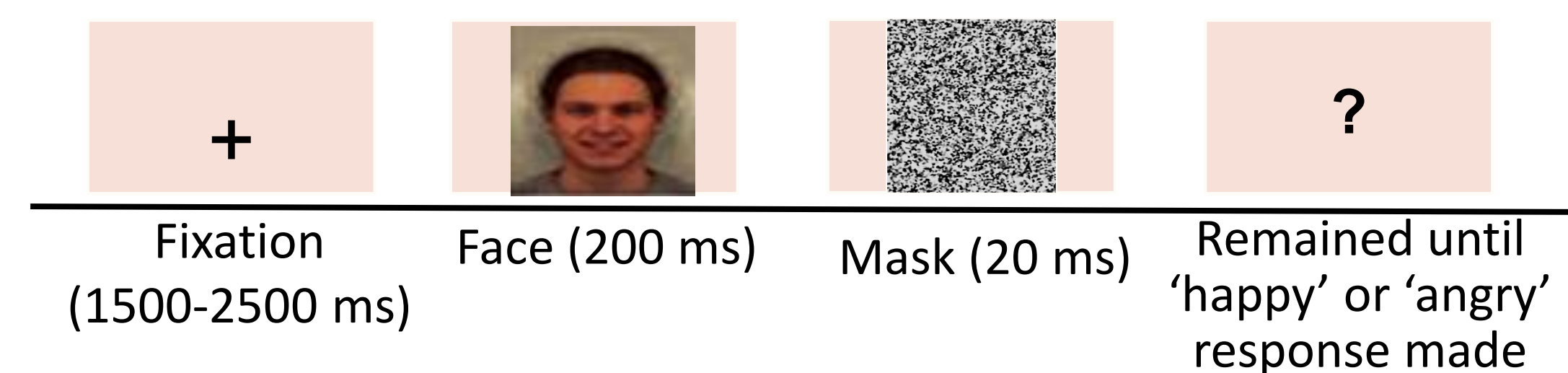
Figure 1: No correlations were strong enough to warrant concern, ensuring that we could reasonably isolate irritability as a variable for analysis.

Methods

Interpretation Bias Task (IBT):

- Stimuli consisted of 15 face 'morphs' on a continuum from happy to angry

Figure 2: Trial Structure



Training Session Procedure:

- All participants completed a single training session beginning with an assessment, followed by 6 training blocks, and ending with another assessment; each face presented 3 times per block, in random order
- Assessment Blocks: Participant's balance point is measured as the point on the morph continuum at which judgment changes from happy to angry
- Training Blocks: Post-response feedback provided to shift the balance point toward happy judgements of ambiguous faces



Computational Learning Model:

- Neural net variant of Rescorla-Wagner model (using *MatLab*) with several parameters:

Parameter	Measures	What it Means
σ	Generalization	Higher values indicate more generalization. Also, a difficulty distinguishing between faces.
Θ	Reliability	Lower values indicate poor intrasubject reliability.
ϵ	Learning Rate	Higher values indicate quicker adaptation to feedback.

- Further analysis of data accomplished using *R Statistical Package*

Results

Generalization (σ):

- We found no significant associations between σ and any of the clinical variables (p values > 0.08)

