# Bridging the Science-Practice Gap in Selection: Encouraging Evidence-based Assessment and Decision Making

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# Decisions, Decisions, Decisions



- Hiring

- Promotion

- Admission

# Information Collection

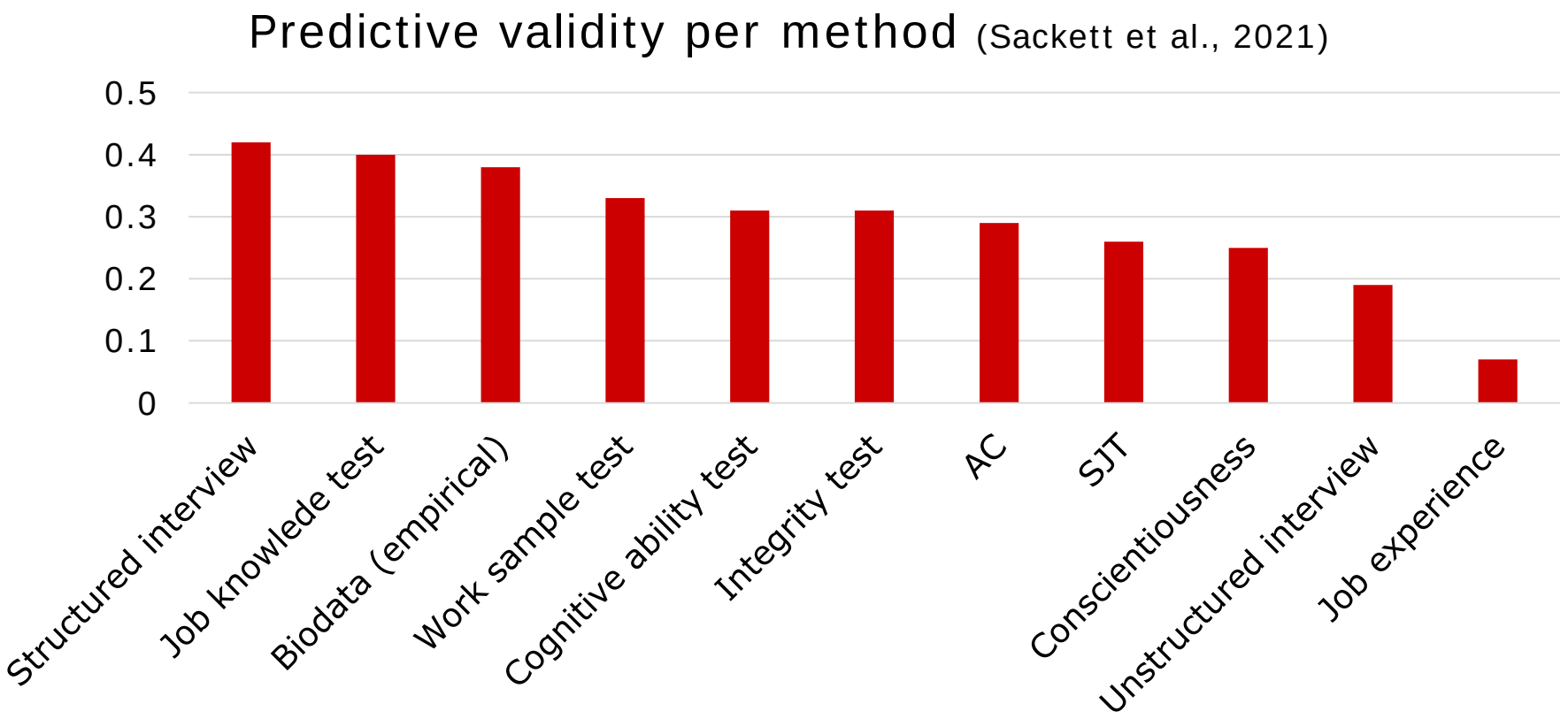


- We collect information to predict behavior
  - Test scores 
  - Interview impressions 
  - Behavioral observations 
  - Etc.

