

Creativity and the Cognitive Dynamics of Pun Processing



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BACKGROUND

- Understanding puns often requires access to implied double meanings.
- The order of meaning access, as a function of fine and coarse semantic coding, is still unclear, with some accounts stating that the more salient, dominant meaning is putatively accessed first^{[1][2][3][4]}.
- Verbal creativity is shown to correlate with humor production, but has yet to be shown in humor perception. Differences in ability to coarse code distant concepts may underlie both of these effects^{[5][6][7]}.

What is the time course of meaning activation that allows people to understand puns, and how might differences in verbal creativity predict differences in this ability?

HYPOTHESES

- If coarse and fine semantic coding occur in tandem, priming for both dominant and subordinate pun meanings will be evident at earlier and later time points during processing.
- If verbal creativity is an index of ability to coarse code, more verbally creative individuals will more readily access subordinate meanings and perceive and process puns.

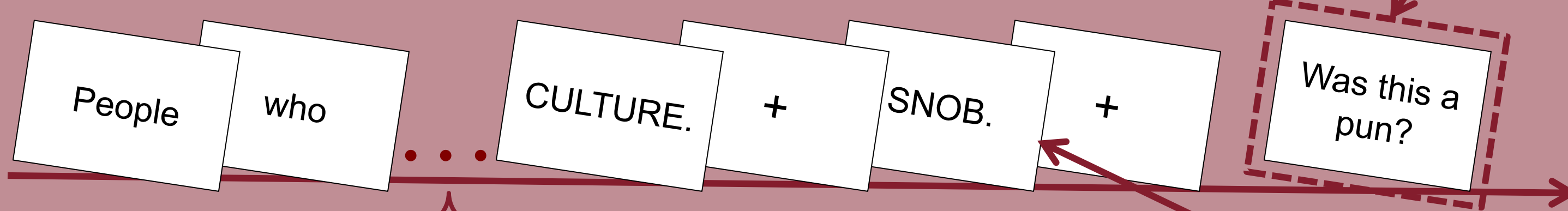
METHODS

Subjects

N=59, within-subjects design
Performance cutoffs excluded 7 out of an initial 66

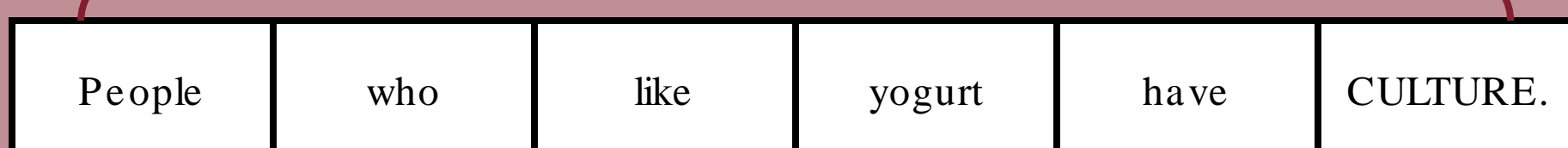
Pun-Primed Lexical Decision Task

- Word/non-word judgment



Catch Trials: Referring to pun/sentence just read, where catch sentences inferred only a single meaning.

Target word: word with either a dominant, subordinate, or unrelated meaning to the last word (a homograph) in the pun.



Individual Differences Measures

Pun Funniness and Familiarity

Not funny at all | Slightly funny | Moderately funny | Very funny | Extremely funny

People who like yogurt have CULTURE.

Not familiar at all | Slightly familiar | Moderately familiar | Very familiar | Extremely familiar

People who like yogurt have CULTURE.

Noun-Noun Pair Meaning Production

What does "SEAL VIPER" mean?

Fluency Task

Please write down all the items from the category: ANIMALS. Separate each answer with a comma.

