

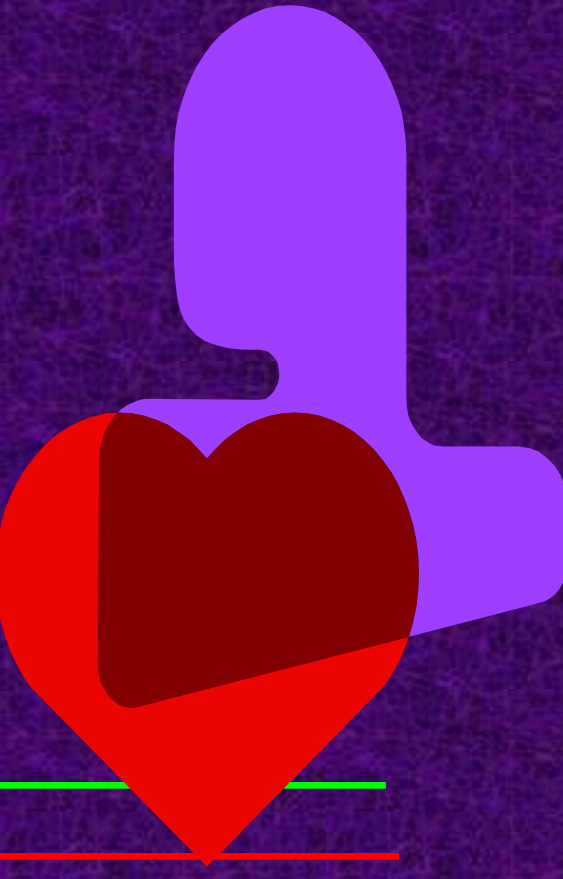


Intranasal Administration of Vasopressin Reduces Cognitive Empathy

Florina Uzefovsky¹, Idan Shalev², Salomon Israel¹, Shany Edelman², Ariel Knafo¹ and Richard P. Ebstein^{1,3}

¹ Psychology Department, Hebrew University, Jerusalem, Israel ² Neurobiology, Hebrew University, Jerusalem, Israel

³ Psychology, National University of Singapore, Singapore



INTRODUCTION

- ❖ At the core of human social communication is the ability to accurately perceive another's emotions and to respond to them in an appropriate way.
- ❖ **Empathy** is a multi-faceted concept that consists of at least two processes: **cognitive empathy** – the ability to perceive what the other is feeling, and emotional empathy – matching emotional response to the feelings of the other¹.
- ❖ What drives empathic understanding?
- ❖ **Arginine vasopressin (AVP)** is an important neuromodulator of activation in various brain areas involved in emotion regulation, including the limbic system². AVP is considered a prime candidate to modulate human social perception and communication.
- ❖ In humans, AVP has been connected to decreased perceived friendliness of facial expressions in males³.
- ❖ In the current study, we used intranasal administration of AVP to look at the effect of AVP on cognitive empathy in human males.

¹ Davis, M. (1980). "A multidimensional approach to individual differences in empathy." JSAS Catalog of Selected Documents in Psychology 10(4): 85.

² Zink, C. F., J. L. Stein, et al. (2010). "Vasopressin modulates medial prefrontal cortex-amygdala circuitry during emotion processing in humans." J Neurosci 30(20): 7017-22.

³ Thompson, R. R., K. George, et al. (2006). "Sex-specific influences of vasopressin on human social communication." Proc Natl Acad Sci U S A 103(20): 7889-94.

METHODS

- **Participants** – 39 Male Israeli university students (mean age= 24.69, SD=2.52)
- **Procedure** – In a between-subject, double-blind design, participants were randomly assigned to placebo or treatment groups. Participants self-administered into both nostrils a 250 µl solution containing 20IU of AVP (diluted in 0.9% NaCl, Sigma, Germany) or placebo (sterile saline, 0.9% NaCl). After a 45-minute waiting period, subjects were presented with the task.
- **Measures** –
 1. Reading of the Mind in the Eyes Test (RMET) – A measure of cognitive empathy, comprised of 36 emotion expressive photos of the eye area. For each photo, participants were asked to select one among four alternative affective labels, best describing the exhibited facial expression.
 2. Interpersonal Reactivity Index (IRI) – A self-report measure of trait empathy, comprised of 28 items on a 5-point Likert scale.

