

# **Measuring Mental Math: A Simple Task Presents Complex Problems**

**TJ Clayton, Tara Myers, Andrew Loignon,  
Sarah Gilbert & Cheryl Hendrickson  
American Institutes for Research**



**AMERICAN  
INSTITUTES  
FOR RESEARCH®**

**Funded Under Contract:  
N00173-07-C-2011**

# Overview of Presentation

- **AIR's Measure of Mental Math**
  - Rationale
  - Development
- **Innovative Item Types (IITs)**
  - What are they?
  - Challenges
  - Benefits
- **Applicant Reactions to AIR's IIT**
- **Conclusion and Future Research**

# Rationale for Measure

- **A thorough job analysis of a security-related position revealed:**
  - “*Ability to perform basic mental math quickly*” was
    - Very important (M=4.63, 5-point scale)
    - Linked to ¼ of the job tasks
    - Needed prior to training
- **Challenges:**
  - Minimum qualifications would not be sufficient
  - Existing measure for this low level ability did not exist
  - Needed to assess candidate’s ability to *quickly conduct simple mental math* in a manner that was:
    - Face valid
    - Created variability in scores

# Development of Measure

## 1. Paper and pencil methods

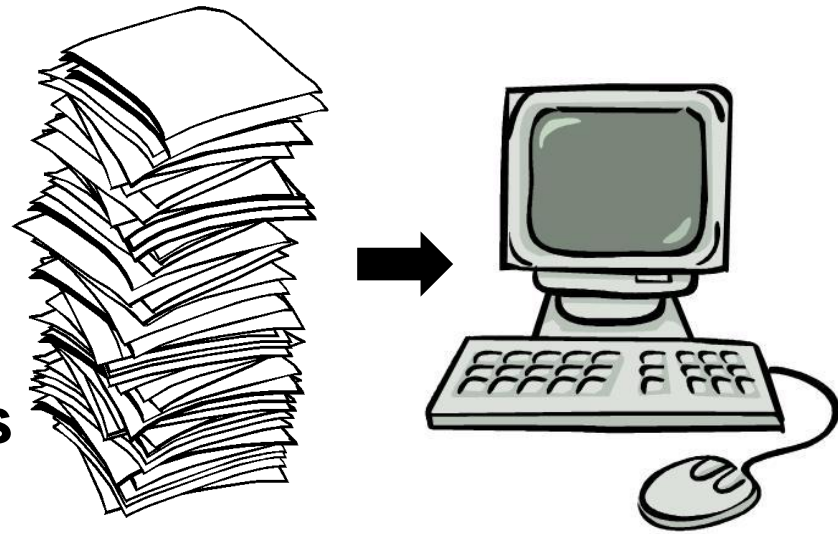
- Time limits

## 2. Alternative methods

- Interactive
- Processing speed element

## 3. Innovative Item Types

- Development Dimensions International, Shaker Group, and SHL Previsor (2011)



# What are Innovative Item Types?

- **Originate in areas with minimal background research**
- **Replicate certain functions of a particular job**
- **Incorporate technology**
- **Can be used along with other IITs, work samples, or traditional methods in the selection process**



# Challenges to Creating IITs

- **Longer initial development**
- **Additional pilot testing**
- **Greater familiarity with technology**
- **Balancing job-relatedness and statistical integrity**

