

Computerized Adaptive Testing (CAT)

Shu-chuan Kao, PhD,
Senior Manager, Measurement &
Testing

Objectives

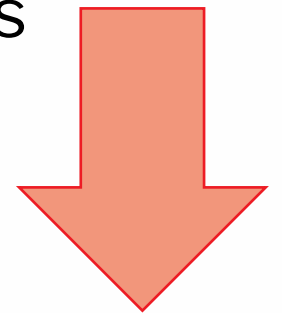
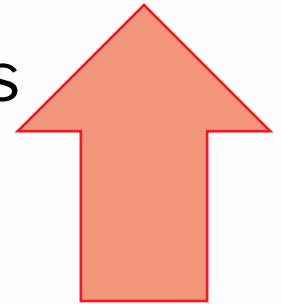
By the end of the session, participants will be able to:

- Understand how Computerized Adaptive Testing (CAT) works
- Recognize REx-PN[®] CAT components
 - **Variable Length Exam**
 - **Content Balancing**
 - **Exam stopping rules**

What is “Adaptive” testing?

Exams are customized for individual candidates. The difficulty of each test is tailored to the person taking it.

- **High-ability** candidates will receive more difficult items
 - Easy items provide little information about a high performer’s ability
- **Low-ability** candidates will receive fewer difficult items
 - Avoid guessing on items that are too difficult

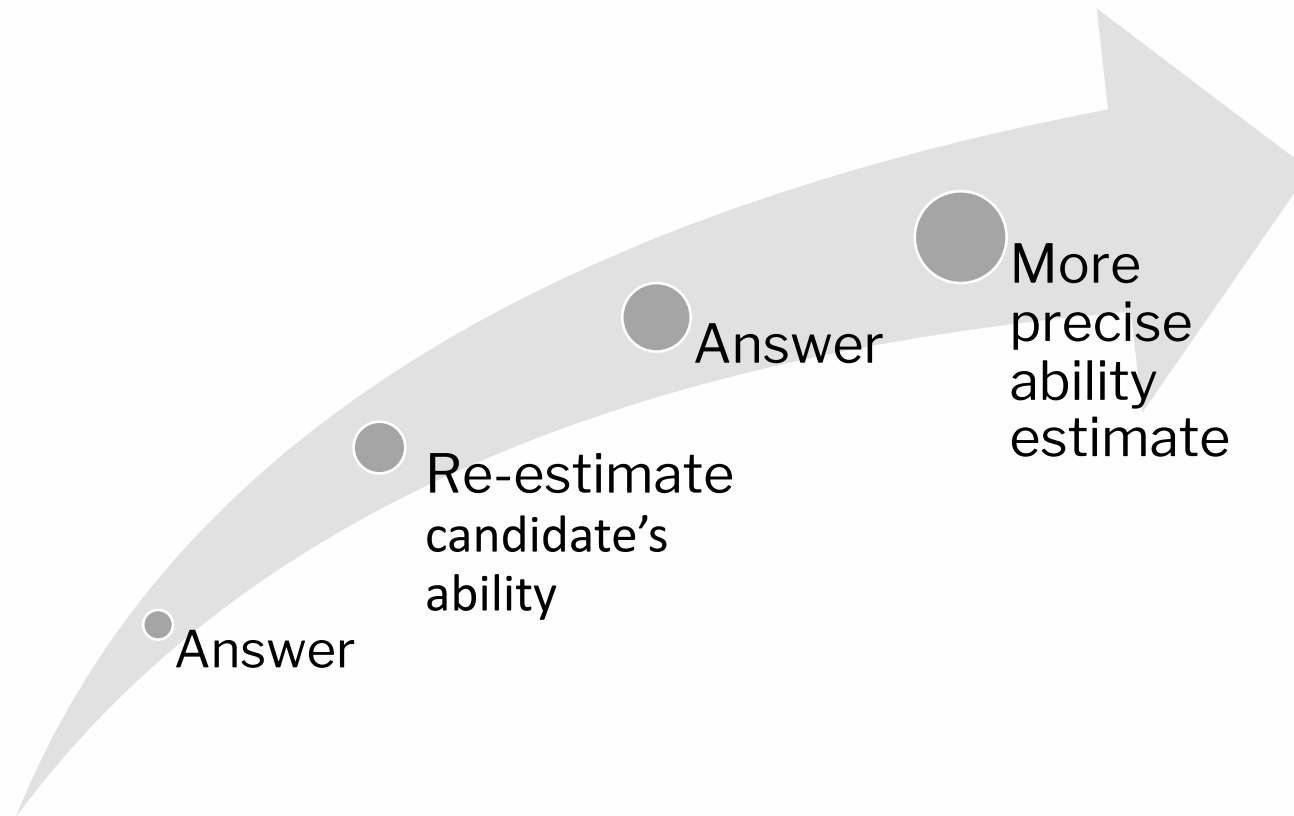


What is “Adaptive” testing? (Cont.)

