



Identifying Consequences of Negatively Worded Items with the Nominal Response Model

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Introduction

Conundrum of Negatively Worded Items

- Cronbach (1958) suggested utilizing negatively worded items (NWI) to counter response sets.
- Matlock, Turner, and Dent Gitchel (2015) demonstrated that NWI's functioned dissimilarly to positively worded items in that participants responded differently to NWI's than they did to their positively worded counterparts.
- Roszkowski and Soven (2010) also found that the only 2-NWI's were enough to generate a factor separate from a factor composed of positively worded items.

NEO-PI-R

- The personality domain "Openness to Experience" has been empirically shown to relate to various measures of crystallized intelligence such as verbal IQ scores.

Purpose

- Evaluate the functioning of the negatively worded items (NWI's) within the personality domain of "Openness to Experience".
- Examine if NWI's provide differing amounts of information than positively worded items with respect to the latent construct of "Openness to Experience".
- See if the Nominal Response Model (NRM) of Item Response Theory (IRT) can be used to maximize the information obtained from negatively worded items.

Methods

Participants

- A sample of undergraduate students were surveyed from the undergraduate research pool at California State University, Fullerton ($N = 143$, $M_{age} = 20.86$)

Measures

- NEO-PI-R – The domain of "Openness to Experience" was chosen due to its established relationship with crystallized intelligence

The Nominal Response Model (NRM)

- Grants a unique perspective to item functioning by allowing for assessments of category boundary discrimination (CBD) parameters.
- Provides insight into the functioning of categories within items that other divide-by-total models do not.
- Allows for the manipulation of category response options granting researchers the ability to tailor scales to best fit a given population.

Parameter Linking

- Utilized in order to standardize negatively and positively worded items allowing for meaningful comparisons along the trait distributions.