# Benefits of Using IITs

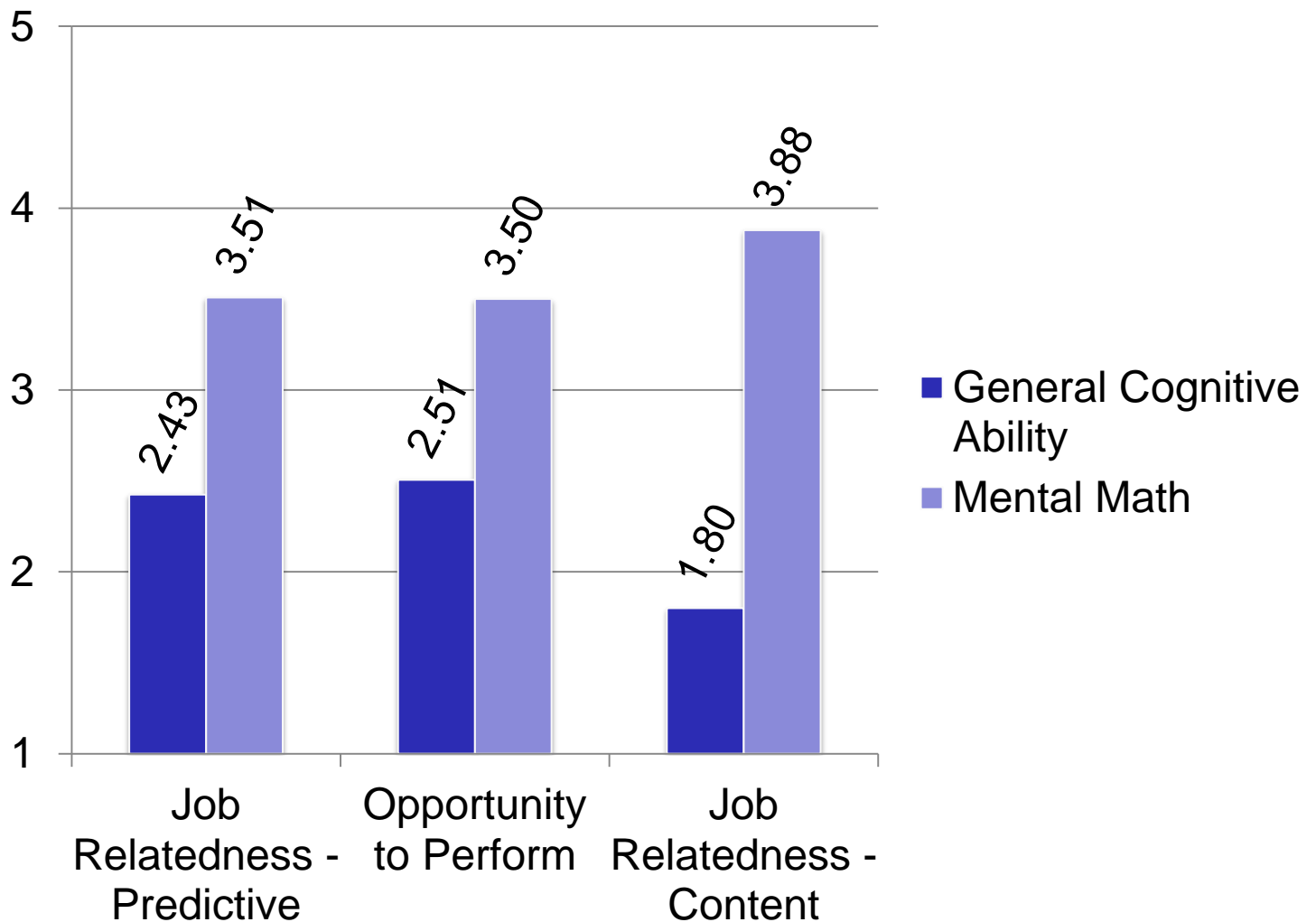
- **Applicant reactions**
- **Realistic job previews**
- **Client and stakeholder buy-in**
- **Wider range of potential constructs**
- **Streamlining the administration process**