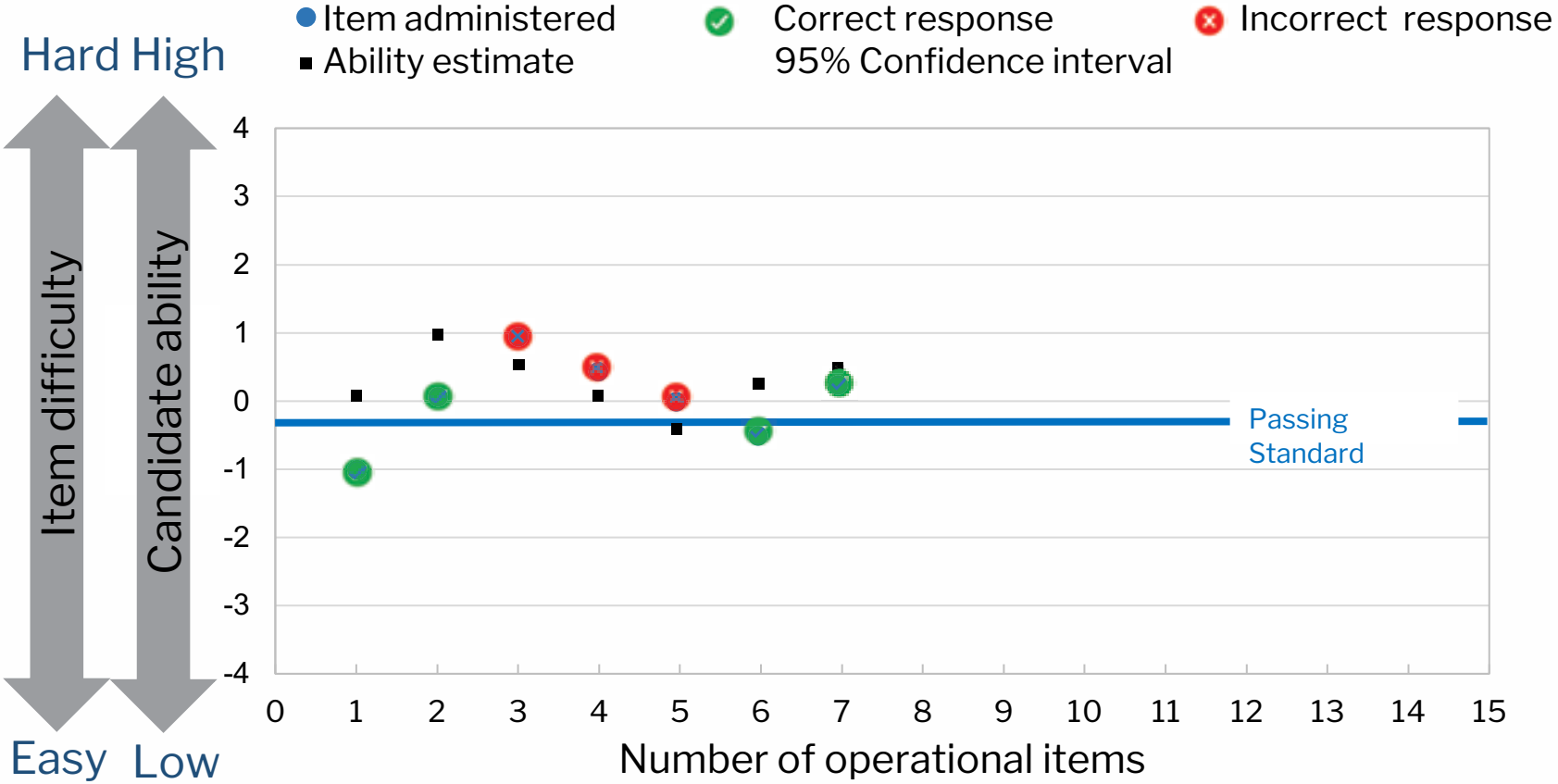
- Every time you answer an item, the computer re-estimates your ability based on all the previous answers and the difficulty of those items.
- Then the computer selects the next item that the candidate has a 50/50 chance of a correct response.
 - Items are not too easy or too hard
 - The goal is to get as much information as possible about your true ability
 - You should find each item challenging as each item is targeted to your ability

What is “Adaptive” testing? (Cont.)

- When you answer more items, the computer re-estimates your ability immediately and the estimate becomes more precise.