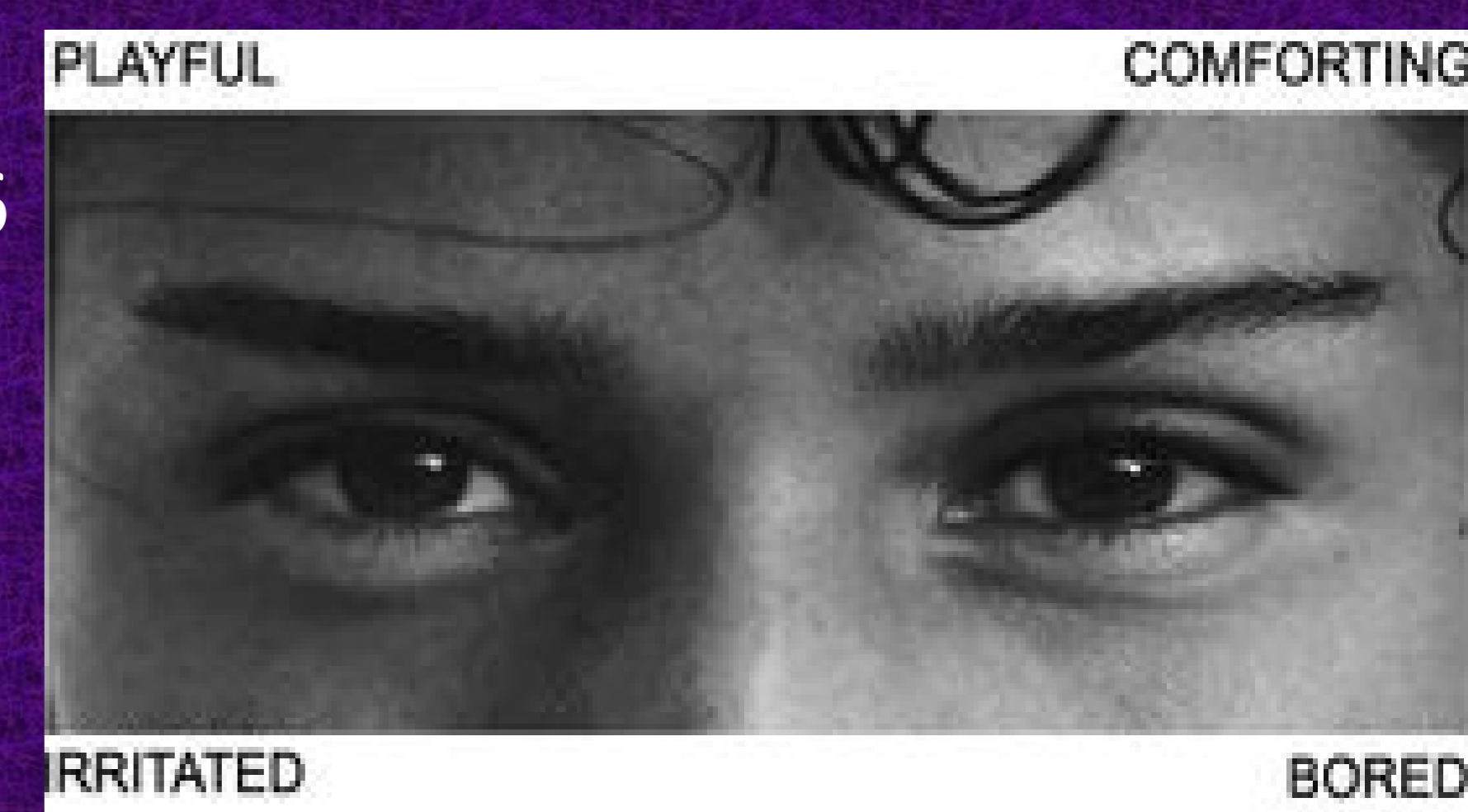


Figure 1 – Example of the RMET stimuli

RESULTS

1. We first looked at the effect of treatment on accuracy in the RMET.

AVP significantly decreased accuracy of emotion recognition vs. placebo ($p=.034$). These effects were substantial ($D=.72$).