# Applicant Reactions

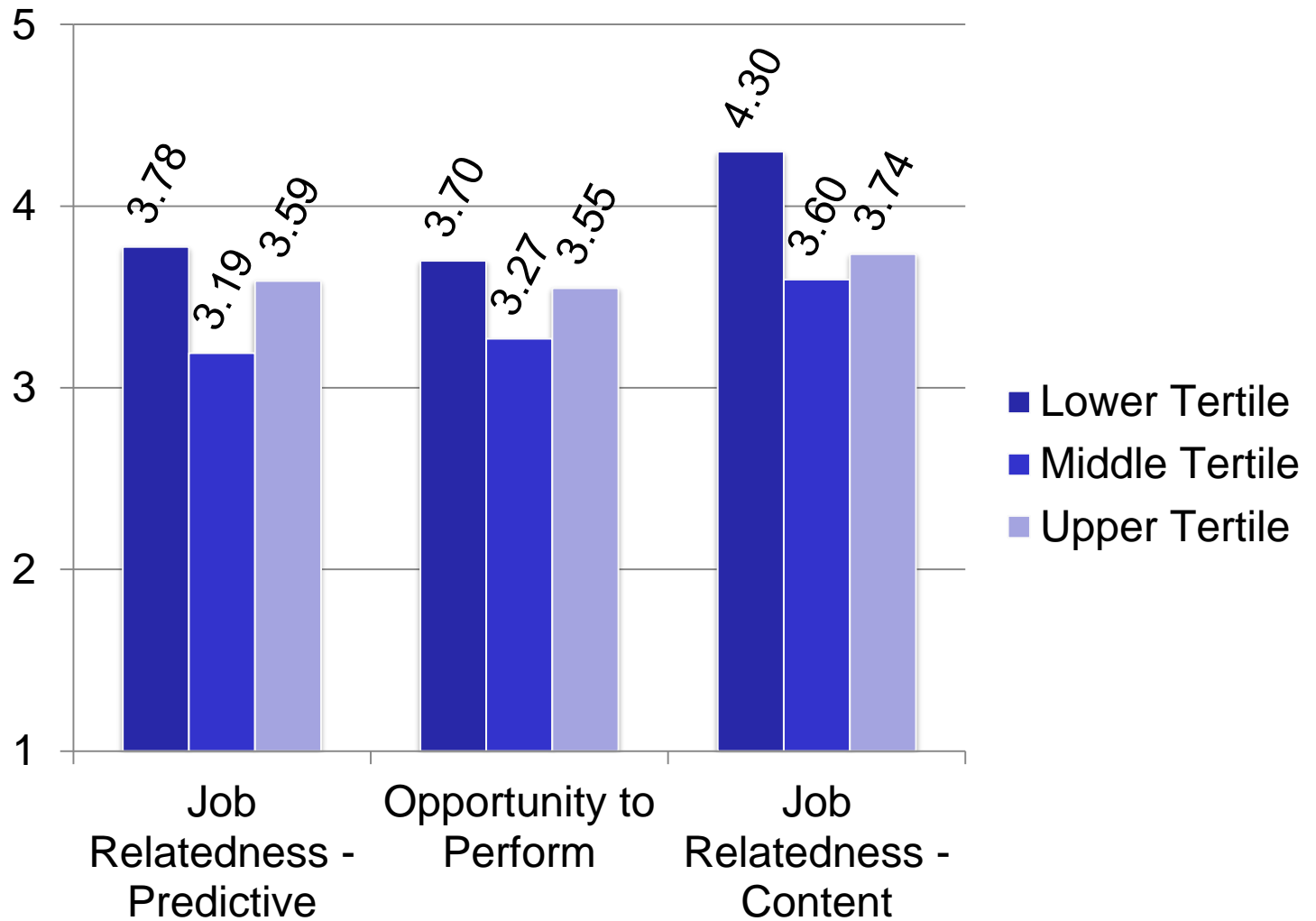
- **Bauer et al. (2001)'s six categories of applicant reactions:**
  - Job-relatedness – predictive
  - Opportunity to perform
  - Openness of the administration process
  - Two-way communication
  - Proprietary of questions
  - Job-relatedness – content