Example of CAT



Components of REx-PN[®] CAT

Variable
Length
Exam

Content
Balancing

Exam
Stopping
Rules

Variable Length Exam

The number of questions depends upon their ability:

Minimum: 90 (60 operational + 30 pretest) items

Maximum: 150 (120 operational + 30 pretest) items

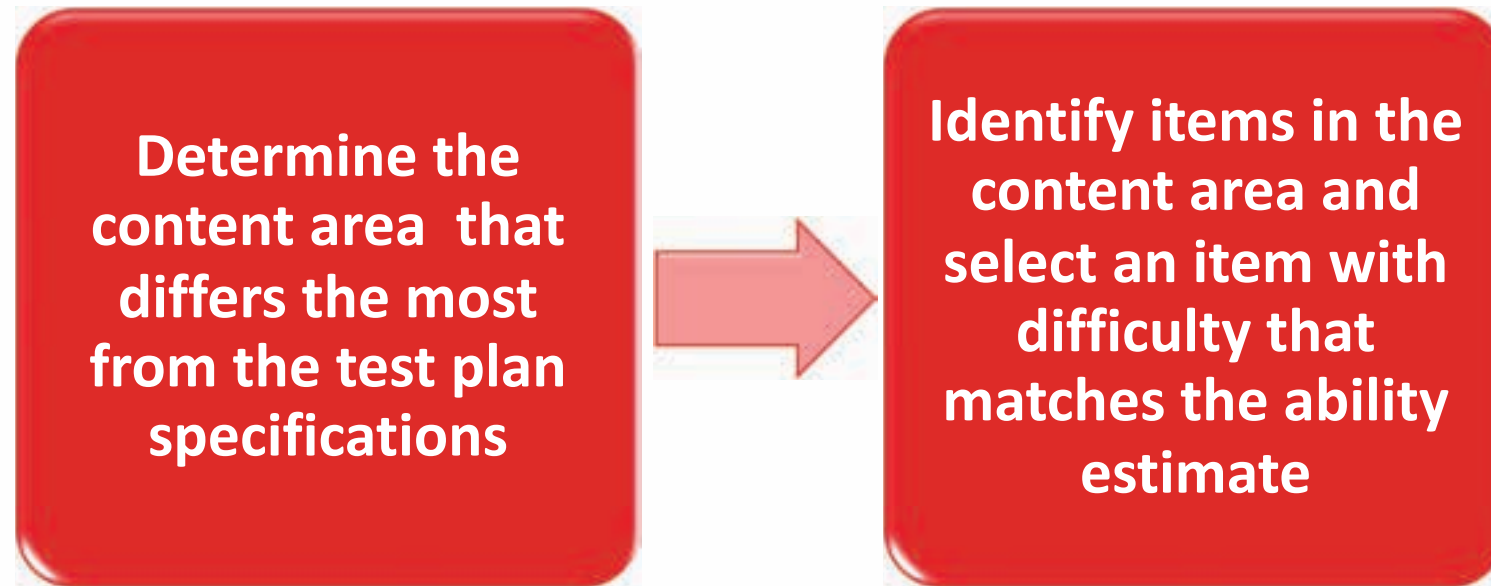
- Shorter length exams - ability is “far” from the passing standard (clearly above or clearly below)
- Longer length exams - ability is “close” to the passing standard

Content Balancing

- The REx-PN Test Plan dictates a specific percentage of the operational items in each content area

Client Needs	Percentage of Items (questions) from each Category/Subcategory
Safe and Effective Care Environment	
▪ Management of Care	18–24%
▪ Safety and Infection Control	10–16%
Health Promotion and Maintenance	6–12%
Psychosocial Integrity	8–14%
Physiological Integrity	
▪ Basic Care and Comfort	6–12%
▪ Pharmacological and Parenteral Therapies	14–20%
▪ Reduction of Risk Potential	8–14%
▪ Physiological Adaptation	6–12%