Results

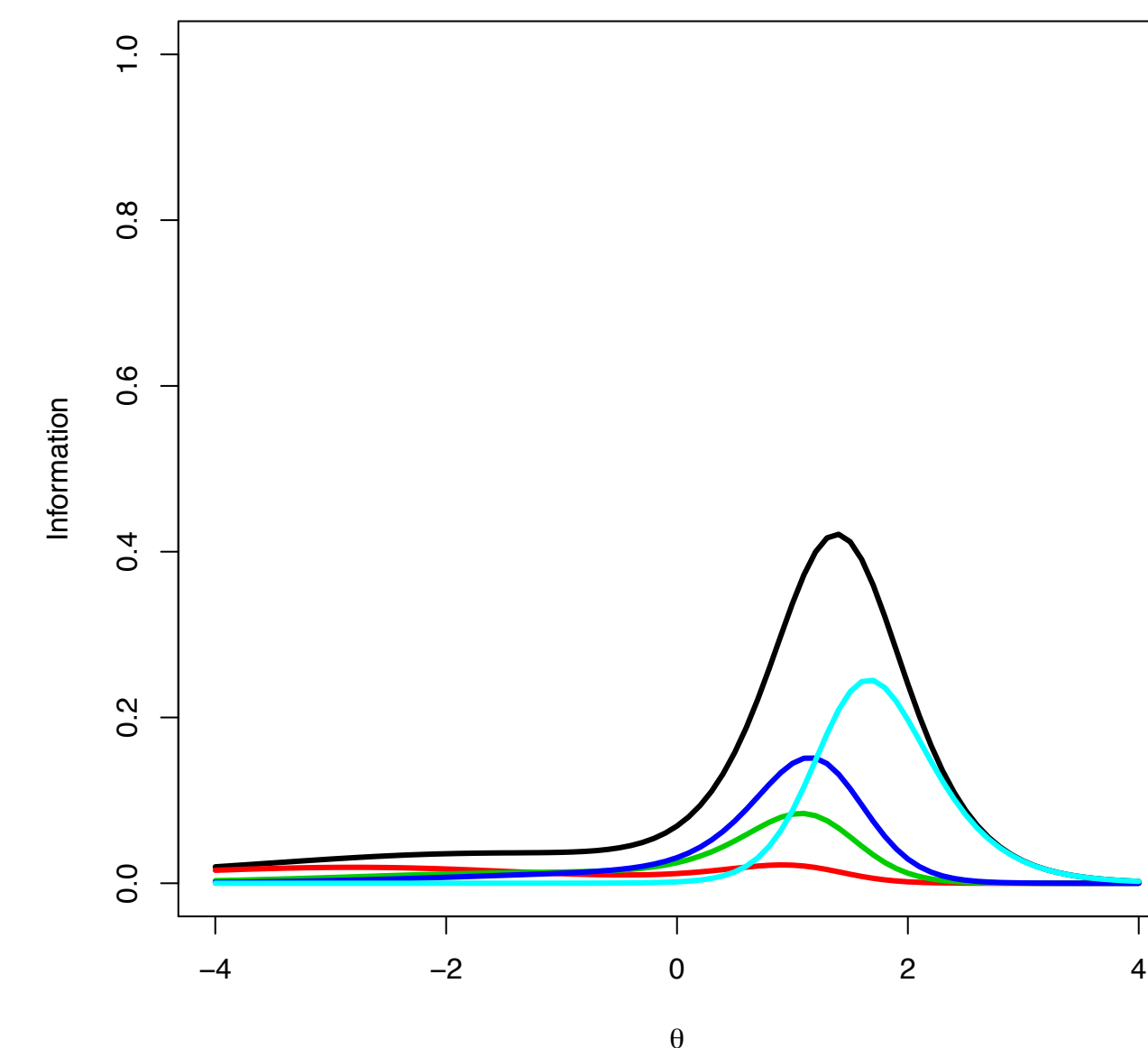


Figure 1. Item