

Walking the Tightrope:

Using Better Content Control to Improve CAT

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Walking the Tightrope:

Using Better Content Control to Improve CAT

All testing involves a balance between measurement precision and content considerations



Linear/Conventional/Form-based exams:

- Exam content specified to desired level of detail; content balanced across forms
- Exam contains stand-alone, independent items
- Measurement precision suffers for any individual test-taker

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Original/"Pure" adaptive exams:

- Items calibrated and scaled together; are interchangeable from a measurement perspective
- Exam contains stand-alone, independent items
- Optimal measurement precision for individual test-takers
- Content coverage may vary across test-takers

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CAT item-selection algorithms have evolved to accommodate content considerations



Original/"Pure" adaptive exams anchor the *non-constrained* end of the continuum

- Focus was on the optimization of a single variable (e.g., information)

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Constrained CAT (Kingsbury & Zara, 1989):

- Content area selected based on how far it is below its target admin percentage; item then selected from that content area
- Modified Multinomial Model, Modified Constrained CAT

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Weighted-deviations method (Stocking & Swanson, 1993)

- Minimize difference between target and actual values of relevant test attributes
- Weights determined by testing organization

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Shadow-Test Approach (van der Linden & Reese, 1998)

- Linear test assembled prior to the selection of each item, with max info at current θ , meets constraints, contains all items already administered
- Select item with max info at θ among the free items

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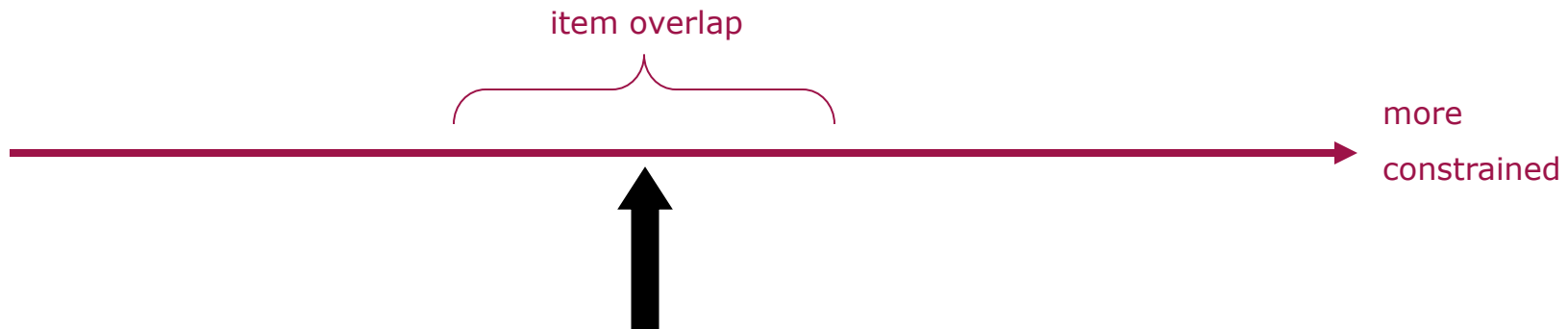
Testlets instead of fully adapted tests (Wainer & Kiely, 1987)

- Testlets selected based on total testlet information

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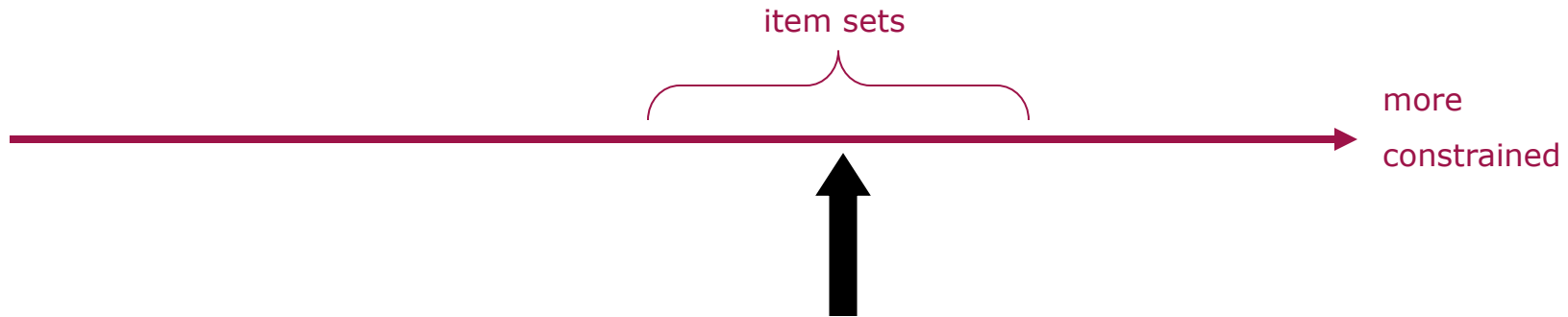
Administration of one item may preclude the administration of other item(s)

- Enemy items / “bad neighbors”
- Redundant item content

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Items may be related to each other via:

- Common stimulus (ex: reading passage, case study)
- Common item format and instructions

Exams may contain items in several different formats

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Research Questions

- How do the (new) item-selection algorithms perform in terms of measurement precision? item exposure? item-pool usage?
- Do we know the best way to incorporate item sets into adaptive exams?
- Consider exams with multiple item types. Must the item types be treated separately in a CAT, or can we adapt exams across item types?

Thank you!

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