Content Balancing



Note: item type is **not** part of the selection algorithms

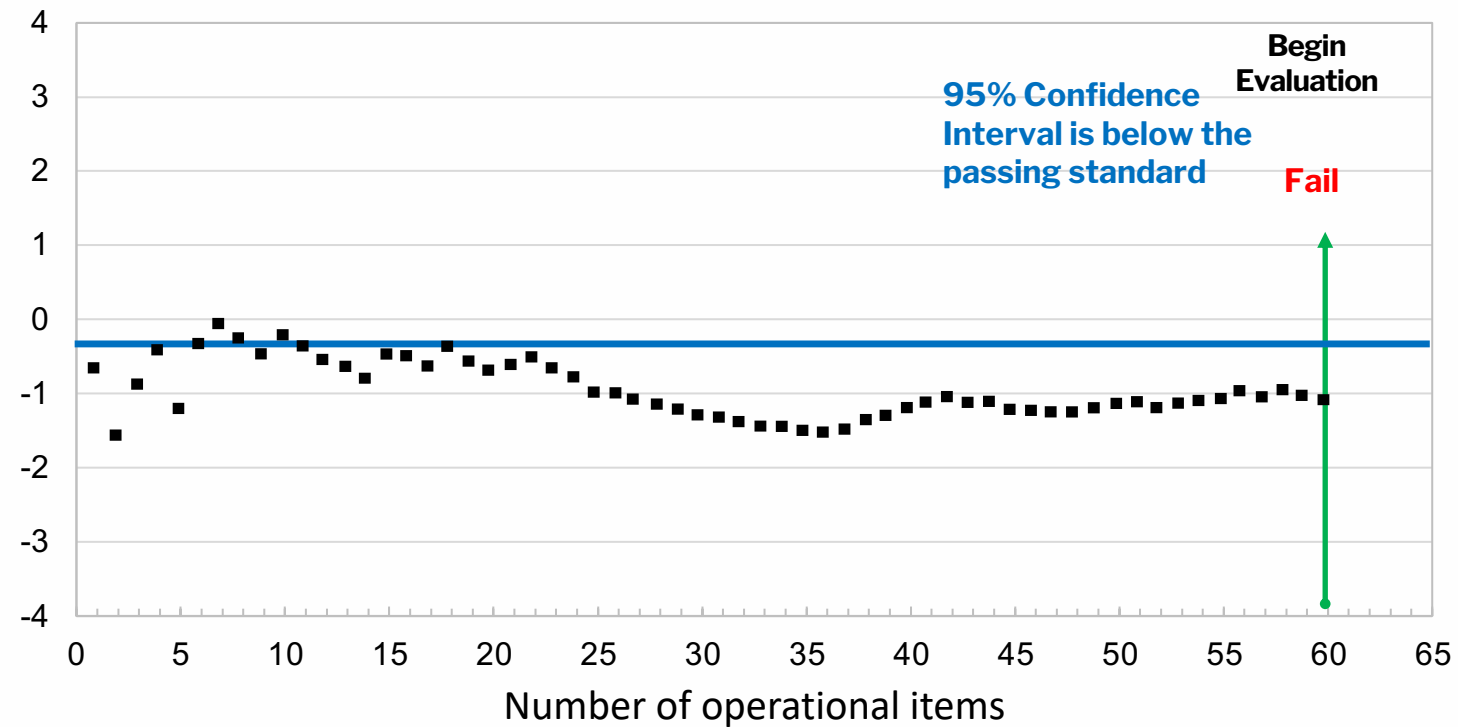
Stopping Rules and Pass/Fail Decisions

- Performance is reported only as a pass-fail classification.
- At least **60 operational** items have been answered within the 4-hour exam time.
- Three stopping rules are used to terminate an exam and make the pass/fail decision.
 - 95% Confidence Interval
 - Maximum Length
 - Run Out Of Time

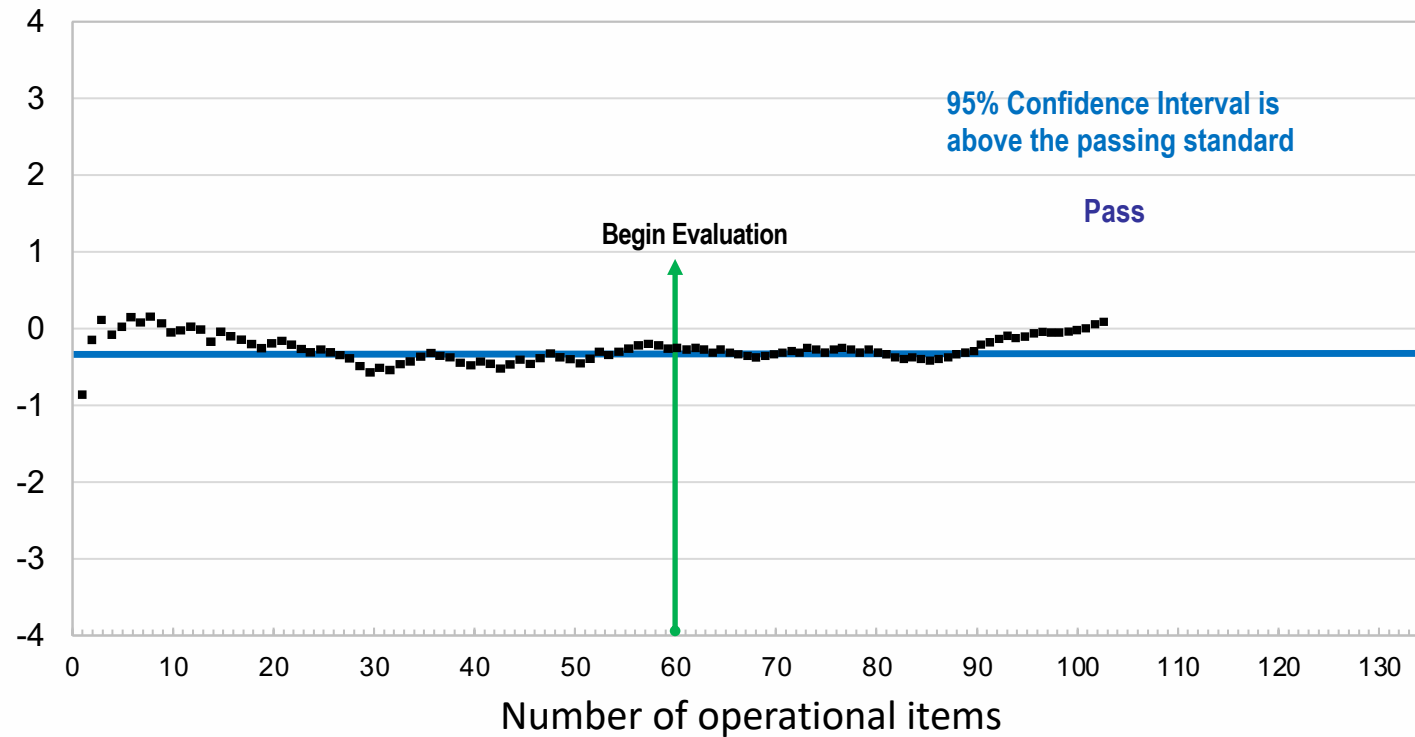
Stopping Rule #1: 95% Confidence Interval