Analysis

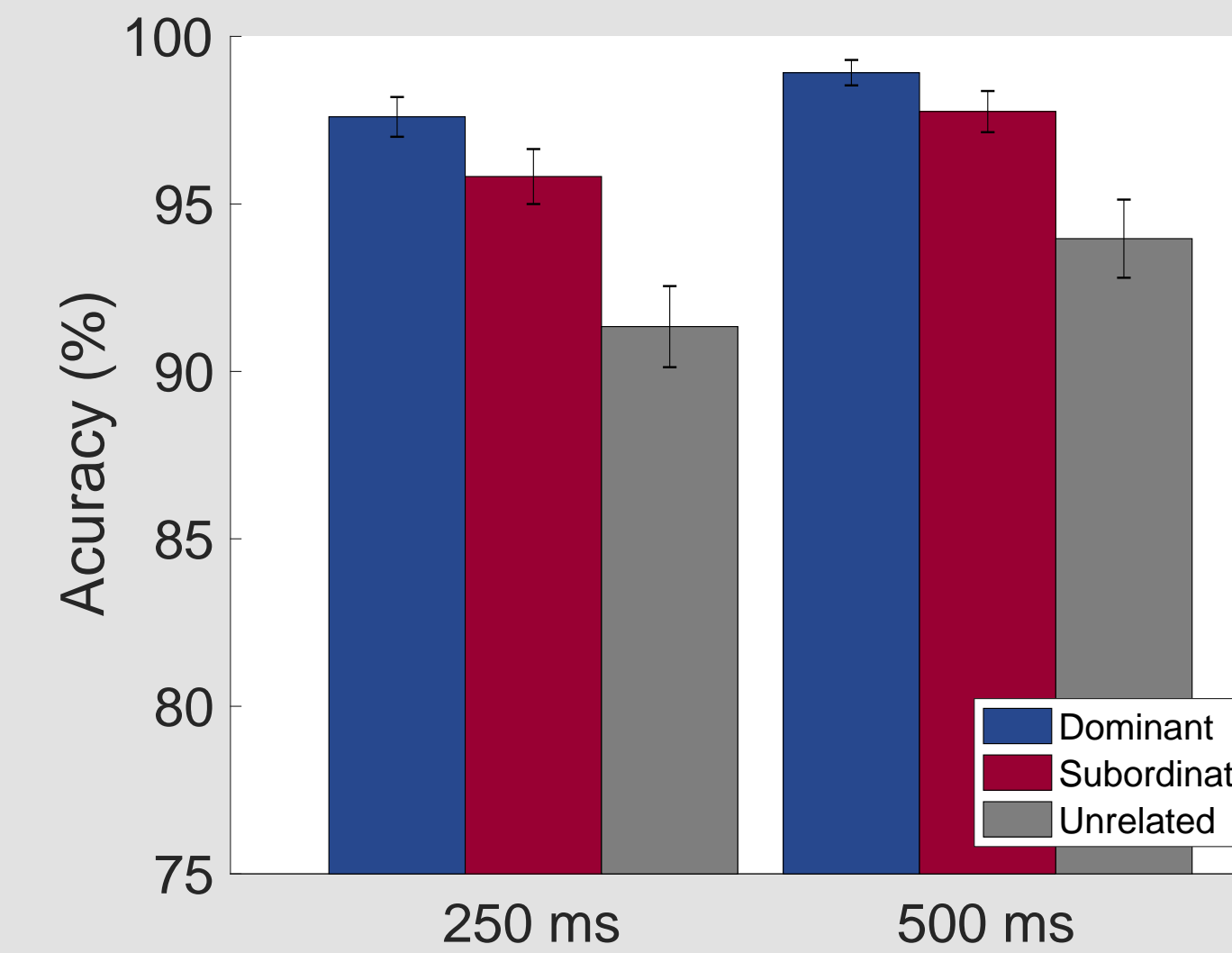
- Repeated Measures ANOVA
- Mixed-effects Linear Regression
- Spearman's Correlation

