

Validation and Applications of Rapid Guessing to Detect Test Taker Disengagement

Steven L. Wise
Senior Research Fellow
NWEA



Presentation at the “Beyond Results: Paving the Way for the Use of Process Data” Workshop
Frankfurt, Germany
June 2020

What I will discuss

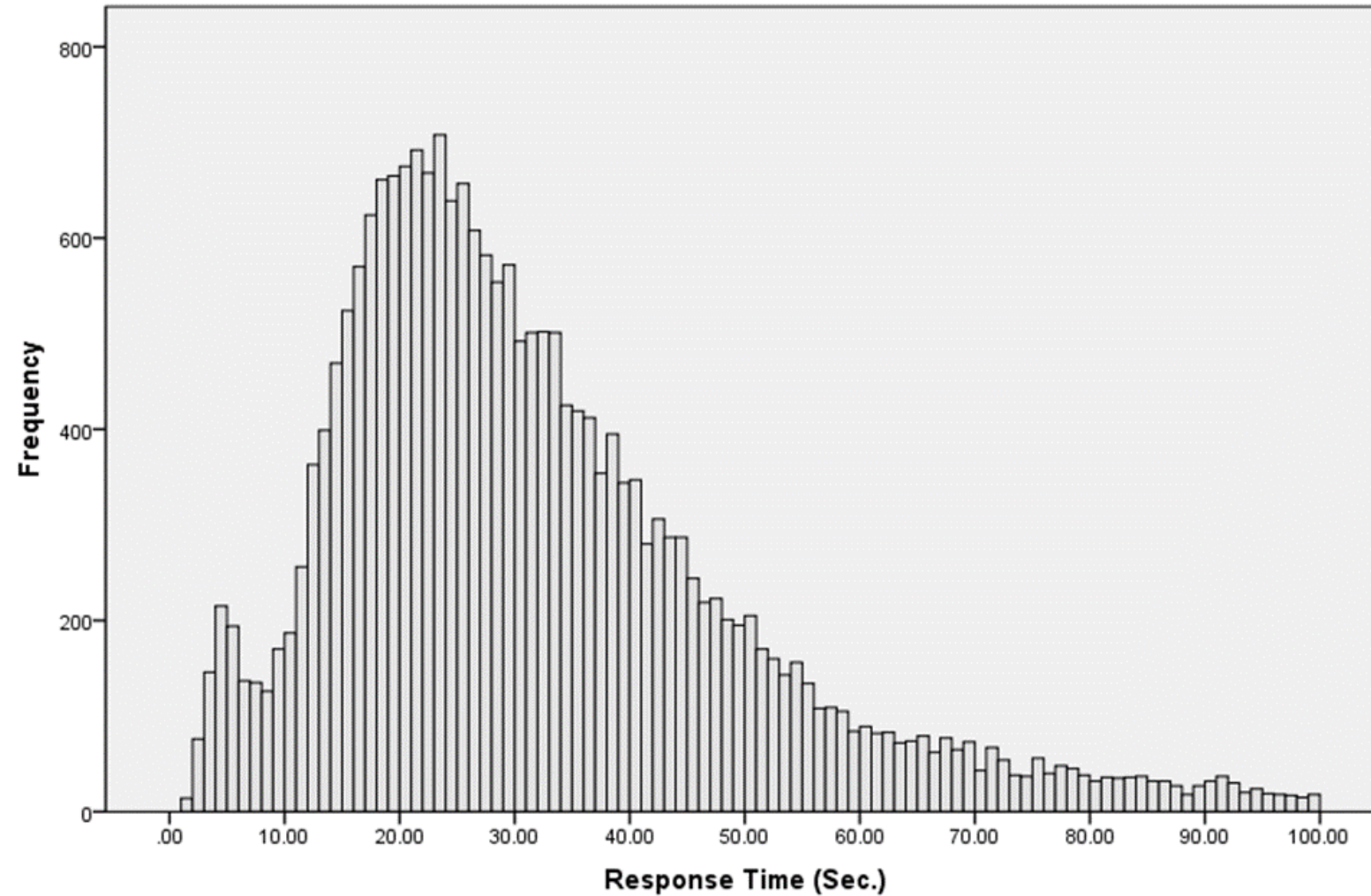
- + Response time and rapid-guessing behavior
- + Validation evidence
- + Application in operational testing
- + Audience questions