- Respond to at **least 60** operational items.
- The exam continues when the confidence interval straddles the passing standard.
- Exam stops when the confidence interval is clearly above or below the passing standard.
 - Above the passing standard → **Pass**
 - Below the passing standard → **Fail**

Sample REx-PN Minimum Item Fail Chart



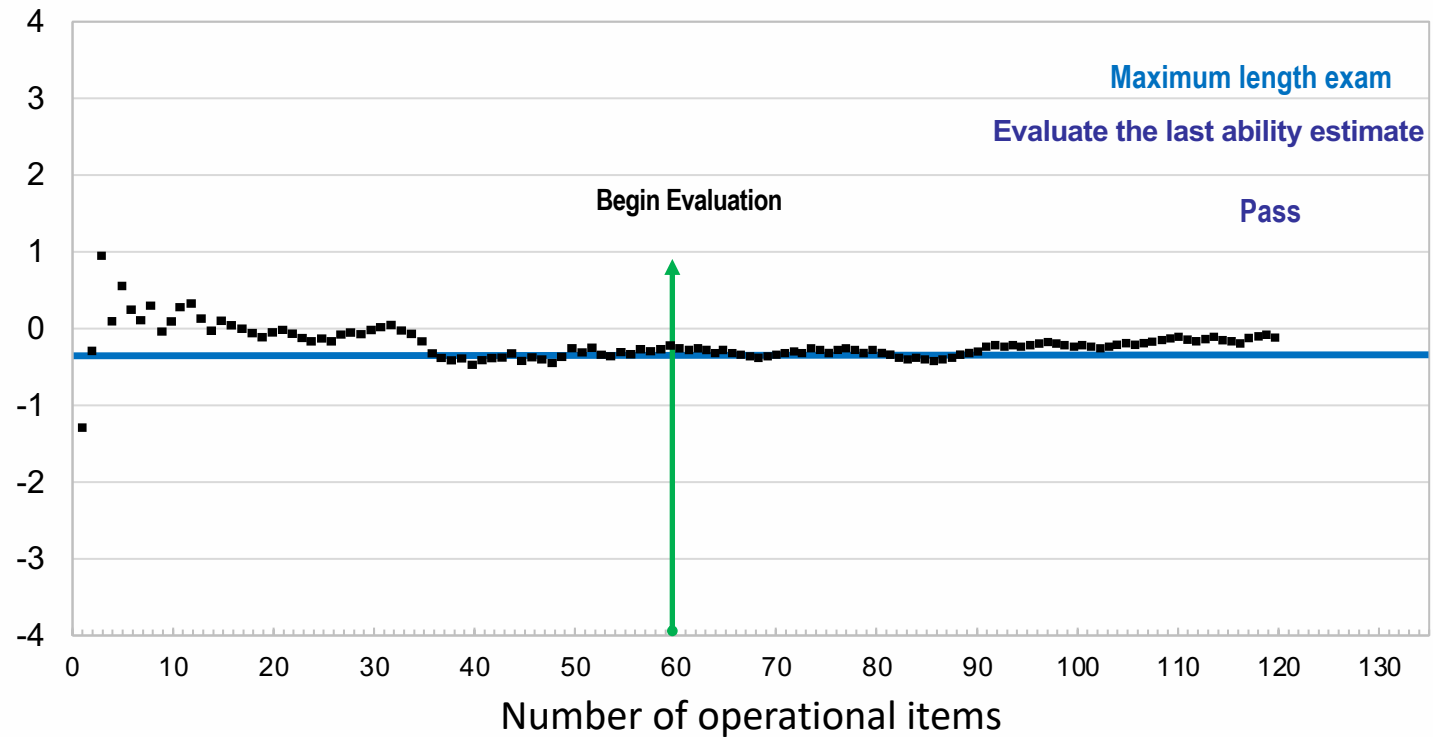
Sample REx-PN Medium Length Pass Chart



