UNIVERSITY OF OSLO

Detecting Careless and Insufficient Effort Responding: A Comparison of Attention Check and Model-Based Approaches

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Context: Data Collection in the Social Sciences

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C/IER is likely to vary across the course of the questionnaire (Galesic & Bosnjak, 2009; Gibson & Bowling, 2019), requiring fine-grained identification methods

Methods to Identifying Varying C/IER Across the Questionnaire

Attention Checks

Items all attentive respondents are assumed to answer in the same way (e.g., disagreement with "I enjoy eating cement")

Major appeal: Ease-of-use and clear interpretability

Major limitation: Have to be used parsimoniously; C/IER on content items is inferred from nearby attention checks

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Confirmatory Mixture IRT Models

Translate theory on attentive and C/IER behavior as well as transitions among them into constrained mixture models

Major appeal: Avoid administration of additional items

Major limitation: Rely on strong assumptions about attentive behavior, violations may heavily distort conclusions

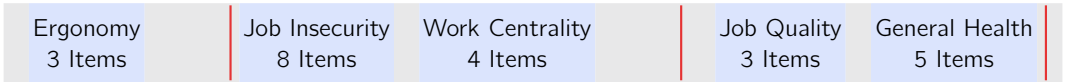
Objective

Comparison of Conclusions Drawn from Different Methods

Do attention check items and confirmatory mixture IRT models...

1. ... yield comparable conclusions on the overall level and trajectory of C/IER?
2. ... agree in which respondents are at high risk of displaying C/IER?
3. ... yield comparable adjustments of parameters of interest (here: correlation among latent traits)?

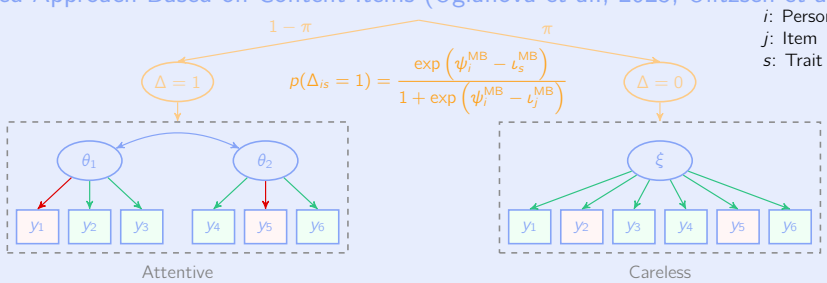
Data



- $N = 707$ respondents being administered a 163-item questionnaire
- Focus: Item responses to 23 content items from 5 scales and 3 attention check items administered at different positions across the questionnaire

Analysis Approach

Model-Based Approach Based on Content Items (Uglanova et al., 2025; Ulitzsch et al., 2022)



$$p(y_{ij} = k \mid \Delta_{is} = 1) = \frac{\exp\left(k w_j \theta_{is[j]} - \sum_{l=1}^{k} \beta_{jl}\right)}{1 + \sum_{r=1}^{K} \exp\left(r w_j \theta_{is[j]} - \sum_{l=1}^{r} \beta_{jl}\right)}$$

$$p(y_{ij} = k \mid \Delta_{is} = 0) = \frac{\exp\left(k \zeta_i - \sum_{l=1}^{k} \kappa_l\right)}{1 + \sum_{r=1}^{K} \exp\left(r \zeta_i - \sum_{l=1}^{r} \kappa_l\right)}$$

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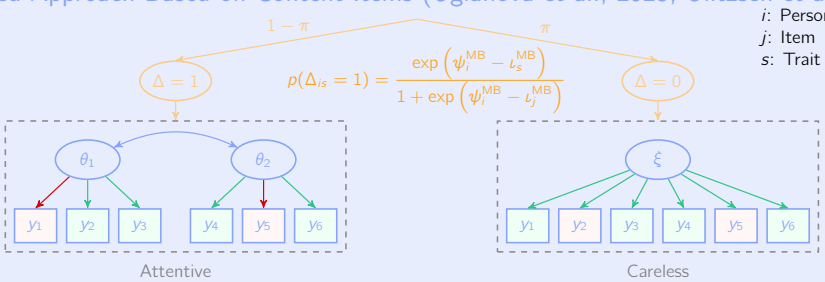

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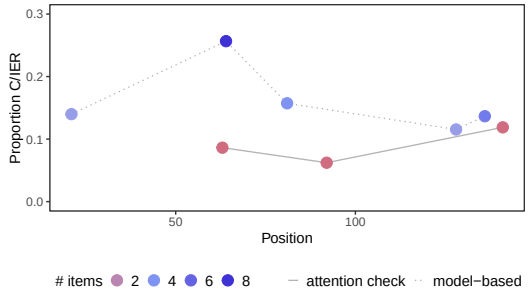
Attention Checks

$$p(a_{ij} = 1) = \frac{\exp\left(\psi_i^{AC} - \iota_j^{AC}\right)}{1 + \exp\left(\psi_i^{AC} - \iota_j^{AC}\right)}$$

Results RQ1: Level and Trajectory of C/IER



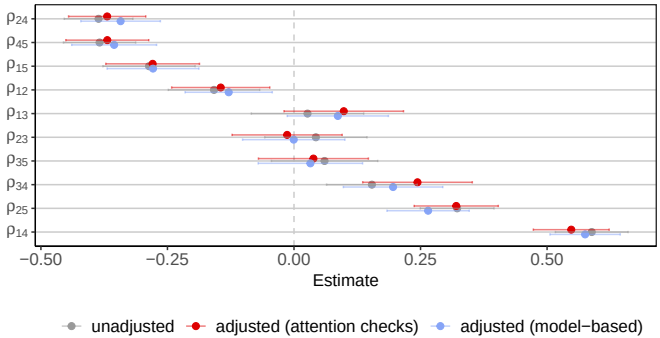
- Model-based approach consistently identified higher C/IER proportion (average: .18) than attention check items (.09)
- Neither method revealed a strong position effect
- Model-based approach uncovered highest C/IER proportion on the longest scale

Results RQ2: Agreement in C/IER Identification

$$cor(\psi^{MB}, \psi^{AC}) = .77\ [.68; .86]$$

- High correlation between method-specific person attentiveness parameters indicate that the methods agree in which respondents are at high risk of displaying C/IER

Results RQ3: Comparison of Adjustments



- No systematic patterns in adjustments
  - All analyses yielded comparable correlations (ρ_{24}, ρ_{25}, ρ_{15}, ρ_{12}, ρ_{14})
  - Both approaches yielded comparable adjustments (ρ_{13}, ρ_{23}, ρ_{35})
  - Approaches yielded different adjustments (ρ_{34}, ρ_{25})

Discussion

- Both methods appear to capture the same aspect of respondent behavior, as reflected in strong agreement on which respondents are at risk of displaying C/IER

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- Nevertheless, they may lead to different conclusions regarding the prevalence and trajectory of C/IER as well as adjusted parameters of interest
- Since it is never fully knowable which method yields "better" C/IER identification in a given context, we recommend conducting sensitivity analyses and reporting the range of plausible results across methods

Thank you for your attention!

Questions? Comments?

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