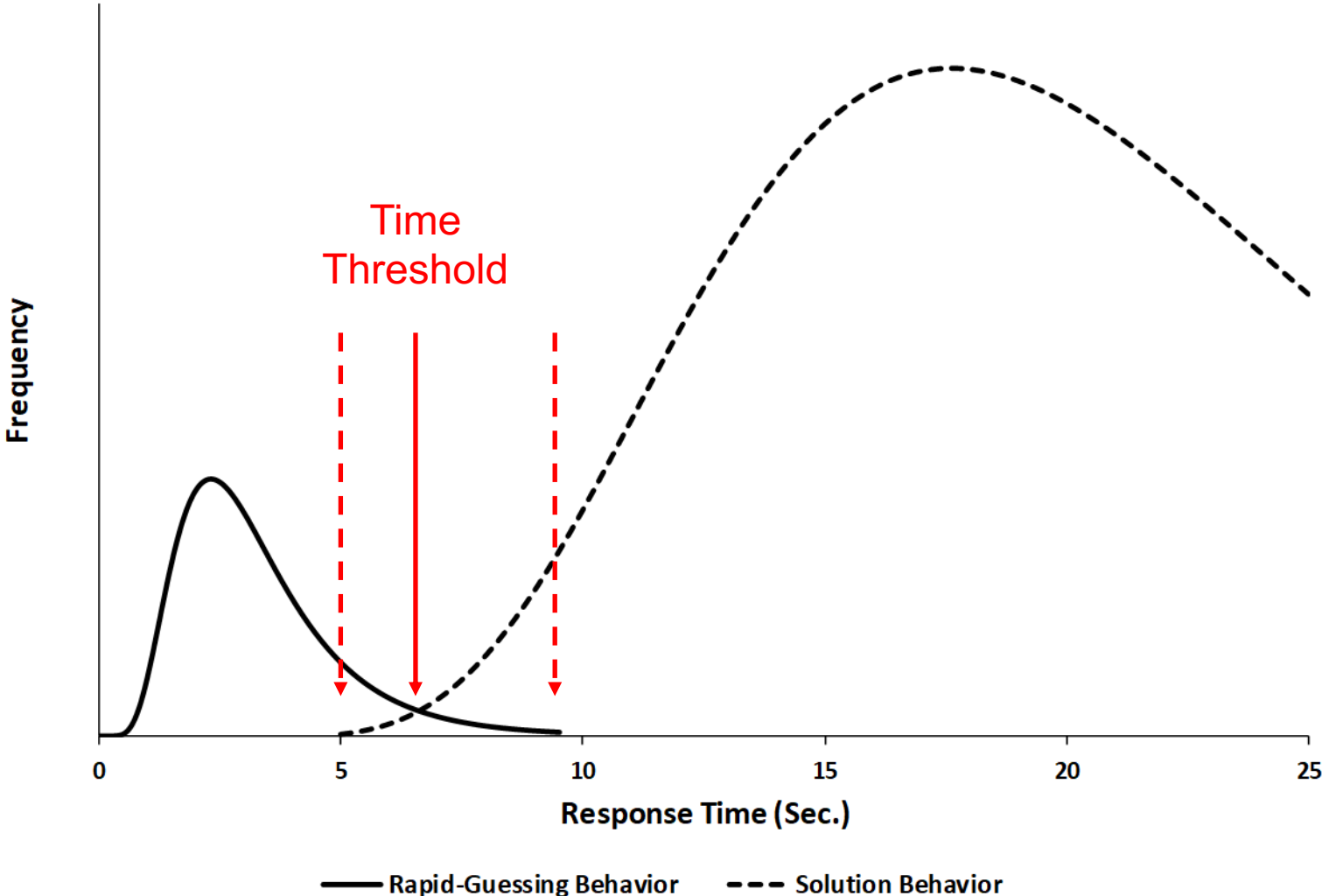
Item Response Time

- + Most widely collected process data with computer-based tests.
- + Earliest application of process data
- + Examination of response times can reveal item responses that are very rapid and unlikely to reflect engaged test taking.
- + This allows us to assess engagement down to the level of individual item responses.

A Distribution of Response Times for an Item



Two Response Time Distributions



Item Response Classifications

- + Each response can be classified as a rapid guess or a solution behavior.
- + These classifications can be aggregated
 - Response Time Effort (RTE). The proportion of a given test taker's responses that were solution behaviors.