information of a negatively worded item

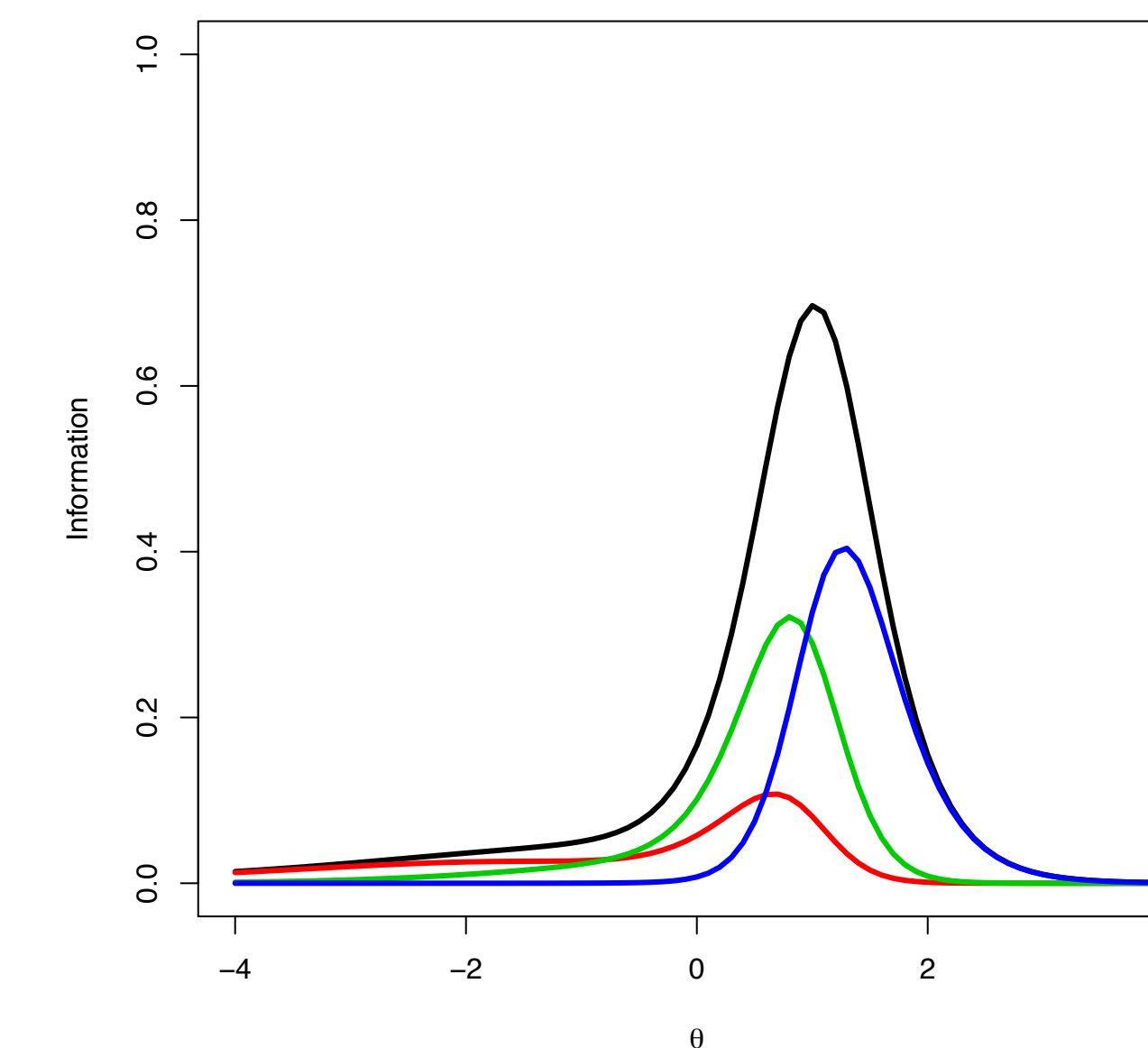


