

Numeracy

Numeracy is the ability to process basic probability and numerical concepts (Peters et al., 2006). It can be divided into two classes:

- Objective Numeracy (performance on numeric tasks)
- Subjective Numeracy (self efficacy /preference for numbers)

Numeracy has been linked with important outcomes:

- Risk Assessment (Health/Finance)
 - Educational Outcomes
 - Susceptibility to framing effects
- We often measure these on **numeric** response scales

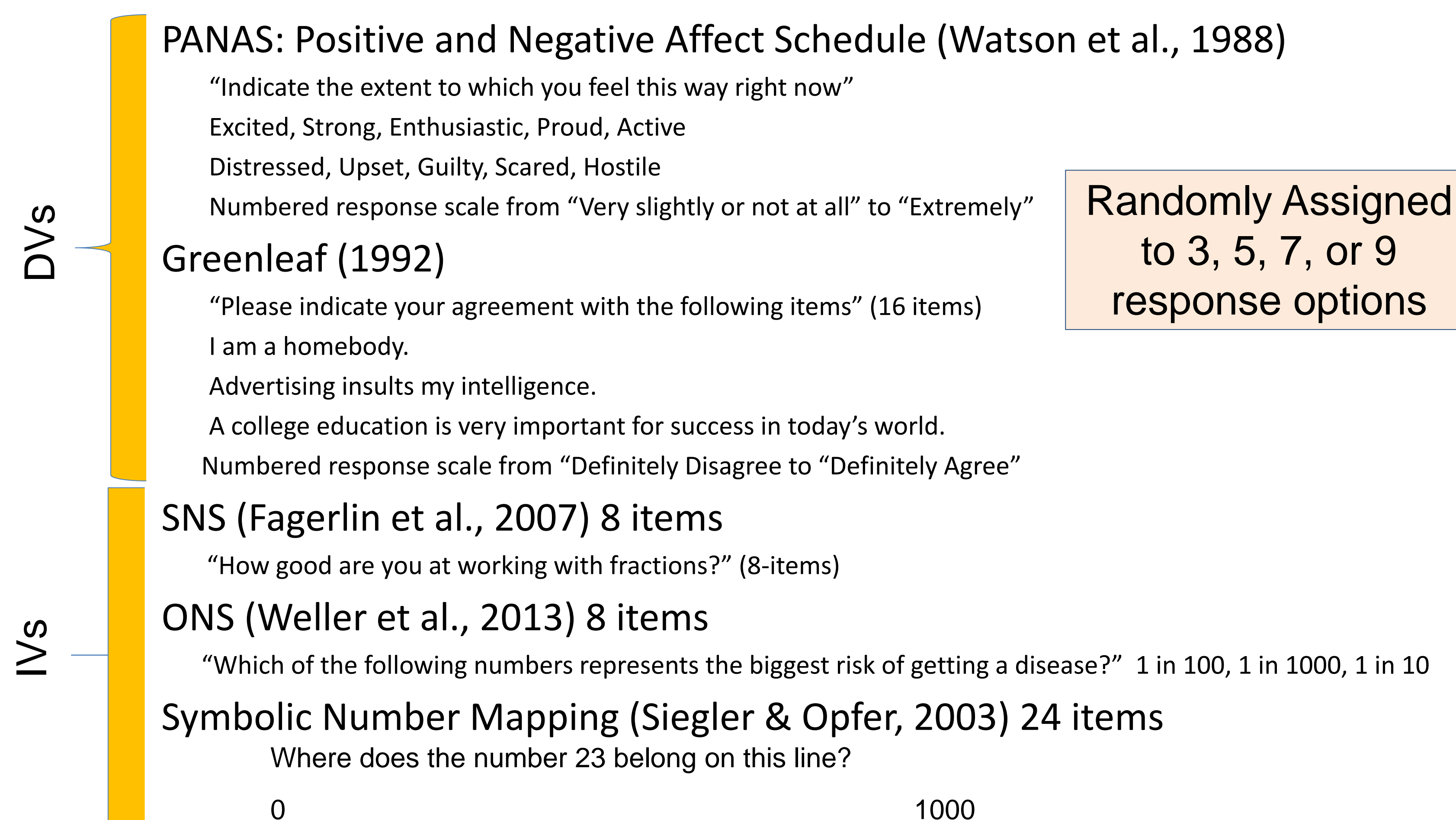
In this research we investigate if numeracy is related to the way that individuals interact with numeric self-report scales.

H1: Participants lower in objective numeracy will overuse mid/endpoints.