RESULTS

Group-Level Effects

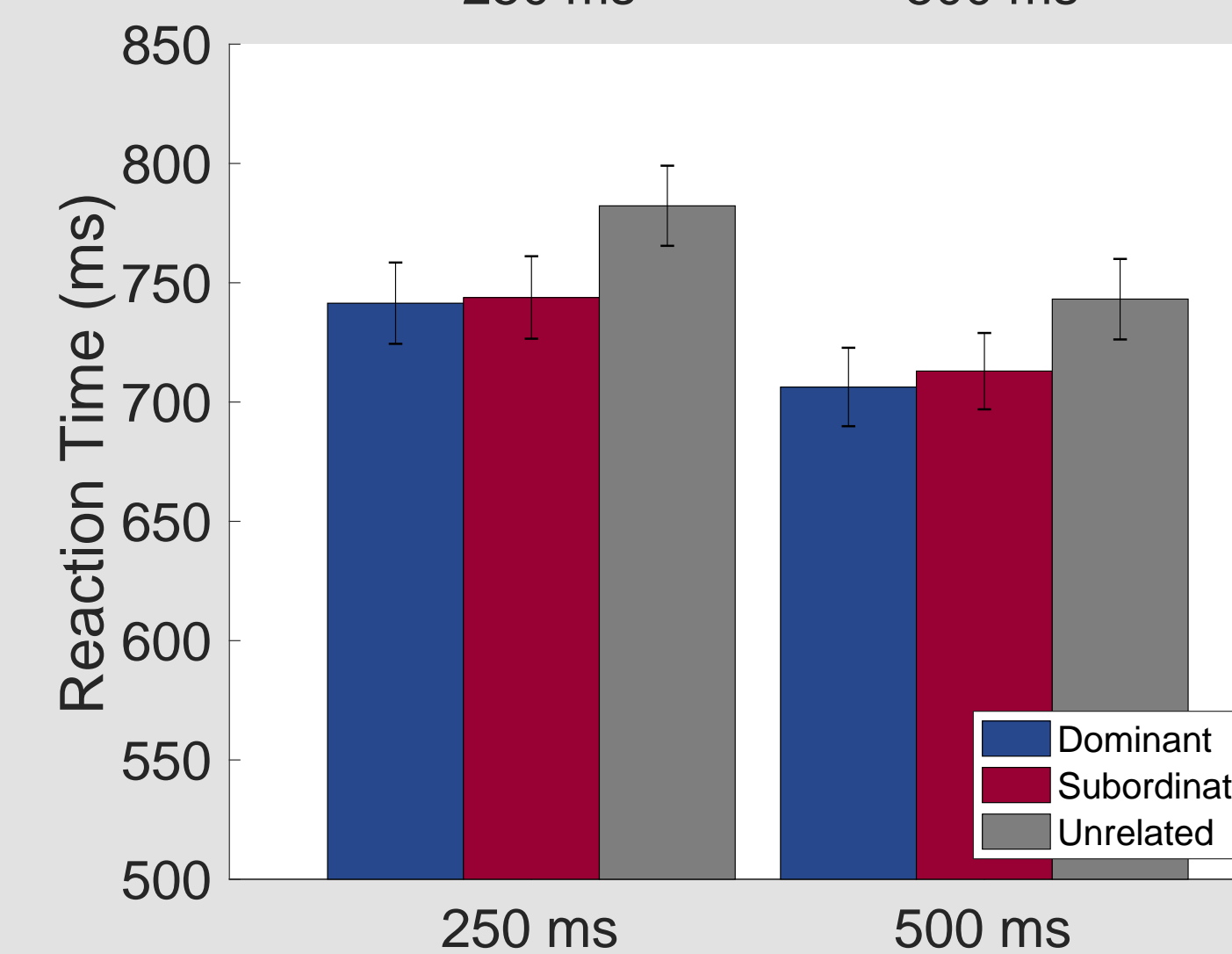
Accuracy:

- Significantly higher overall accuracy at 500ms ($F(1,55)=11.1, p<0.001$).
- Significantly higher accuracy for dominant than subordinate, and for subordinate than unrelated meanings ($F(2,110)=32.3, p<0.001$)
 - Dom vs. Sub: $t(111)=3.08, p<0.01$
 - Sub vs. Unr: $t(111)=5.66, p<0.001$
 - Dom vs Unr: $t(111)=7.12, p<0.001$