# Information Collection



1. We know how to collect information



# Information Combination



› How could we combine such information?

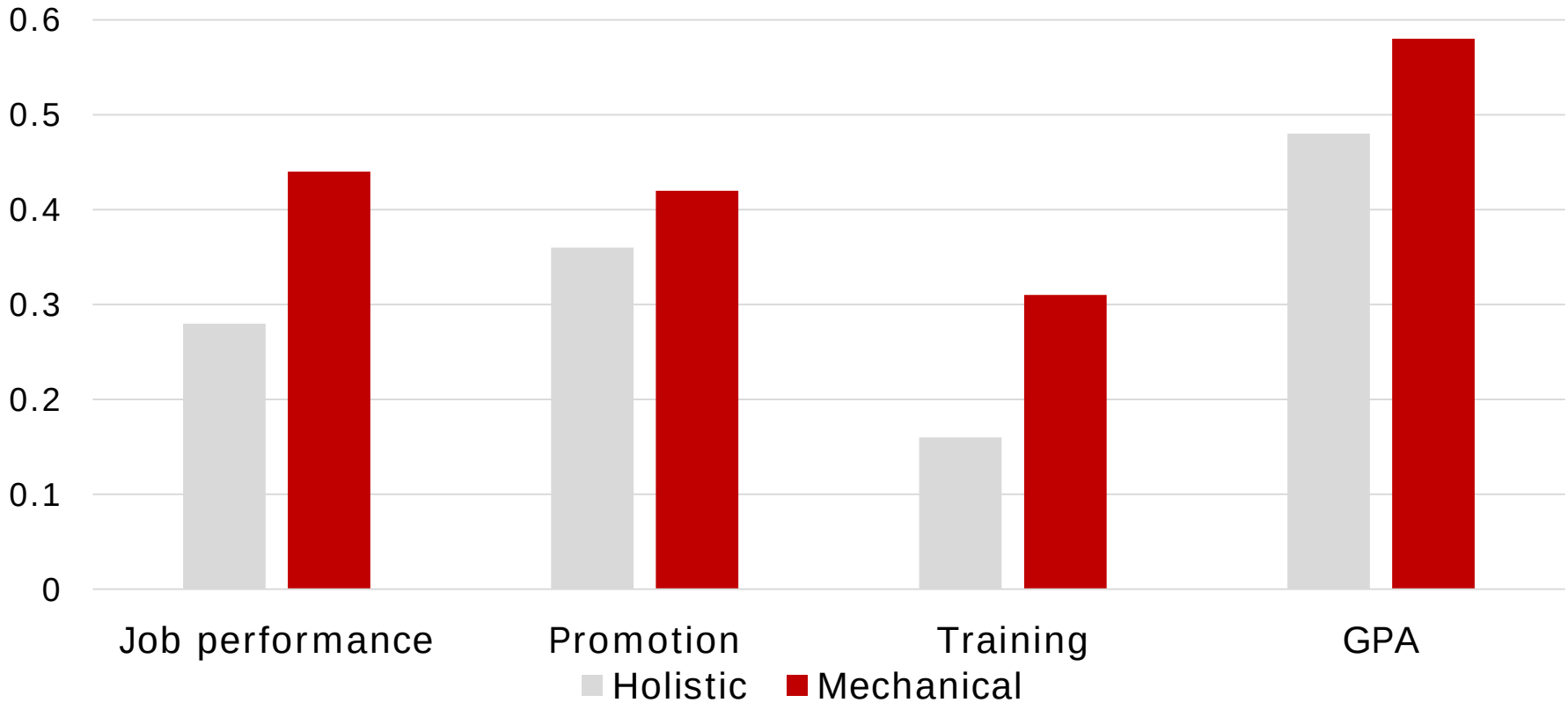
| Holistic combination | Mechanical combination |
| --- | --- |
| • Combination 'in the mind'  | • Combination through an algorithm  |
| • 'Thinking about the information' | • Same predictor weights across applicants |
| • Predictor weights can differ across applicants | • Suitability = test score* 0.8 + interview rating*0.2 |