H2: Differences in numeracy based response style will be more pronounced with more response options

Methods

N = 578 Mturk Workers in final sample (26 excluded because of error)



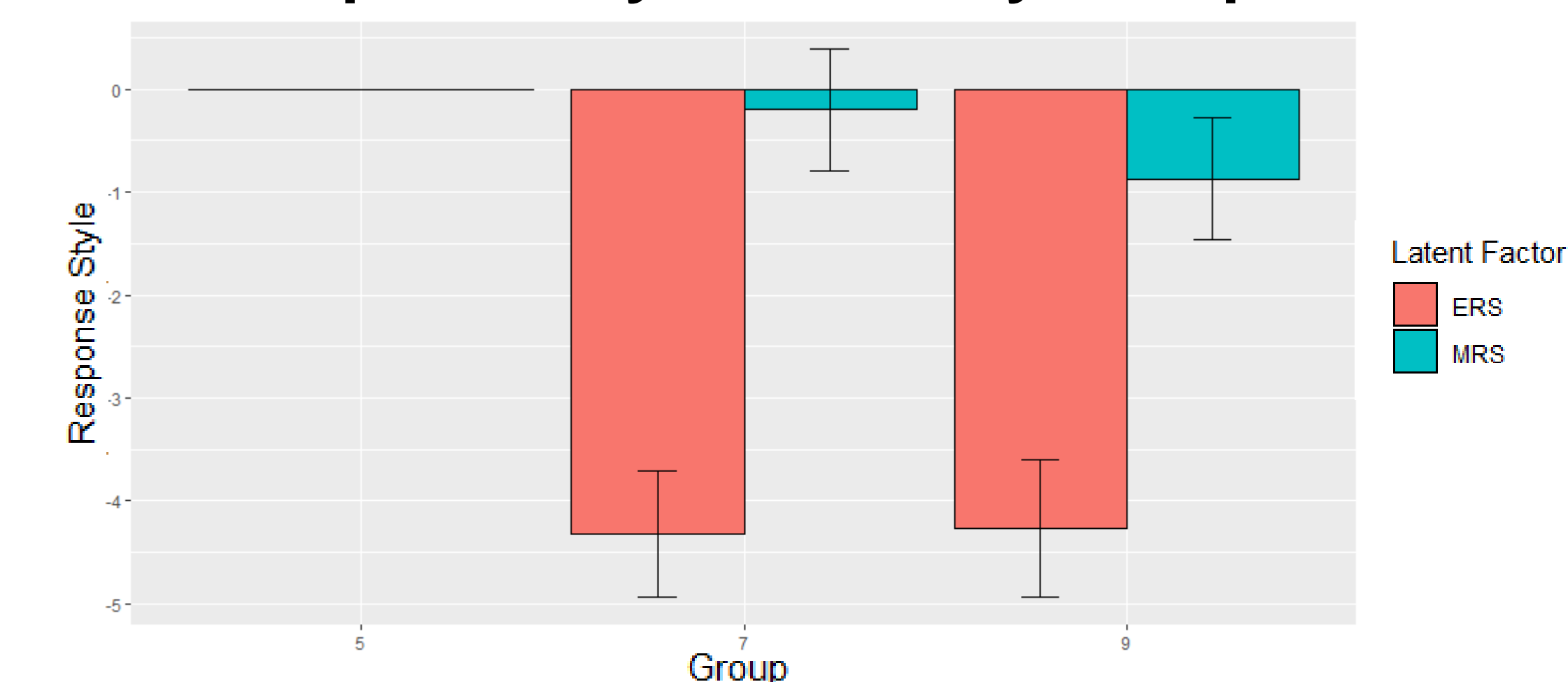
IRTree Results

Results are for Greenleaf data only

Correlations	Subjective Numeracy	Objective Numeracy	Symbolic Number Mapping
Midpoint Response	-.210	-.754	-.293
Extreme Response	-.087	-.321	-.120

Higher scores on all measures of numeracy are related to lower extreme and midpoint responding.