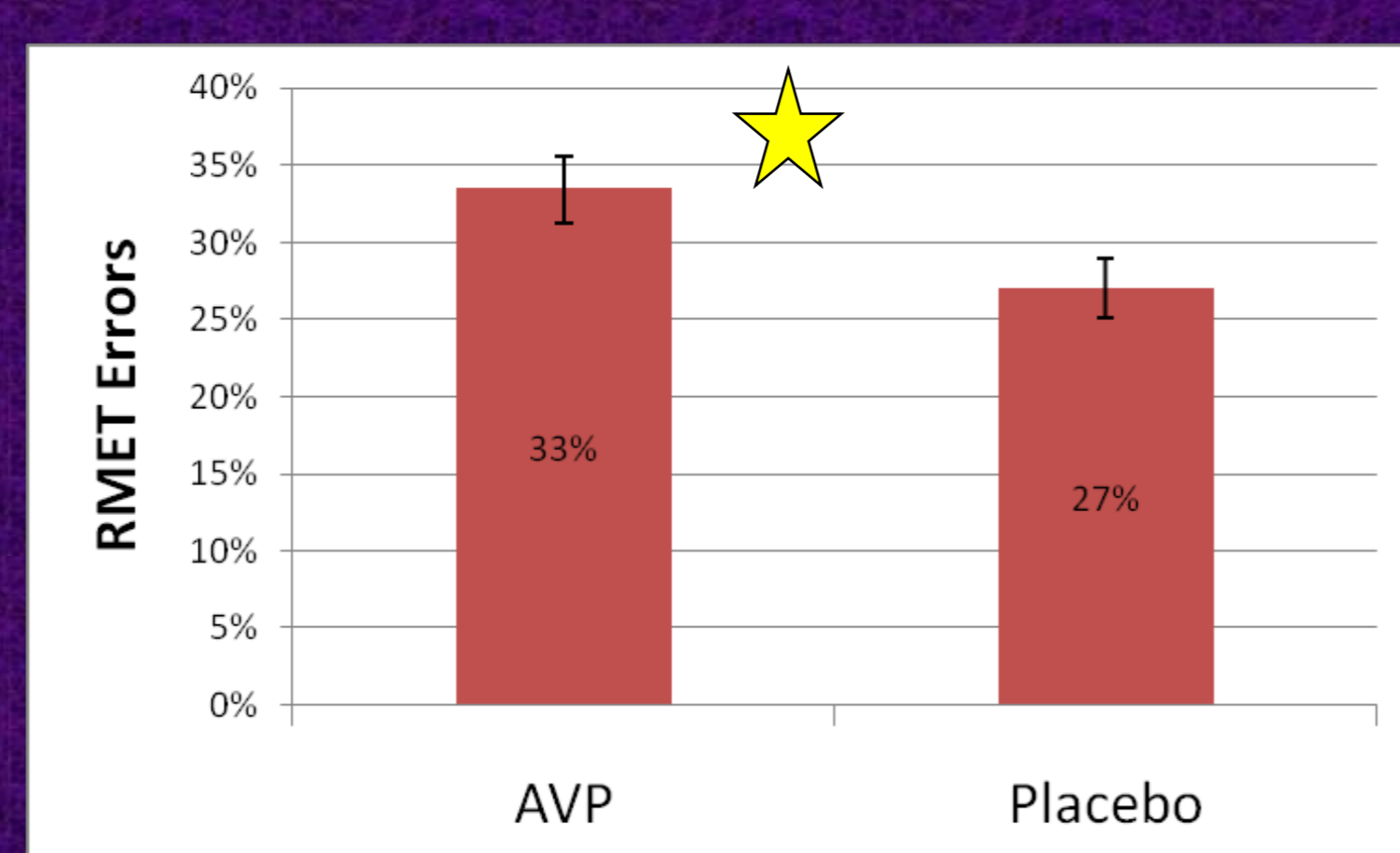


Figure 2 – Percent of errors in RMET (±SE) by treatment

2. Division of the exhibited emotions by valence reveals an interaction effect of the treatment.

AVP significantly increases errors in RMET only for negative emotions ($p=.023$), but not for positive emotions ($p=.960$).