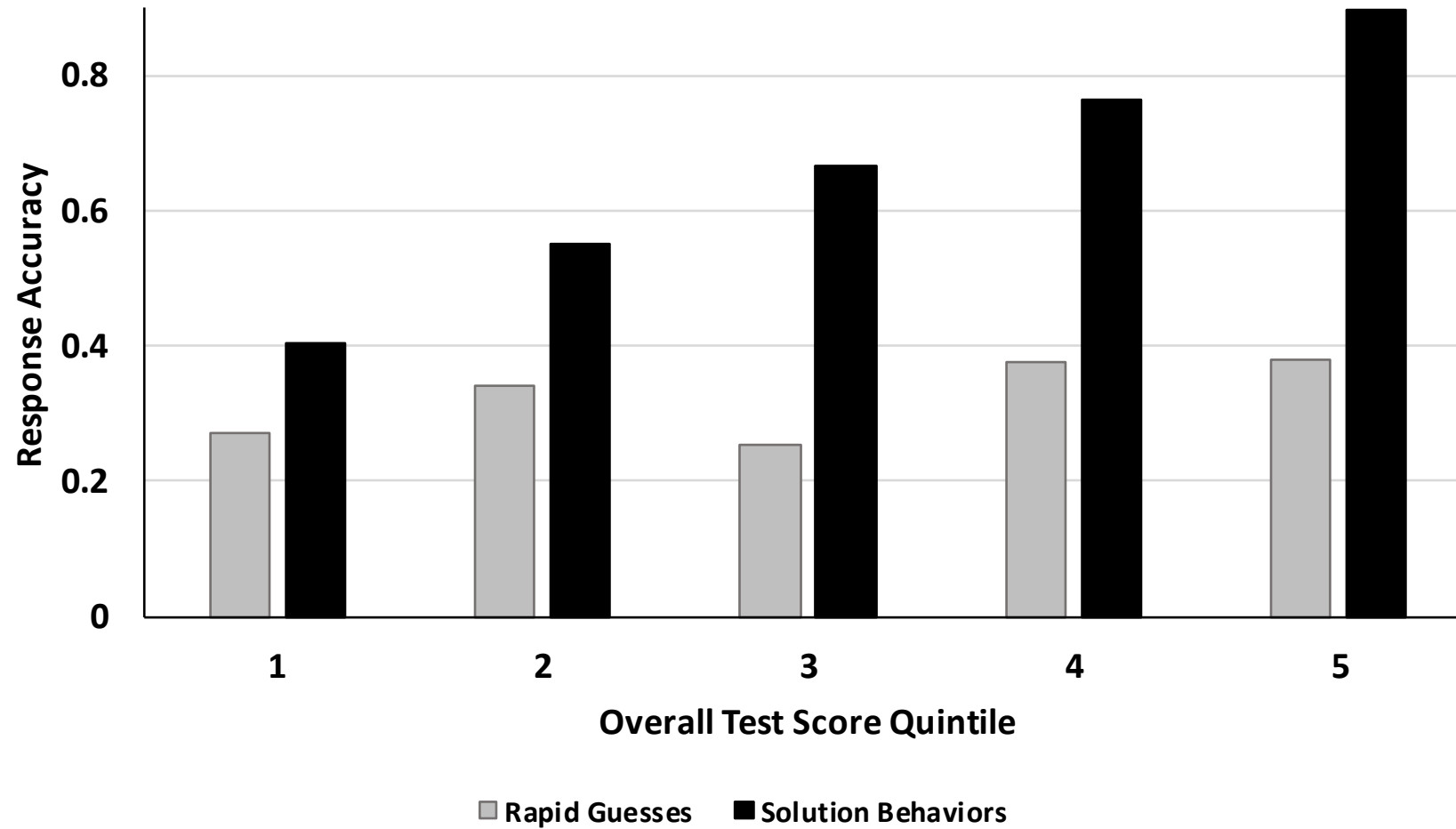
Validating Inferences About Rapid Guessing

- + With unspeeded low-stakes tests, rapid guesses are interpreted as indicating disengagement.
- + Rapid guesses appear to reflect a different response process.
- + However, inferences about engagement and response processes based on process data require validation evidence.
- + Although interpreting rapid guessing as disengagement is intuitively appealing, what other evidence is there?