# Information Combination



2. We know how to optimally combine information

Predictive validity per combination method (Kuncel et al., 2013)

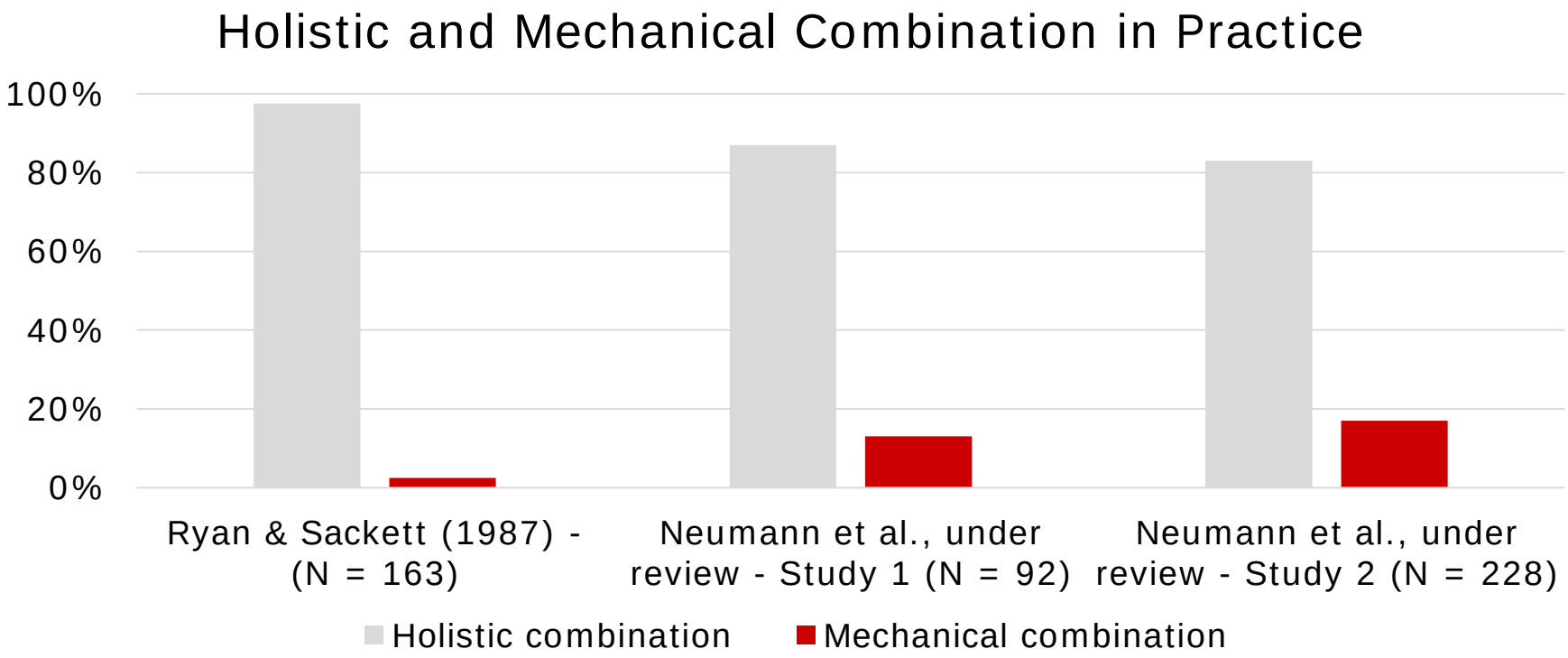


# The Problems



1. We often use poor assessment instruments

2. We still combine information holistically



# Relevant Research Questions



› How can we encourage:

1. Evidence-based assessment use?
2. Algorithm use, and still improve predictive validity compared to holistic combination?