Response Style Means by Group



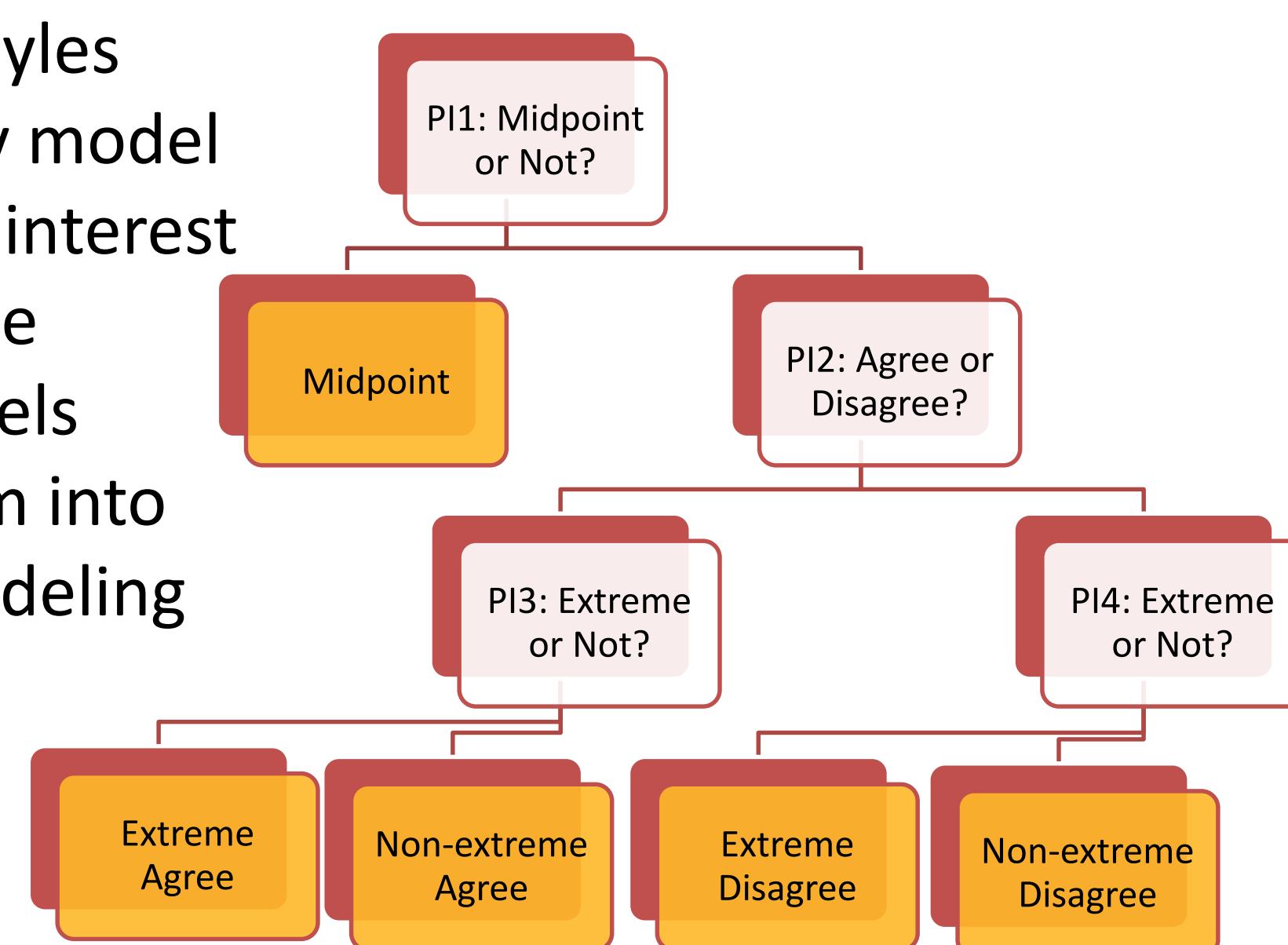
Contrary to what we hypothesized, more response options resulted in **less extreme and midpoint responding**.

Response Styles and IRTrees

A response style is a systematic difference in responses that persists after accounting for the variable measured by a scale with three previous studied styles:

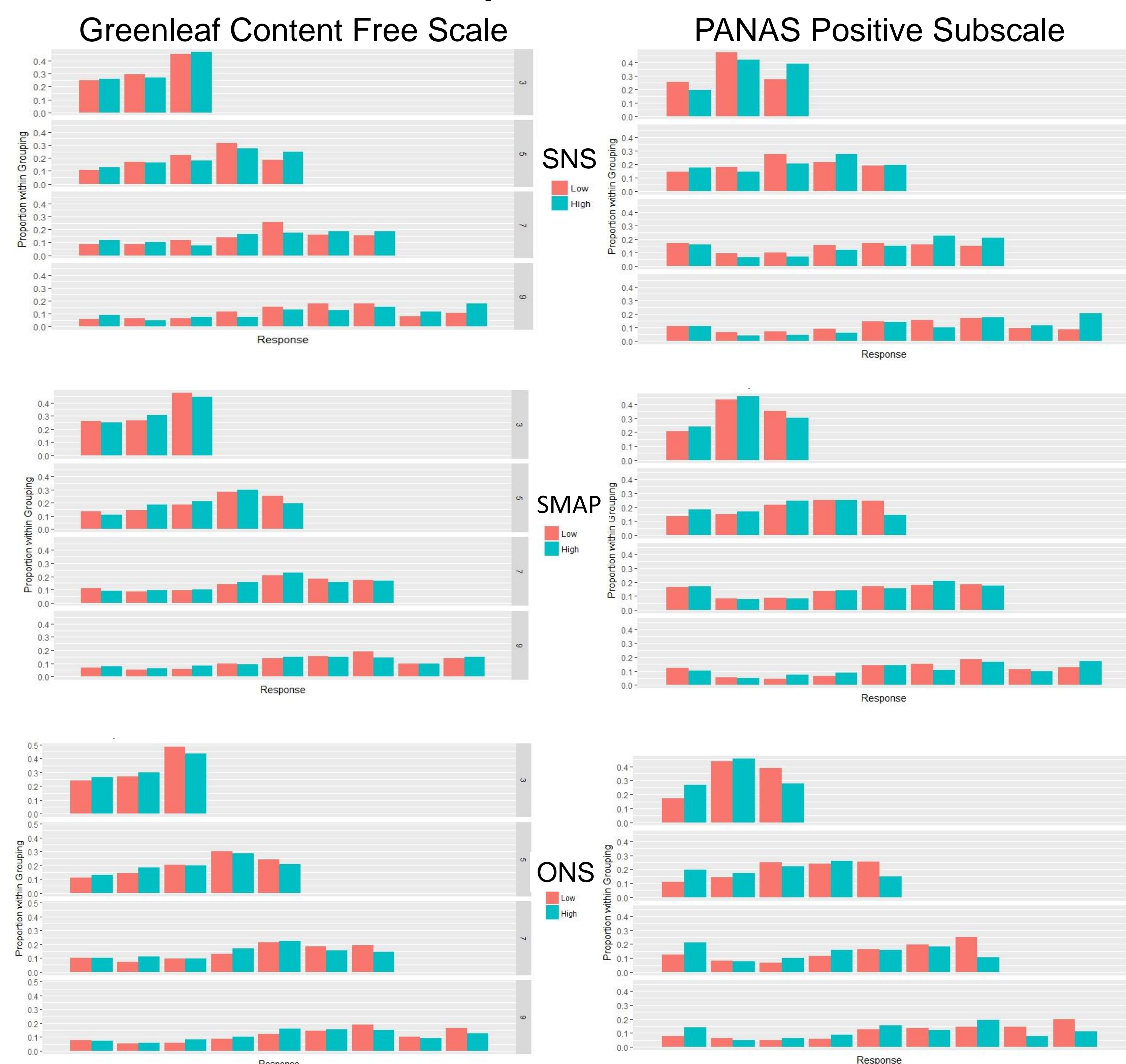
- Extreme responding (tending toward endpoints)
- Midpoint responding (preference toward middle of a scale)
- Acquiescence (preferring the "positive" side of the scale)

IRTrees are a method for modeling response styles which simultaneously model the latent variable of interest and the response style variables. These models break down each item into pseudoitems (PI), modeling each response using simultaneous IRT models.



Verbal Label	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Response	1	2	3	4	5
PI 1	0	0	1	0	0
PI 2	0	0	N/A	1	1
PI 3	1	0	N/A	N/A	N/A
PI 4	N/A	N/A	N/A	0	1

Graphical Results



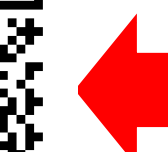
Conclusions

We found some evidence that numeracy is related to the way that people respond on numeric scales. Individuals lower on numeracy are more likely to respond at the mid/endpoints of a scale.

We found that extreme and midpoint responding are reduced with more response options. We are unsure if these results are conflated with number of response options influencing the model.

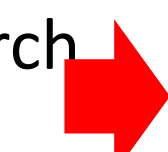
Future Directions:

- Replicate with more people and with only 7 options
- Examine effects of verbal labels on relationship between numeracy and extreme/midpoint responding
- Simulate results to examine how numeracy-response style connection could influence research findings.



This poster

Quantitative Research
Collaboratory



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