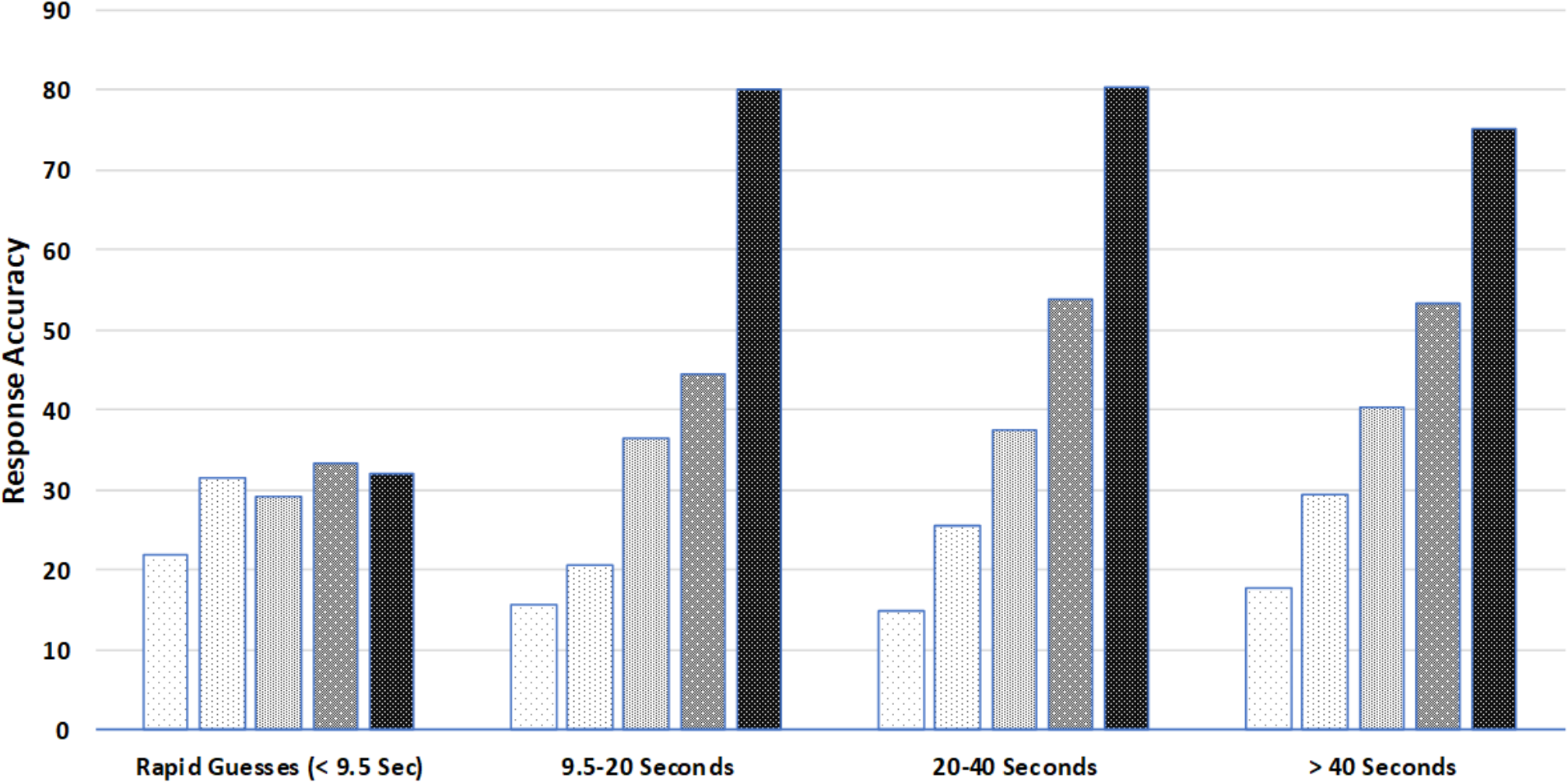
Evidence that Rapid Guessing Indicates Disengagement

- + RTE correlated with self-reported effort and person fit statistics
- + Accuracy of rapid guesses resembles random chance levels.
- + Rapid guesses are (often) not psychometrically informative.
- + Rapid guessing accuracy reflects psychological choice bias, and not the construct being measured.
- + When rapid guessing is reduced, measurement improves