Response Time:

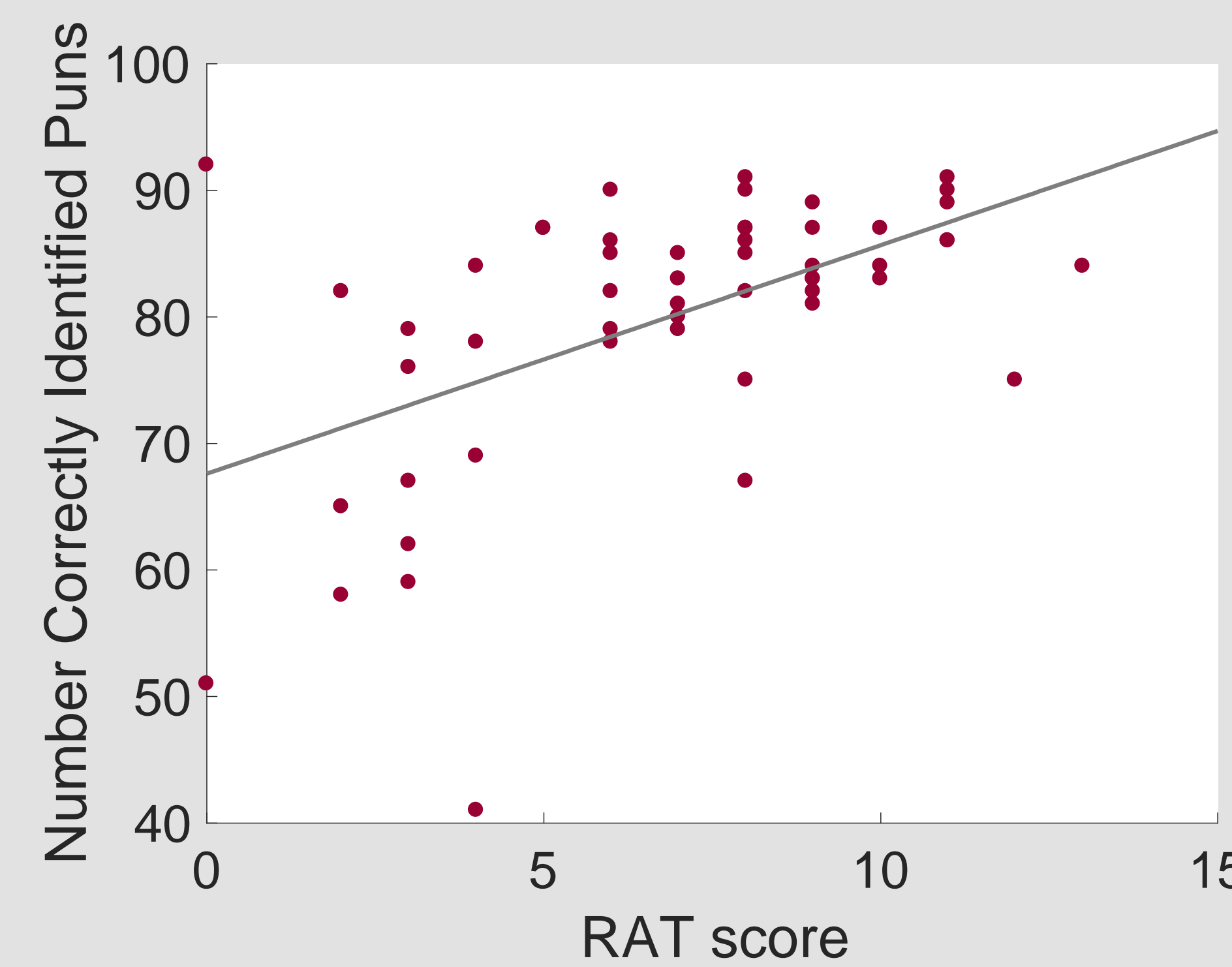
- Significantly higher overall response time at 500ms ($F(1,55)=20.7, p<0.001$).
- Significantly faster responses for dominant and subordinate than for unrelated meanings ($F(2,110)=38.53, p<0.001$)
 - Dom vs. Sub: $t(111)=0.59, p=0.9$
 - Sub vs. Unr: $t(111)=4.46, p<0.001$
 - Dom vs. Unr: $t(111)=5.84, p<0.001$



Participants were significantly more accurate and faster when responding to dominant and subordinate meanings than when responding to unrelated meanings.