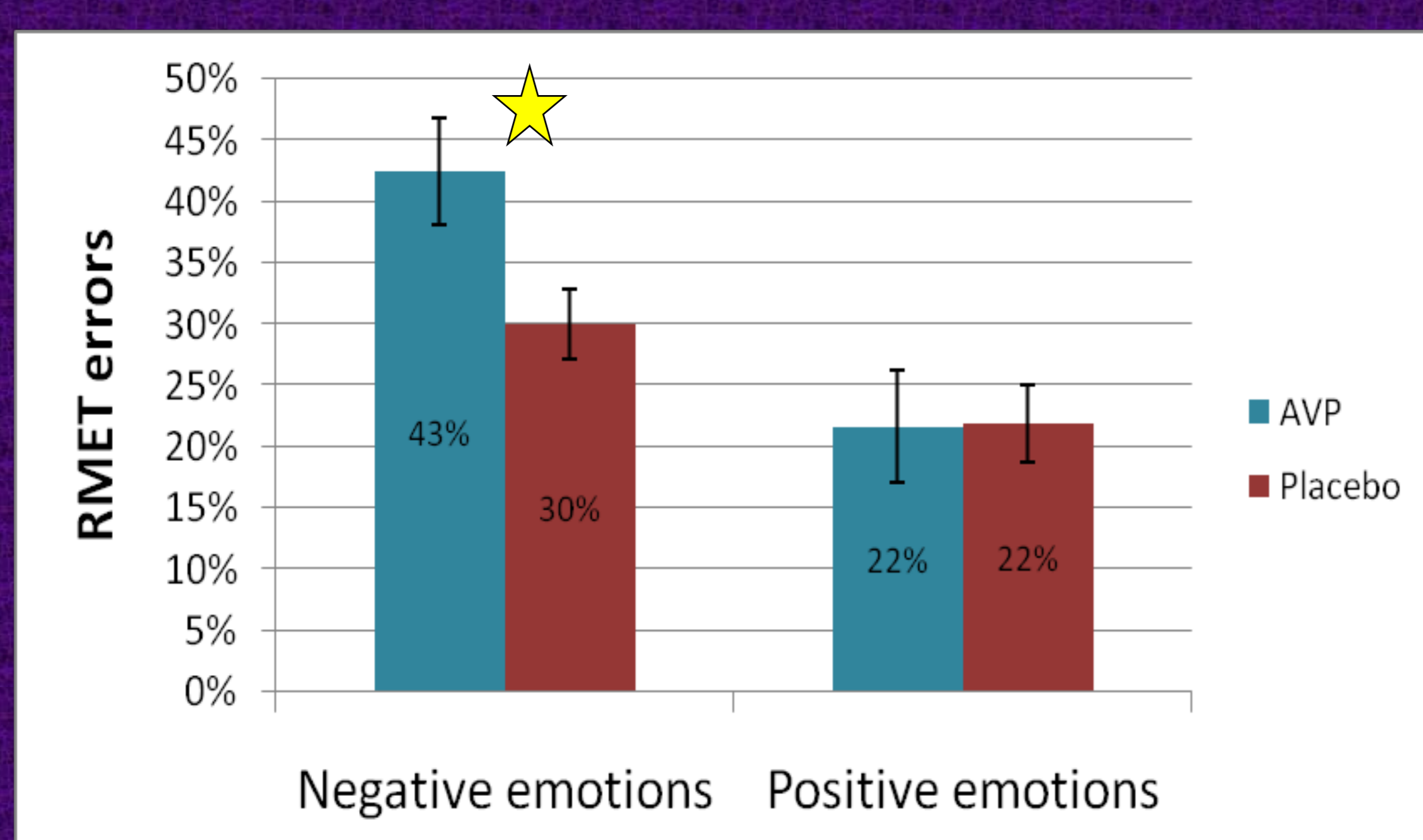


Figure 3 – Effect of treatment on percent of errors in RMET (±SE) for positive and negative emotions

3. We then looked at the effect of treatment on accuracy, conditioned on trait empathy as measured by the IRI. A linear regression with treatment and IRI as predictors was conducted (Figure 4).

The analysis revealed that participants with low trait empathy were negatively affected by the treatment, causing an increase in error rate (Treatment: $b=.749$, $p=.506$; IRI: $b=-.169$, $p=.011$; Interaction: $b=-.273$, $p=.037$).