Figure 2. Item information of a positively worded item

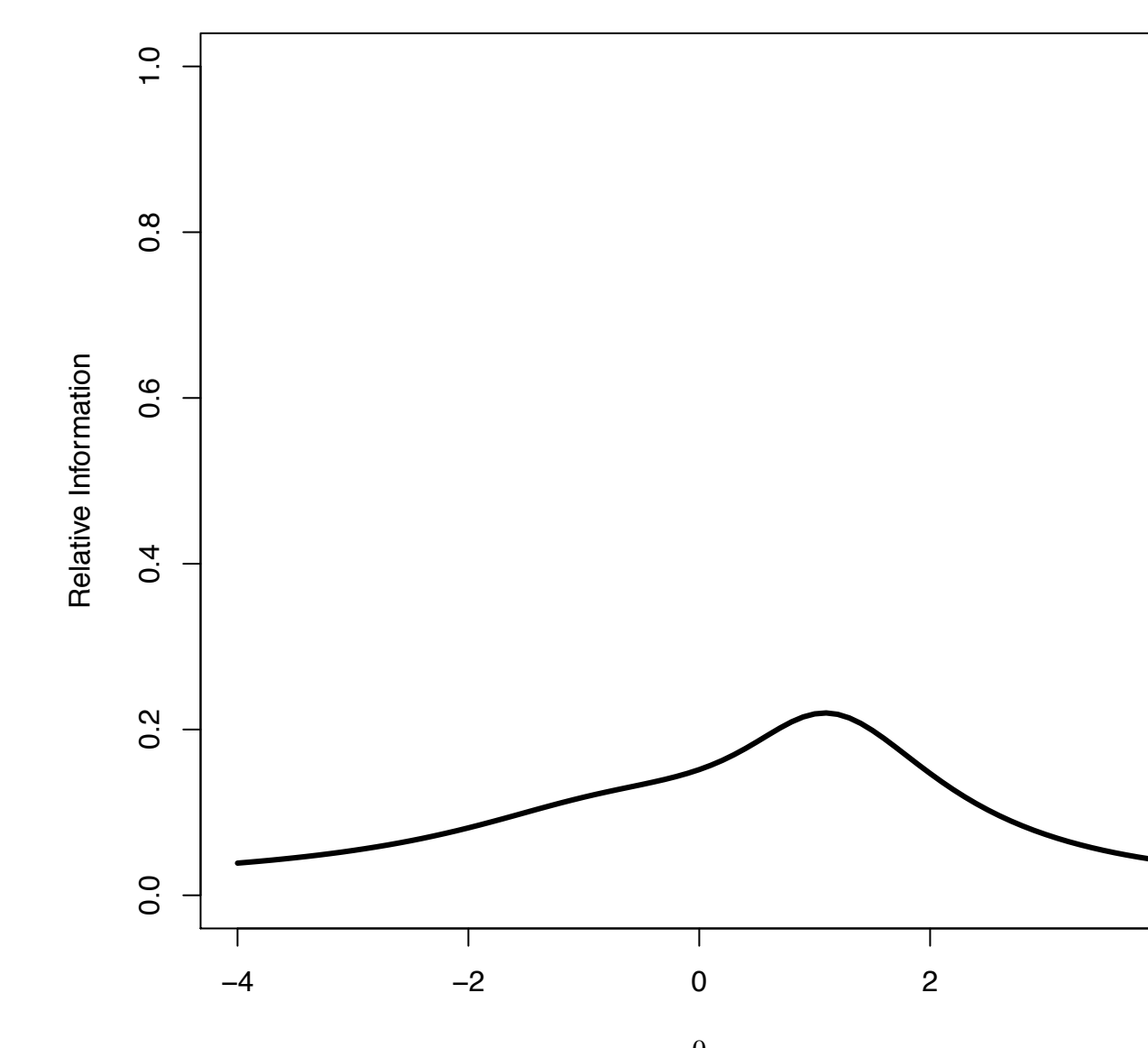
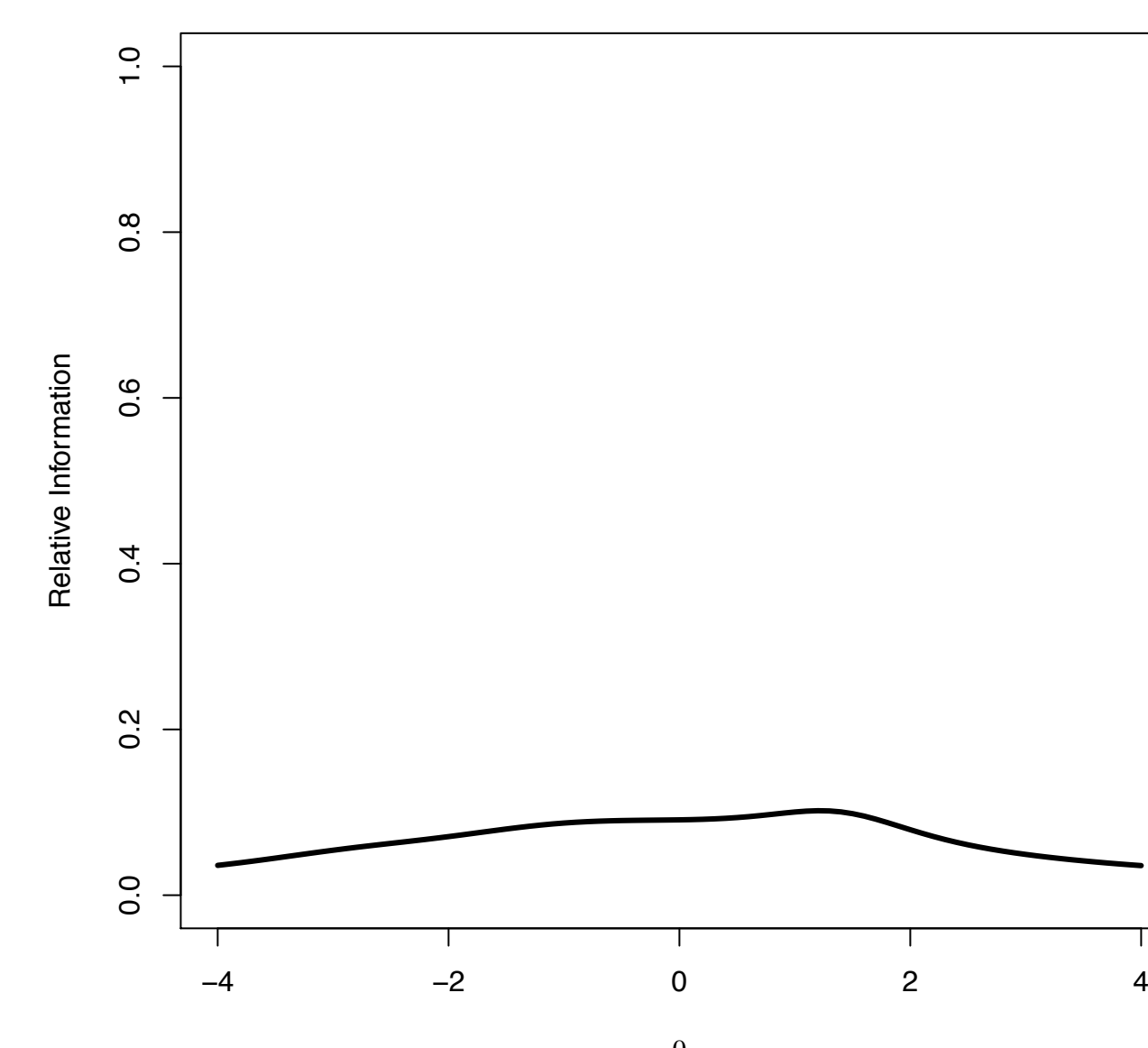