Differences in Pun Perception

Controlling for differences in fluency, cognitive control, and familiarity of puns, performance on the Remote Associates Task (RAT) significantly positively predicted the number of puns a participant correctly identified ($F(5,48)=5.50, p<0.001, R^2=0.36$).



More verbally creative participants demonstrated greater pun perception.

ACKNOWLEDGEMENTS

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CONTACT

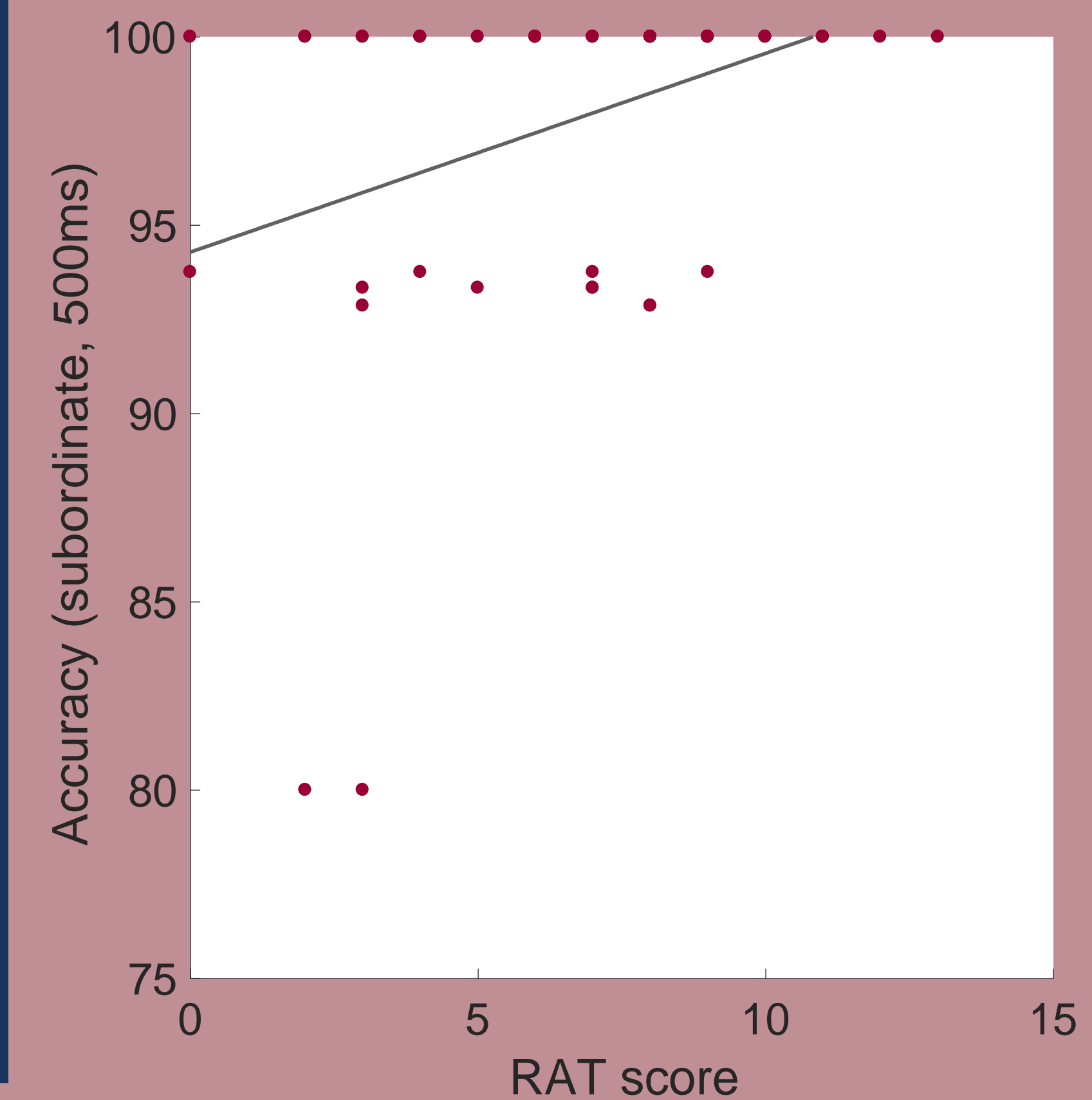
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RESULTS