# Systematic Review



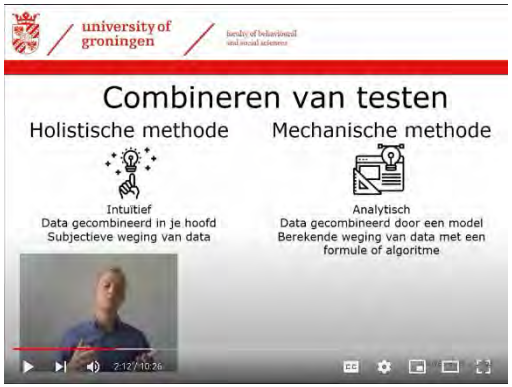
- Few studies exist (*N* = 21)
- Few consistent findings
- Topic not covered in the professional literature

| Intervention / Factor | Effect | Collection or Combination |
|---|---|---|
| Education | -/+ | collection |
| Communication | + | collection |
| Psychological traits | + | collection |
| Feedforward | + | combination |
| Outcome feedback | - | combination |
| Autonomy | + | both |
| Negative stakeholder perceptions | - | both |

# Training



- 171 participants predicted GPA of 20 applicants
- Between-subjects design
  - Training on decision making




- Results: (participants' validity – optimal model validity)
  - Trained condition: $r$ = - .13
  - Control condition: $r$ = - .19

# Retain Experts' Autonomy



- Does enhancing autonomy in algorithm use…

  1. Improve validity compared to holistic combination?
  2. Alleviate decision-makers' concerns about negative stakeholder perceptions?

# Participants and Task



- *N* = 269, experience in making hiring decisions
- Context: Airline hired ticket agents (Kausel et al., 2016)
- Task: Predict job performance based on:
  - Cognitive ability test score
  - Conscientiousness questionnaire score
  - Unstructured interview rating

# Applicant Data



› 40 applicants selected from the full dataset presented in Kausel et al. (2016)

| Variable | 1. | 2. | 3. |
|---|---|---|---|
| 1. Cognitive ability | - | | |
| 2. Conscientiousness | .11 | - | |
| 3. Unstructured interview | .11 | .02 | - |
| 4. Job performance | .31 | .23 | .04 |

# Between-subjects Design



1. **Holistic condition**
   Purely holistic predictions
2. **Holistic adjustment condition (AEAP)***
   Holistically adjust predictions from a prescribed algorithm
3. **Self-designed algorithm condition (AEAP)***
   Choose predictor weights and apply consistently
4. **Prescribed algorithm condition**
   Prescribed algorithm makes predictions

Maximal autonomy

No autonomy

* AEAP = Autonomy-enhancing algorithmic procedure

# Summary of Hypotheses



› Using AEAPs results in…

1. Higher predictive validity than holistic predictions
2. More positive beliefs about stakeholder perceptions than using a prescribed algorithm