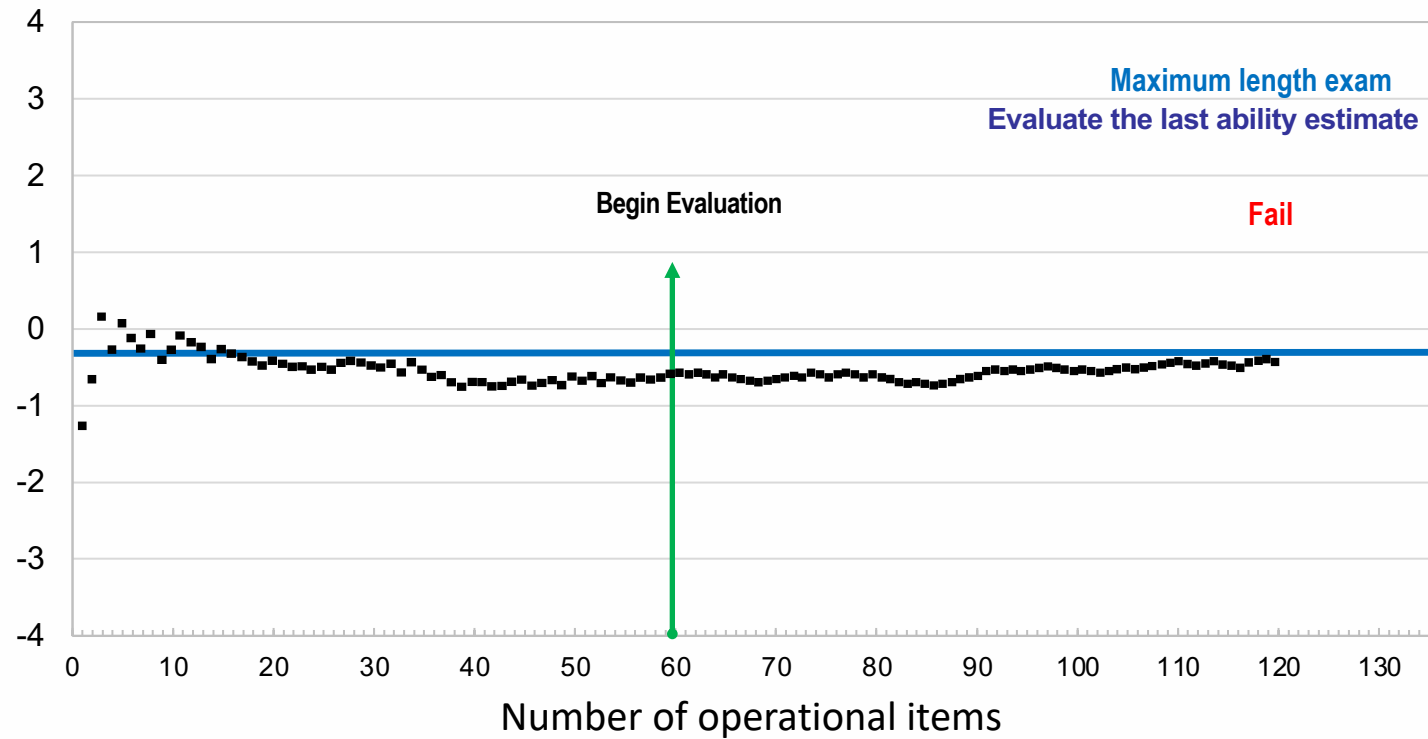
Stopping Rule #2: Maximum Length

- Candidates with abilities very close to the passing standard may receive maximum length examinations.
- When a candidate answers 120 operational items, computer disregards the 95% certainty requirement.
- Outcome depends on the final ability.
 - ABOVE the passing standard → Pass
 - AT or BELOW the passing standard → Fail