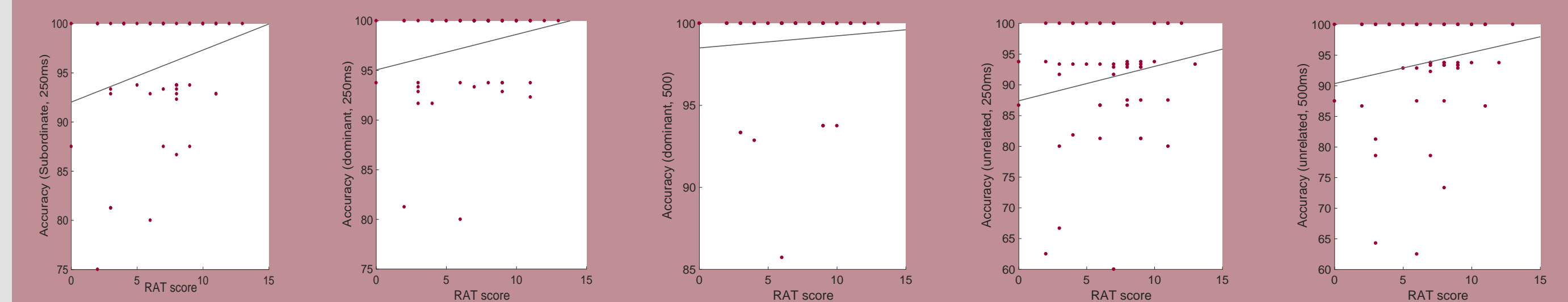
Correlation between Creativity and Accuracy

Spearman's Correlation revealed a significant positive correlation between accuracy for subordinate meaning targets at 500ms and both fluency ($\rho=0.36, p<0.05$) and Remote Associates Task performance ($\rho=0.33, p<0.05$).

Semi-partial correlation revealed a persistent positive correlation between Remote Associates Task performance and subordinate target accuracy at 500ms, controlling for fluency effects ($\rho=0.33, p<0.05$).



RAT did not significantly correlate with accuracy in any other condition ($p's > 0.10$).



Verbal creativity correlated with higher accuracy only when the word was a subordinate meaning of the pun word.

CONCLUSIONS

- Group-level results replicate previous findings, but also support the hypothesis that both subordinate and dominant word meanings are accessed early in processing in the face of ambiguity (as opposed to one after the other).
- Future studies should investigate hemispheric contributions to processing at earlier and later time points. If right and left hemispheres are coarse and fine coders, as shown in previous studies, current results suggest they work in parallel.
- Verbally creative individuals displayed a pun perception and modest performance advantage in the subordinate condition. This may be due to heightened ability to access distant meanings of unrelated concepts (like the RAT) or contextually ambiguous concepts (like puns).
- These individual differences findings are the first to link creativity and pun perception.

REFERENCES

- Jung-Beeman (2005)
- Coulson & Wu (2005)
- Atchley et al, (2011)
- McHugh & Buchanan (2016)
- Treadwell (1970)
- Brodzinsky and Rubien (1976)
- Sitton & Pierce (2004)