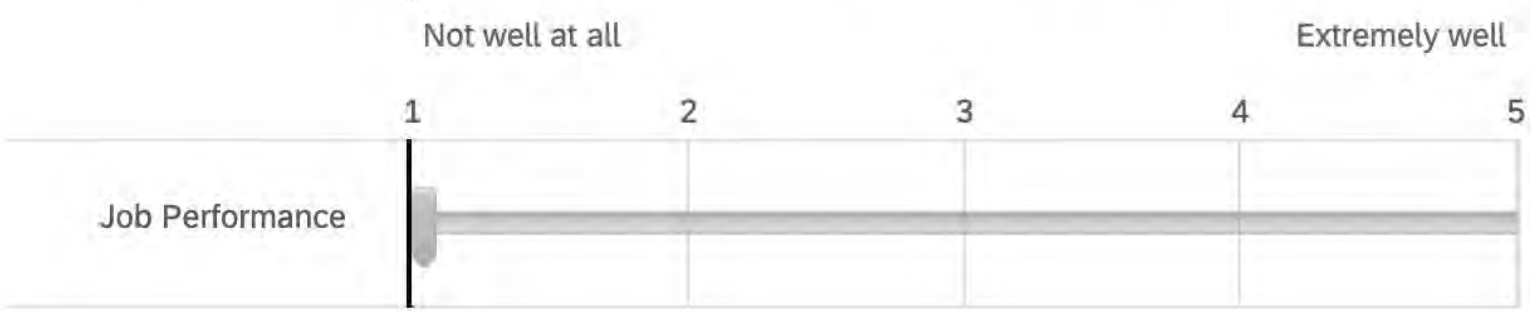
# Holistic Condition



**Applicant Nr. 5** scored the following:

| Measure | Score | Scale/min-max |
|---|---|---|
| General Mental Ability Test | **77** | 0-100% |
| Conscientiousness Questionnaire | **4.13** | 1-5 |
| Interview | **4** | 2-5 |

Based on the information above, how well do you think the applicant will perform in the job assessment three months later in their overall job performance?



# Holistic Adjustment Condition

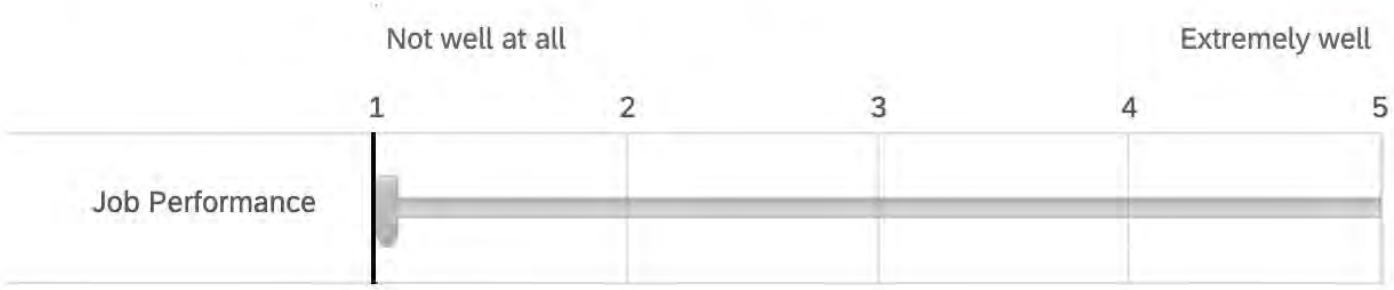


**Applicant Nr. 5** scored the following:

| Measure | Score | Scale/min-max |
|---|---|---|
| General Mental Ability Test | **77** | 0-100% |
| Conscientiousness Questionnaire | **4.13** | 1-5 |
| Interview | **4** | 2-5 |

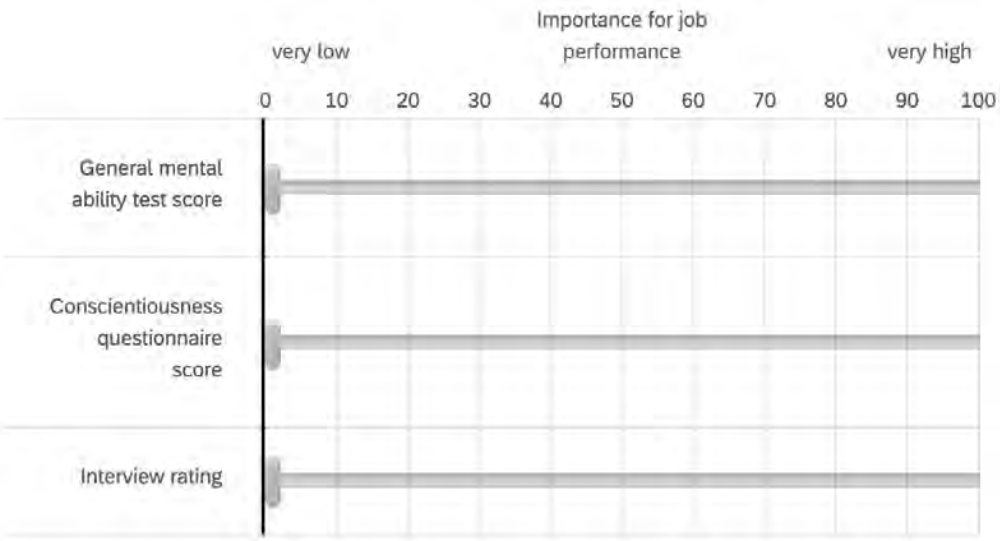
Based on the information above, how well do you think the applicant will perform in the job assessment three months later in their overall job performance?

