Why are we here?

- We want to move beyond traditional multiple choice items
- We want to learn more about K-type items
- We want to learn more about multiple response items
- We want to learn how to train our SMEs on how to write multiple response items

Let’s begin with a few questions

- Who can define K-type items?
- Who uses K-type items?
### K-type Items

- Historically, they were the only items available to address limitations of multiple choice items
- Defined as:
  - Items in which a stem is presented along with a list of options prefaced with a number of a Roman numeral

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Argo</td>
<td>IV. The Departed</td>
</tr>
<tr>
<td>II. Avatar</td>
<td>V. The Help</td>
</tr>
<tr>
<td>III. Life of Pi</td>
<td>VI. The Kings Speech</td>
</tr>
</tbody>
</table>

Which of the following movies won the Academy Award for Best Picture?

- a) I, VI
- b) II, III, V
- c) I, IV, VI
- d) I, II, III, IV
- e) II, IV, V, IV

**Feedback?**
K-type Items Limitations

- More difficult than other multiple choice items
- Less discriminating than other multiple choice items
- Difficult for exam committee members or SMEs to create

Welcome multiple response!

- They look exactly like multiple choice items except an examinee can select one or more response options
- Can be thought of as multiple “True/False” questions in one item
- They can be easier for SMEs to develop

Which of the following movies won the Academy Award for Best Picture? Choose three (3) that apply.

- a) Argo
- b) Avatar
- c) Life of Pi
- d) The Departed
- e) The Help
- f) The Kings Speech
Feedback?

Stress
Relax

CLARB

- Replaced long K-type items with multiple response items
- Same candidate population
- Exact same questions

What a great idea for a research project!
Background of Study

- In 2012, CLARB transition from K-type items to MR items
- Data
  - 78 K-type items transitioned to MR items
  - Difficulty
  - Discrimination

Our Hypotheses

- Hypothesized that MR items would be easier than K-type items
- Hypothesize that MR items would be more discriminating than K-type items

Results

<table>
<thead>
<tr>
<th>Item Type</th>
<th>Average Difficulty</th>
<th>Average Discrimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-type</td>
<td>0.71</td>
<td>0.32</td>
</tr>
<tr>
<td>Multiple Response</td>
<td>0.59</td>
<td>0.13</td>
</tr>
</tbody>
</table>

![Difficulty vs Discrimination Graph]
Additional Analysis

- MR items were also analyzed for differences between two types
  - *Select all that apply*
  - Select a specific number that apply (i.e. *Select 2 that apply or Select 4 that apply*)
- Difficulty
- Discrimination

Results

<table>
<thead>
<tr>
<th>MR Item Type</th>
<th>Average Difficulty</th>
<th>Average Discrimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select All</td>
<td>0.50</td>
<td>0.13</td>
</tr>
<tr>
<td>Select a Specific</td>
<td>0.72</td>
<td>0.13</td>
</tr>
</tbody>
</table>

- Independent Means T-test
  - Difficulty
    - Statistically significant difference between “select all” items and “select N” items
      - Select N items were easier
  - Discrimination
    - No difference between “select all” and “select N”
Limitations of Study

- Small sample size
  - We have only been able to view results through TWO administrations of the exam
- MR items are new to candidates and could create anxiety
- Sample from candidate population could be different

Conclusions

- Not surprising MR items were more difficult given candidate's inexperience with item type
- MR items are less discriminating, however, they have also been used less and discrimination could improve over time

Conclusions

- Not all K-type items translated nicely into multiple response items
  - prompted the need for “select all that apply”
  - “select all” items are much harder than “select N”
Guidelines for MR item development

- A 4-option MR may have 2 keys
- A 5-option MR may have 2-3 keys
- A 6-option MR may have 2-3 keys
- A 7-option MR may have 2-4 keys
- A 8-option MR may have 2-4 keys
- A 9-option MR may have 2-5 keys

More Conclusions

- Multiple response items are easier for SMEs to develop

Future Research

- We still believe that MR items will become more discriminating as
  - the candidate population becomes more used to the new exam format
  - the candidate population becomes more used to the item type
  - SMEs become better at developing these item types

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Questions

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