Figure 3. Test information for negatively and positively worded items prior to IRT and linking.

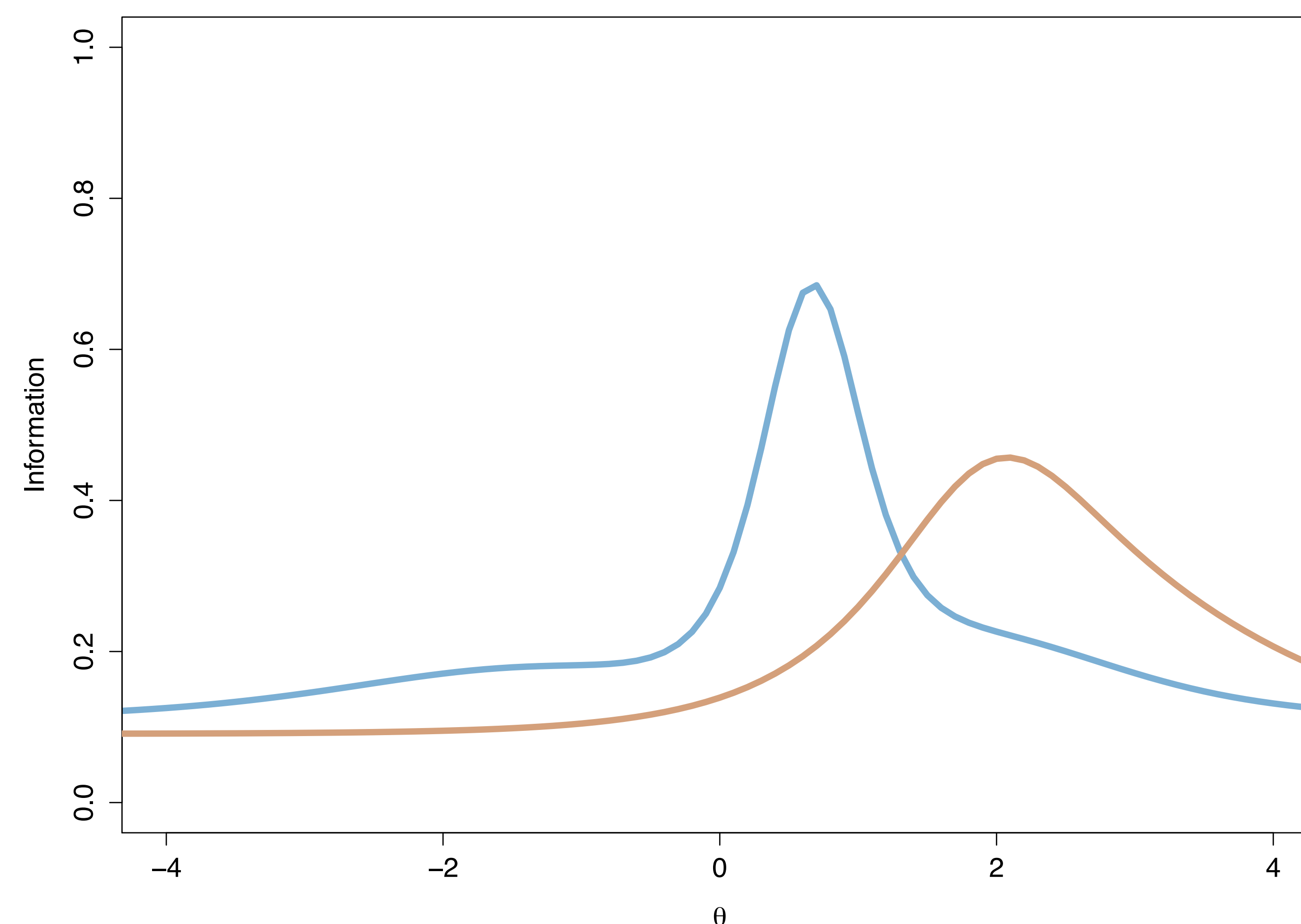


Figure 4. Test information of negatively and positively worded items post IRT and linking.

Results

Item Information

- Initial assessments of item functioning in negatively and positively worded items revealed higher information from positively worded items (Figure 1 & Figure 2).

Test Information

- Assessment of the test information revealed that both positive and negatively worded items provided poor information across the entirety of the latent trait with positively worded items providing more information on average and peaking on high expressions of "Openness to Experience" (Figure 3).

Nominal Response Model (NRM) and Parameter Linking

- Adjustments made via the NRM and subsequent parameter linking allowed for an optimization of the NEO providing an unbiased measure of the underlying construct.
- The alterations maximized the information provided by negatively and positively worded items on the latent trait of "Openness to Experience" with negatively worded items proving to be informative across negative levels of the latent trait as well as providing maximal information at expressions of theta slightly above average (Figure 4).
- In contrast, positively worded items provided maximal information at higher expressions on the latent trait $2-\theta$ and continued to be more informative at higher expressions of "Openness to Experience" (Figure 4).

Conclusion

- In line with previous research, negatively and positively worded items diverged in the amount of information they provided as well as where along the latent trait of "Openness to Experience" they provided the most information.
 - The Nominal Response Model (NRM) and IRT parameter linking allowed for the maximum amount of information to be obtained from negatively and positively worded items within the NEO.
 - IRT parameter linking grants the ability to standardize negative and positive items rendering the two formats directly comparable.
 - Unlike research that suggests removing negatively worded items, this methodology may serve as a workaround for the conundrum of negatively worded items by proposing a methodology for maximizing information and standardizing the different response formats.
 - By utilizing this methodology, future researchers could potentially utilize the entirety of a given measure while simultaneously combatting response sets.
- ### Future Research
- Assess if negatively and positively worded items manifest in differing outcomes after adjustments have been made via this methodology.