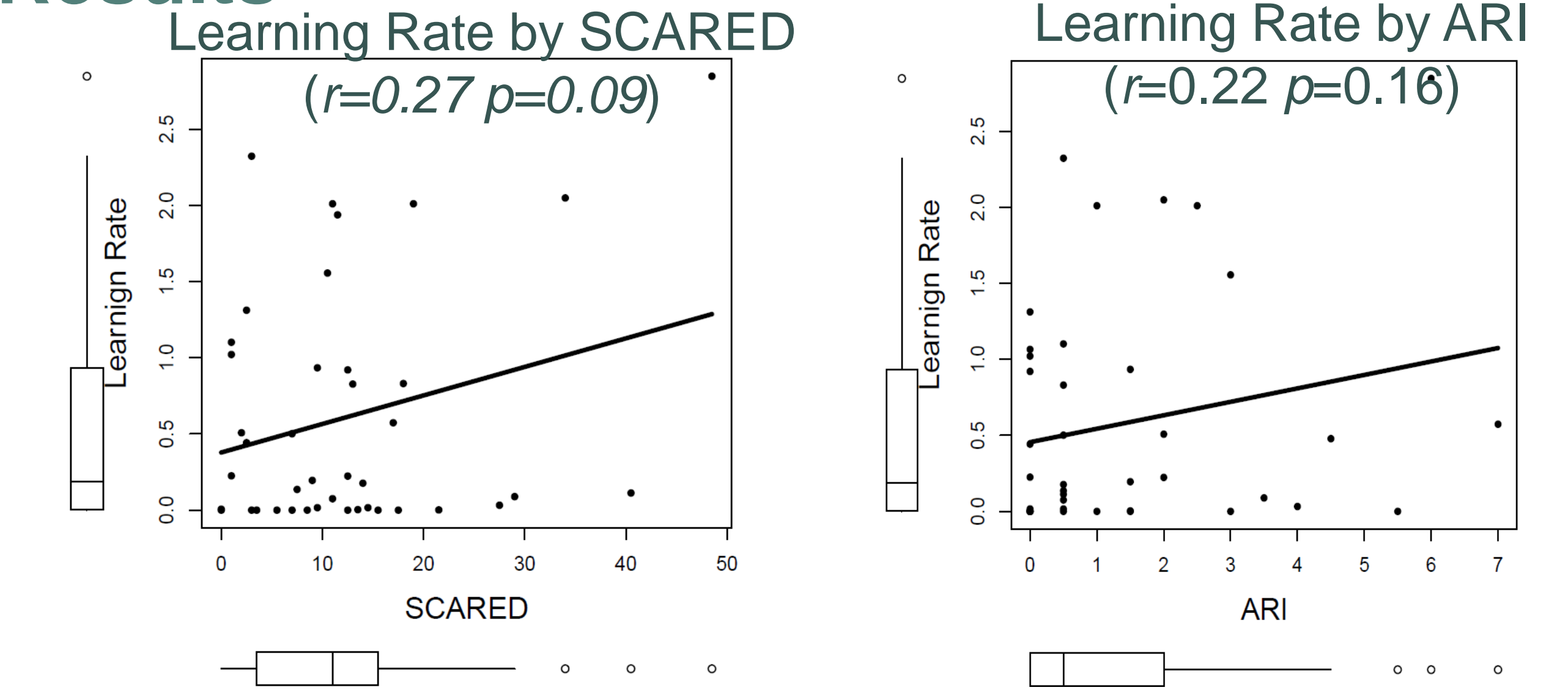
Reliability (Θ):

- We found no significant associations between Θ and any of the clinical variables (p values > 0.22)

Learning Rate (ϵ):

- Significant interaction of ARI by SCARED across ϵ ,** β (SE)=0.01(0.005), t (27)=2.11, $p=0.04$
- All other associations with ϵ were non-significant (p values > 0.18)

Results



The **significant interactive effect of ARI and SCARED** ($p=0.04$), suggests that individuals with higher anxiety **and** irritability have higher learning rates

Discussion

- The significant interaction of ARI by SCARED for learning rate was the *opposite* our expectations
- Further post hoc analysis showed that irritable, anxious youth were:
 - Quicker to reinforce angry associations
- Findings suggest that HIB persists in irritable, anxious youth because they are quick to learn hostile judgements, *not* because they are impaired at learning benign judgements

Limitations

- This particular population had sub-clinical level irritability
 - A more irritable sample may likely yield expected associations
- Depression and ADHD symptoms may be confounds
 - CONNERS and CDI effects did not account for this finding

Future Directions

- These findings suggest that both irritability and anxiety should be considered to assess viable candidates for this treatment
- Training should be altered to focus more on the prevention of rapid acquisition of hostile judgements through reinforcement

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References

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