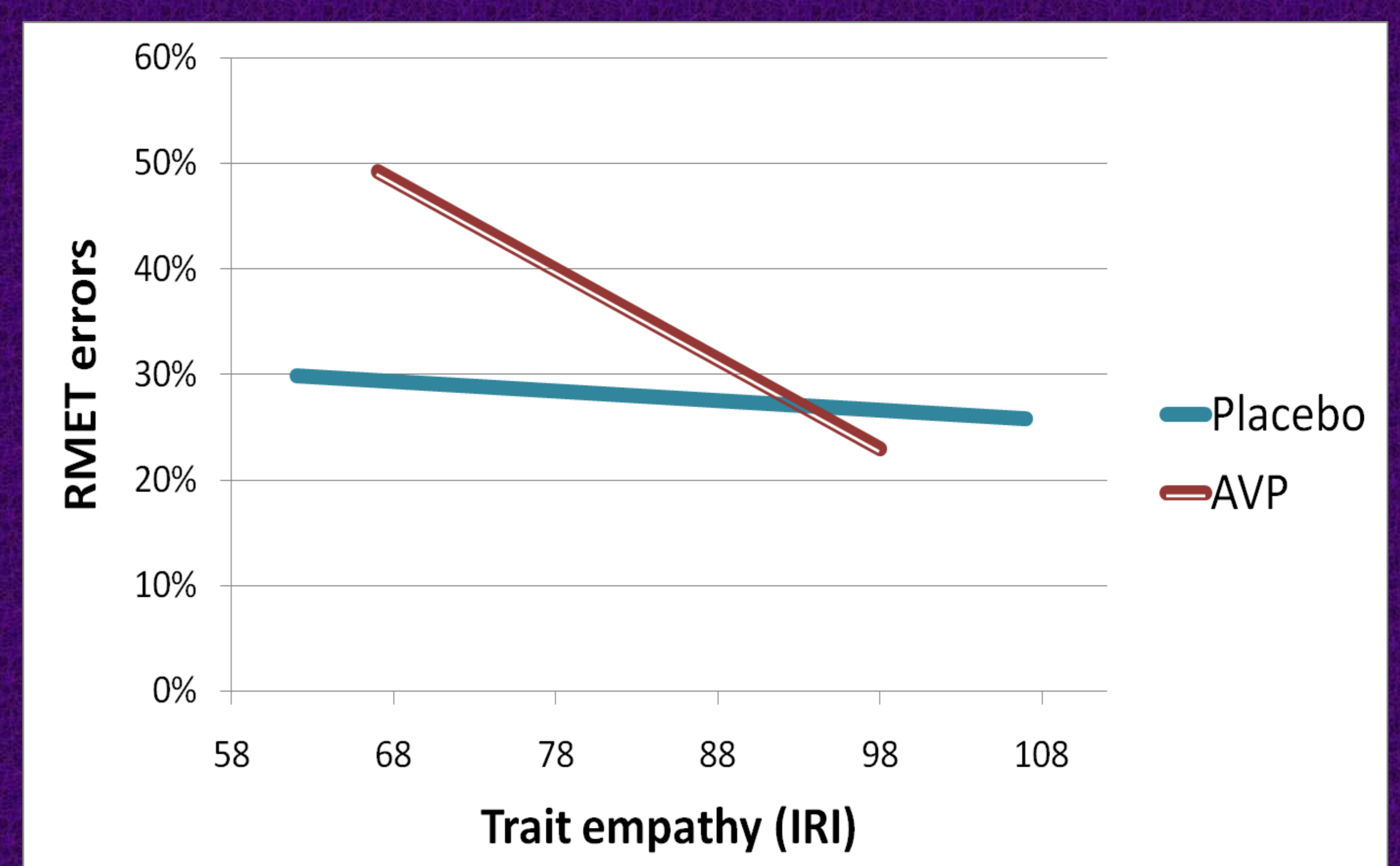


Figure 4 – Effect of treatment and trait empathy on percent of errors in RMET

CONCLUSIONS

- This study provides an important step in understanding the role of AVP in modulating human social communication and demonstrates that AVP has a specific effect on cognitive empathy in males. Specifically, AVP may influence male aggression by predisposing individuals to respond to negative emotional stimuli with a lack of empathy, possibly exhibiting a propensity towards aggression.
- Importantly, the effect of AVP was conditioned on trait empathy, suggesting the involvement of other dispositional mechanisms that interact with AVP to affect cognitive empathy.
- These findings may have clinical implications for the treatment of psychopathologies characterized by deficits in empathy such as autism and schizophrenia.