Sample REx-PN Maximum Length Pass Chart



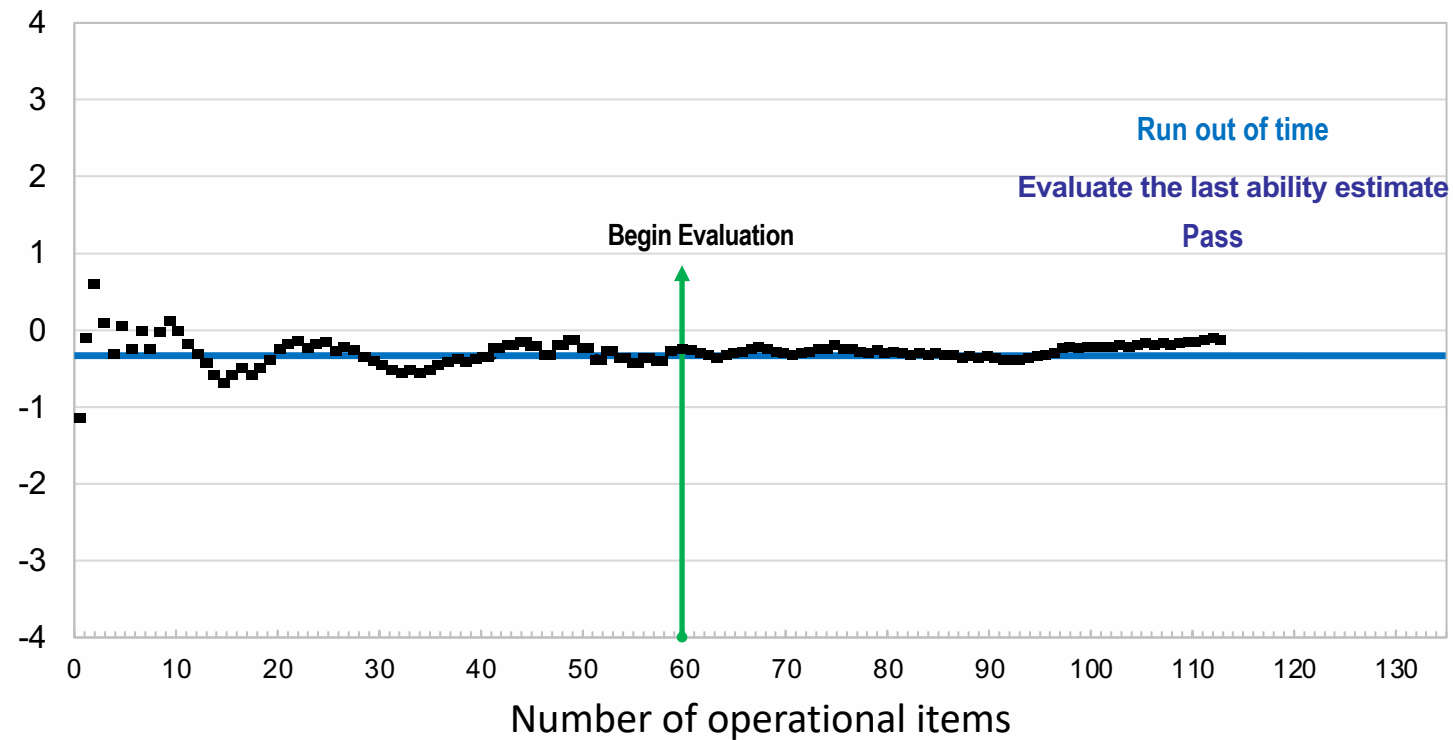
Sample REx-PN Maximum Length Fail Chart



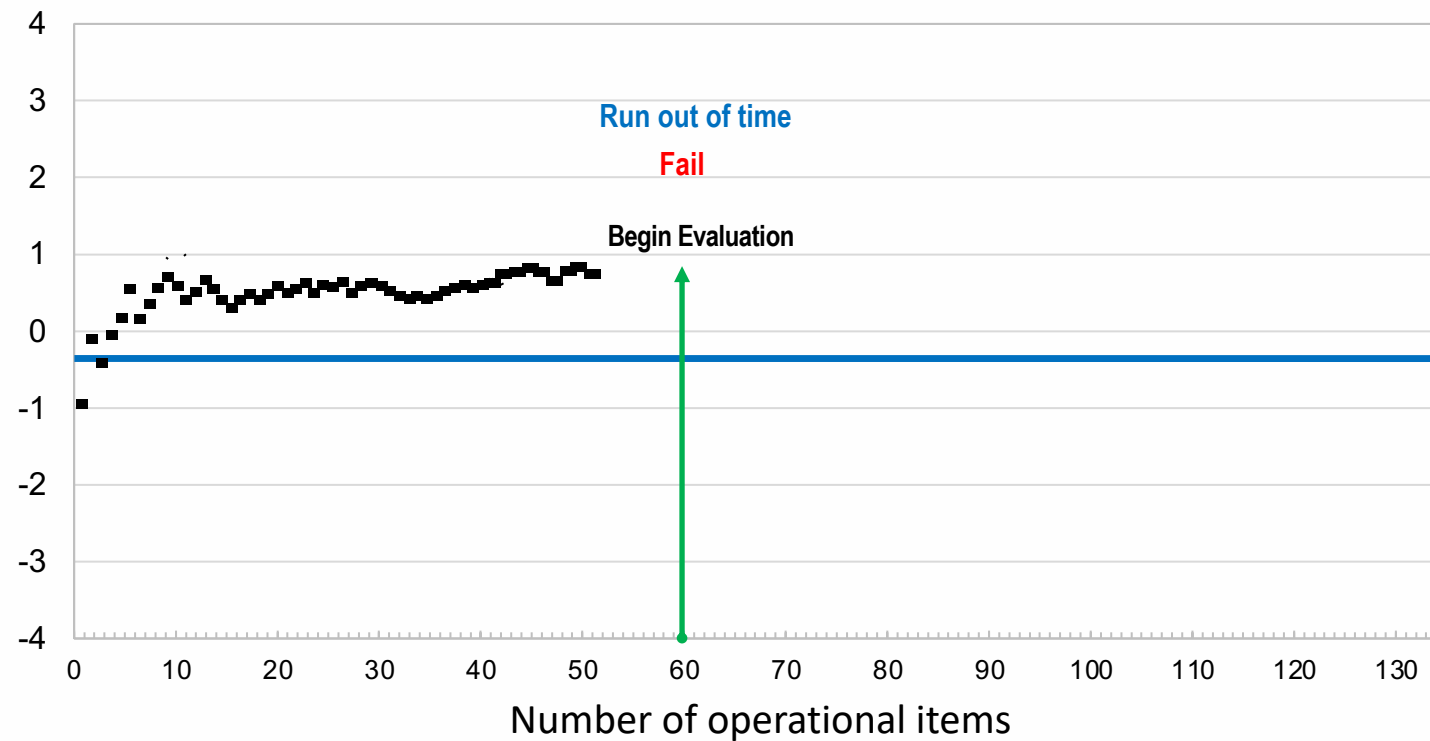
Stopping Rule #3: Run-Out-Of-Time

- A candidate spend **4** hours on the exam, but the exam has not been terminated.
- Responded to 60 at least OP items AND the final ability estimate is above the passing standard → **Pass**