Rapid Guesses Tend to be Psychometrically Uninformative



Informative Responses Begin to Appear Shortly After Threshold



Operational Applications at NWEA

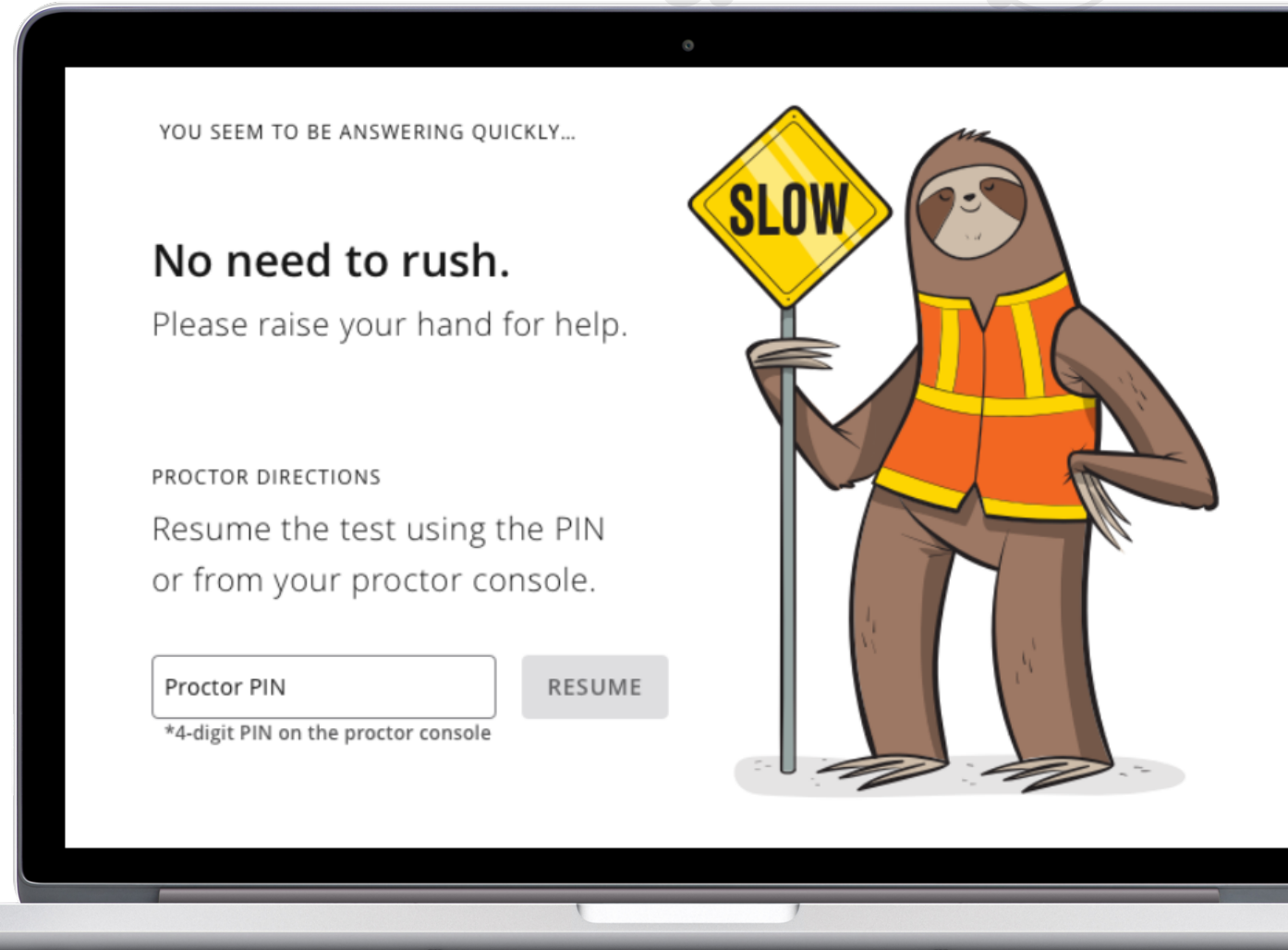
- + The *MAP Growth* assessment is an unspeeded low-stakes adaptive test in math, reading, English language arts, and science given to students in grades 2-10.
- + It is administered over 10 million times per year.
- + In 2017, NWEA incorporated several engagement features into *MAP Growth*.

Engagement Features

- + Individual Student Score Reports
 - Frequency of rapid guessing
 - Estimated score distortion due to rapid guessing (using effort-moderated scoring)
- + Difficulty locking to maintain CAT item selection targeting
- + Engagement monitoring (proctor notification) to re-engage students

Engagement Monitoring

- + Tests will pause when a student has rapid-guessed on multiple questions
- + Both student and proctor are notified
- + Can pause multiple times during a test session
- + Proctor must resume the test before student can continue



Impact of Engagement Features

- + Unique features well received by NWEA partners
 - Teacher and student consciousness raised by their presence
- + Proctor notification associated with increased engagement, higher test performance, and Improved validity
- + CAT item difficulty not confused by rapid guessing
- + Overall, improved score validity through better score interpretations.

Final Comments

- + Process data can help us better understand test taker behavior and improve measurement.
- + Validation evidence for process data inferences: very important!
- + Study the behavior before making too many assumptions about it.

References

- + Wise, S. L. (2017). Rapid-guessing behavior: Its identification, interpretations, and implications. *Educational Measurement: Issues and Practice*, 36(4), 52-61.
- + Wise, S. L. & Kuhfeld, M. R. (2020). A cessation of measurement: Identifying test taker disengagement using response time. In M. J. Margolis & R. A. Feinberg (Eds.), *Integrating timing considerations to improve testing practices*. New York: Routledge.