**The decision-rule prediction of this applicant's job performance is: 4.4**



# Self-designed Algorithm Condition






**Applicant Nr. 5** scored the following:

| Measure | Score | Scale/min-max |
|---|---|---|
| General Mental Ability Test | **77** | 0-100% |
| Conscientiousness Questionnaire | **4.13** | 1-5 |
| Interview | **4** | 2-5 |

Based on the information above, your decision rule predicts the applicants' job performance.

**Your decision-rule prediction of this applicant's job performance is: 3.6**

Your decision rule predicts the performance on a scale from 1 (very bad job performance) to 5 (very good job performance).

# Prescribed Algorithm Condition



**Applicant Nr. 5** scored the following:

| Measure | Score | Scale/min-max |
|---|---|---|
| General Mental Ability Test | **77** | 0-100% |
| Conscientiousness Questionnaire | **4.13** | 1-5 |
| Interview | **4** | 2-5 |

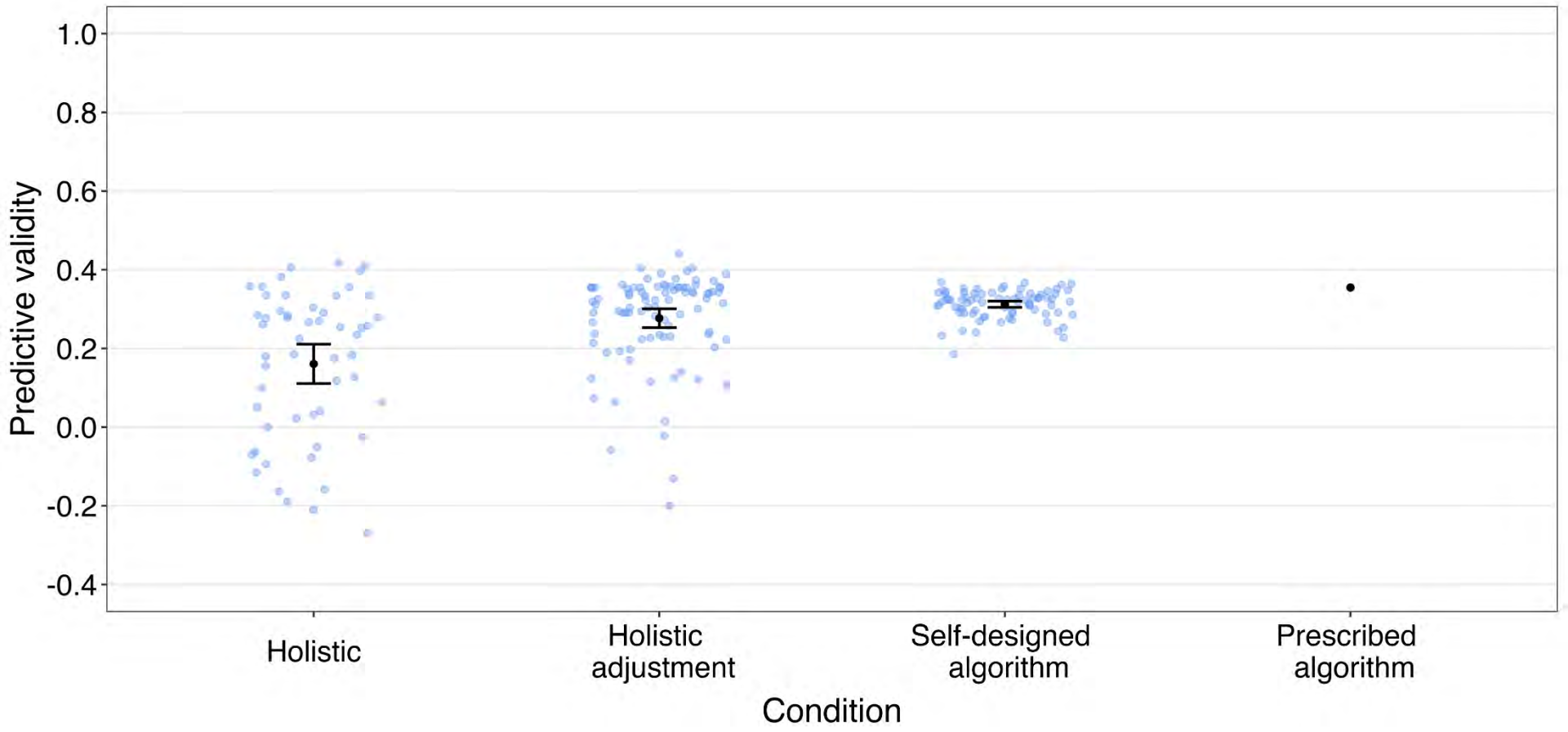
Based on the information above, the decision-rule predicts the applicants' job performance.