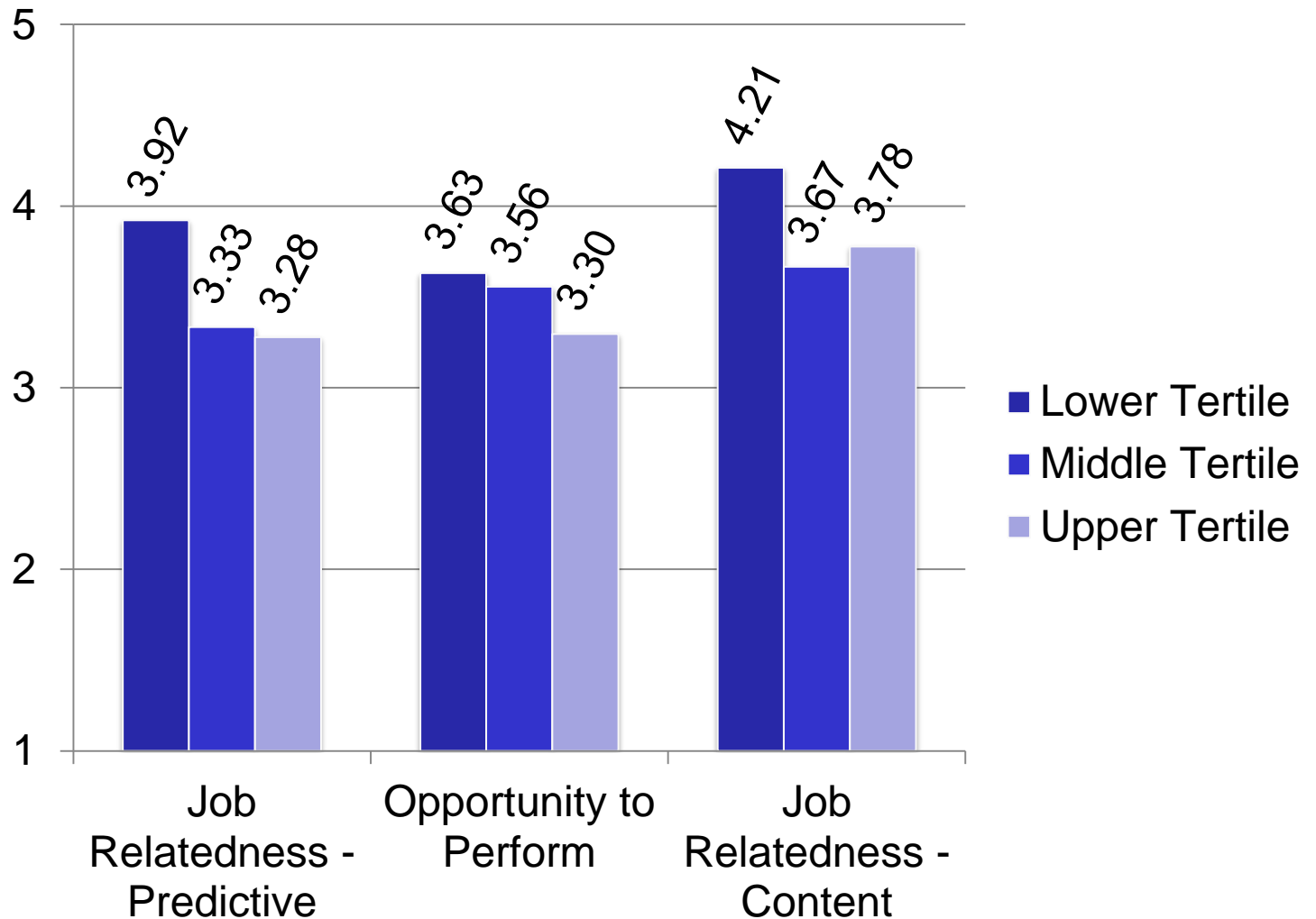
# Applicant Reactions – General Cognitive Ability



# Applicant Reactions by Age



# Applicant Reactions by Tenure



# Conclusions and Future Research

- **Further evidence supporting the use of IITs for assessing certain skills within a high fidelity context**
- **Propositions for future research on Applicant Reactions and IITs**
  - Examine differences in applicant reactions to IITs versus a standard measure while holding the content of the measure constant (cf., Chan & Schmitt, 1997)
  - IITs versus standard measures of interpersonal or communication skills