- Responded fewer than 60 OP items or the final ability estimate is at or below the passing standard → **Fail**

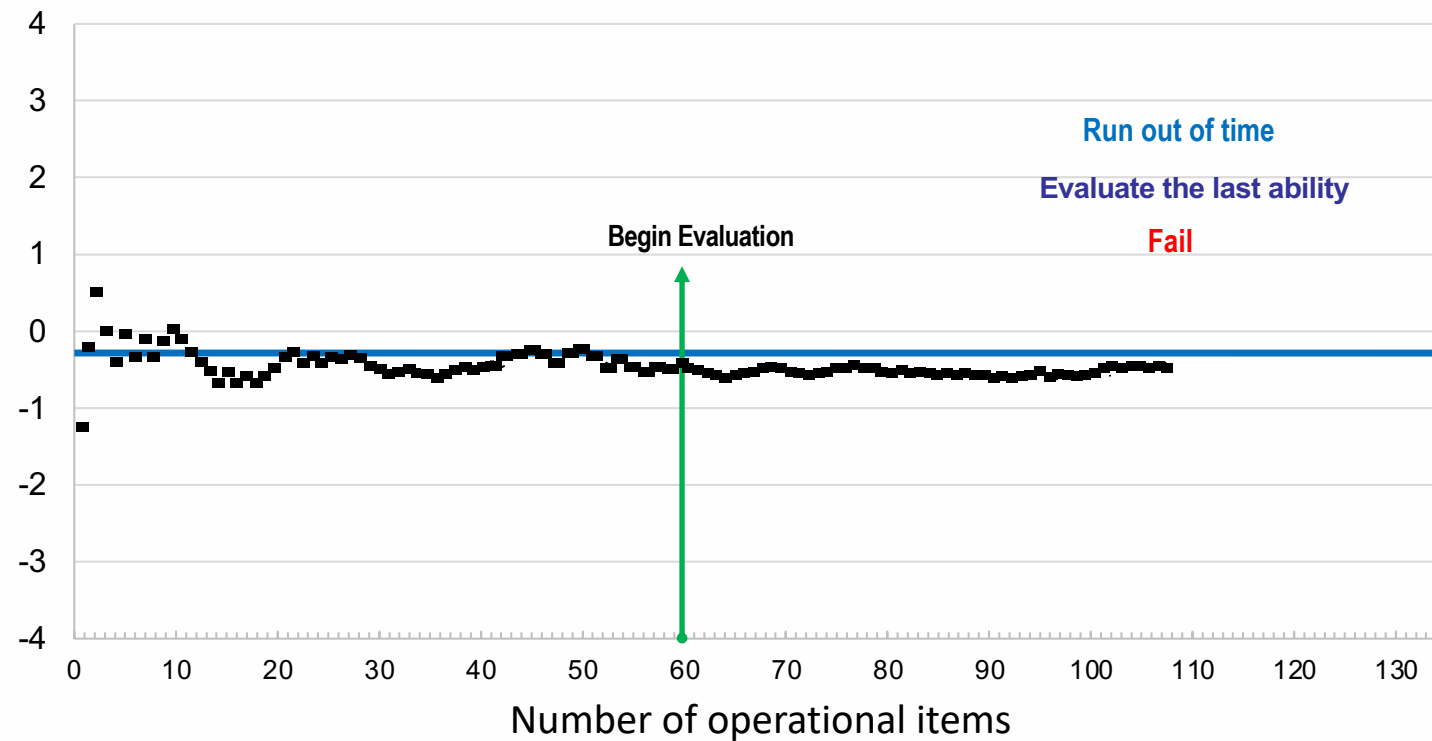
Sample REx-PN Run-Out-Of-Time Pass Chart



Sample REx-PN Run-Out-Of-Time Fail Chart



Sample REx-PN Run-Out-Of-Time Fail Chart



More Information

- For more information about REx-PN and CAT, visit rexpn.com

QUESTIONS?