**The decision-rule prediction of this applicant's job performance is: 4.2**

The decision-rule predicts the performance on a scale from 1 (very bad job performance) to 5 (very good job performance).

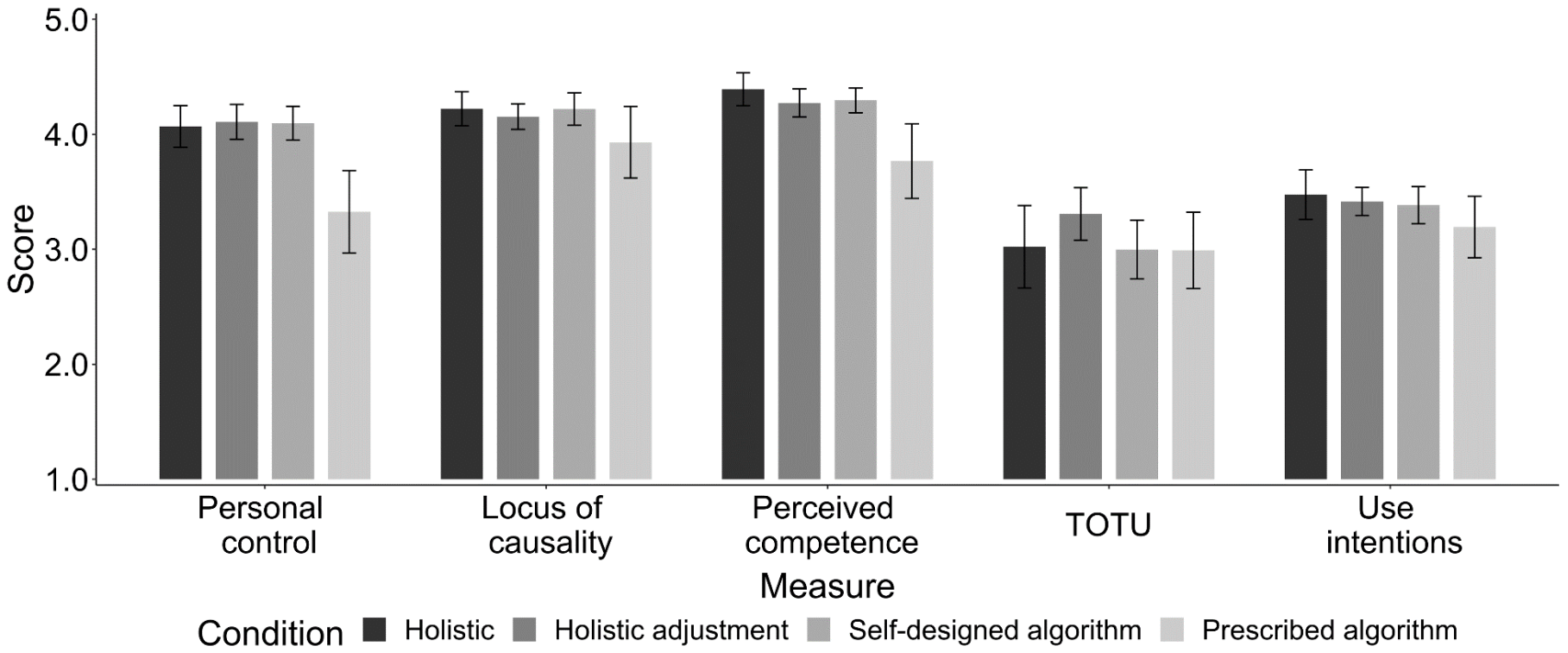
# Results – Predictive Validity





# Results - Attitudes






| AEAPs vs. Prescribed algorithm | Cohen's d | 95% HDI |
|---|---|---|
| Personal control | 0.96 | [0.67, 1.25] |
| Locus of causality | 0.38 | [0.10, 0.66] |
| Perceived competence | 0.77 | [0.49, 1.06] |
| TOTU | 0.14 | [-0.14, 0.42] |
| Use intentions | 0.28 | [0.00, 0.56] |

# Individual Differences



- 308 decision makers with hiring experience
- Similar prediction task + algorithmic advice
- Algorithm validity $r$ = .36
- Mean participant validity $r$ = .26

| Variable | Mean absolute deviation | Judgment consistency | Predictive validity |
|---|---|---|---|
| Conscientiousness | -.30* | .22* | .32* |
| Intuitive style | -.02 | .03 | .09 |
| Inaccurate beliefs | .31* | -.27* | -.18* |
| Cognitive ability | -.23* | .24* | .14* |

# Implications



- How information is *combined* matters!
- More information is not always better
- Autonomy-enhancing strategies seem promising
- Future research should investigate how to encourage consistent use of algorithmic advice

# Publications



Neumann, M., Hengeveld, M., Niessen, A. S. M., Tendeiro, J. N., & Meijer, R. R. (2022). Education increases decision-rule use: An investigation of education and incentives to improve decision making. *Journal of Experimental Psychology: Applied*, *28*(1), 166–178. https://doi.org/10.1037/xap0000372

Neumann, M., Niessen, A. S. M., Hurks, P. M., & Meijer, R. R. (2022). *Holistic and mechanical combination in psychological assessment: Why algorithms are underutilized and what is needed to increase their use*. PsyArXiv. https://doi.org/10.31234/osf.io/y9sfd

Neumann, M., Niessen, A. S. M., Linde, M., Tendeiro, J. N., & Meijer, R. R. (2022). *When and why decision makers use algorithms in personnel selection: Stakeholder perceptions, use intentions, and predictive validity*. PsyArXiv. https://doi.org/10.31234/osf.io/743hn

Neumann, M., Niessen, A. S. M., & Meijer, R. R. (2021). Implementing evidence-based assessment and selection in organizations: A review and an agenda for future research. *Organizational Psychology Review*, *11*(3), 205–239. https://doi.org/10.1177/2041386620983419

Neumann, M., Niessen, A. S. M., Tendeiro, J. N., & Meijer, R. R. (2022). The autonomy-validity dilemma in mechanical prediction procedures: The quest for a compromise. *Journal of Behavioral Decision Making*, *35*(4), e2270. https://doi.org/10.1002/bdm.2270

# Thank you for your attention!

# Questions?