



The ONPAR Project

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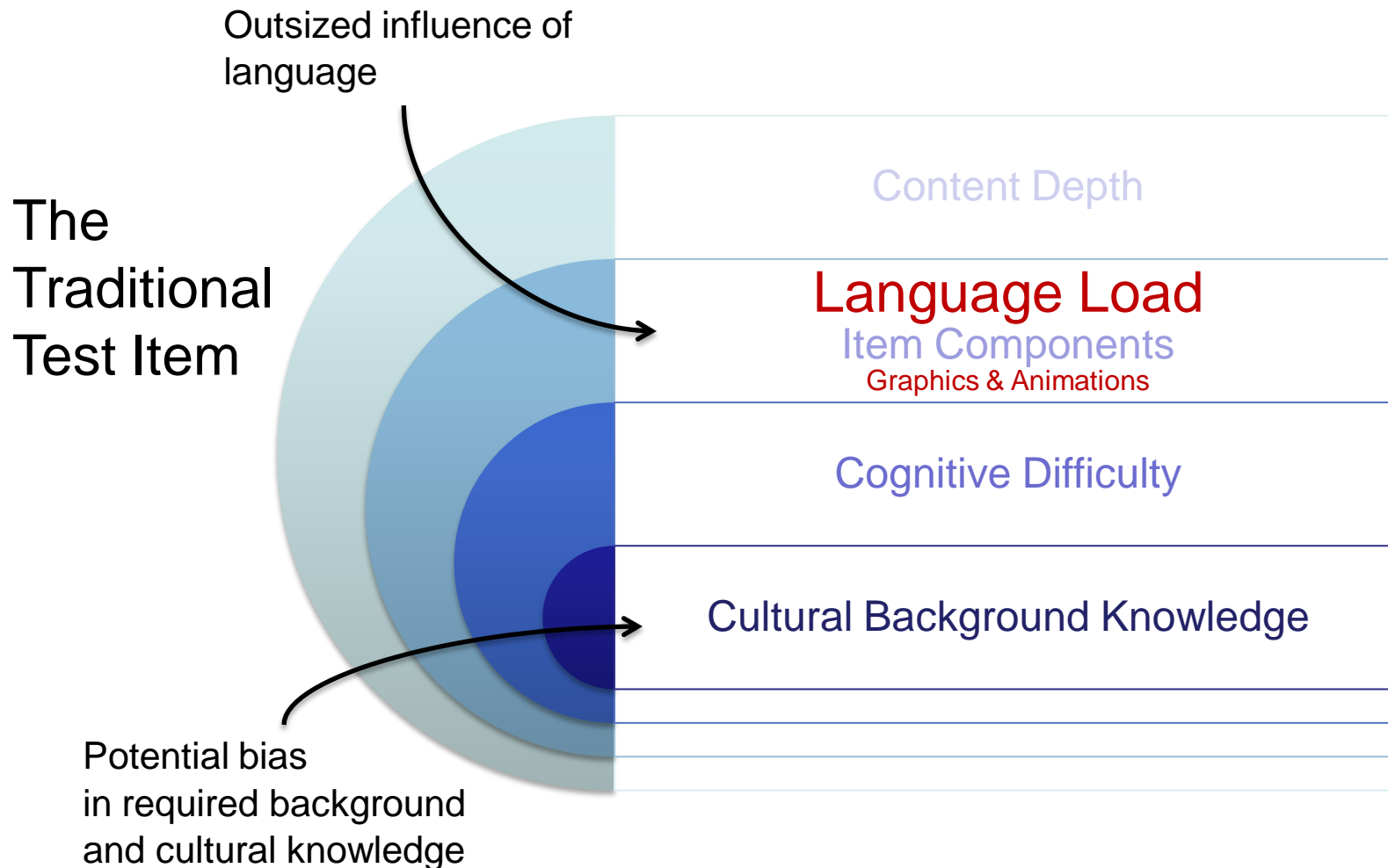
The Center for Applied Linguistics is proud to be celebrating its 50th birthday in 2009. Please visit the CAL web site at www.cal.org/cal50 for some reflection on our past and plans for our future.

- Funded through two EAG's (Enhanced Assessment Grants) from the U.S. Department of Education
- Lead States
 - Science – Rhode Island
 - Math – Illinois
- Wisconsin Center for Educational Research via the WIDA Consortium
 - Tim Boals, Project Director
 - Rebecca Kopriva, Principal Investigator
- Center for Applied Linguistics
 - Jim Bauman, Program Manager
 - David Gabel, Lead Research Associate for Item Development
 - Cathy Cameron, Lead Research Associate for Research Operations
 - Laura Wright, Lead Research Associate for Linguistic Analysis

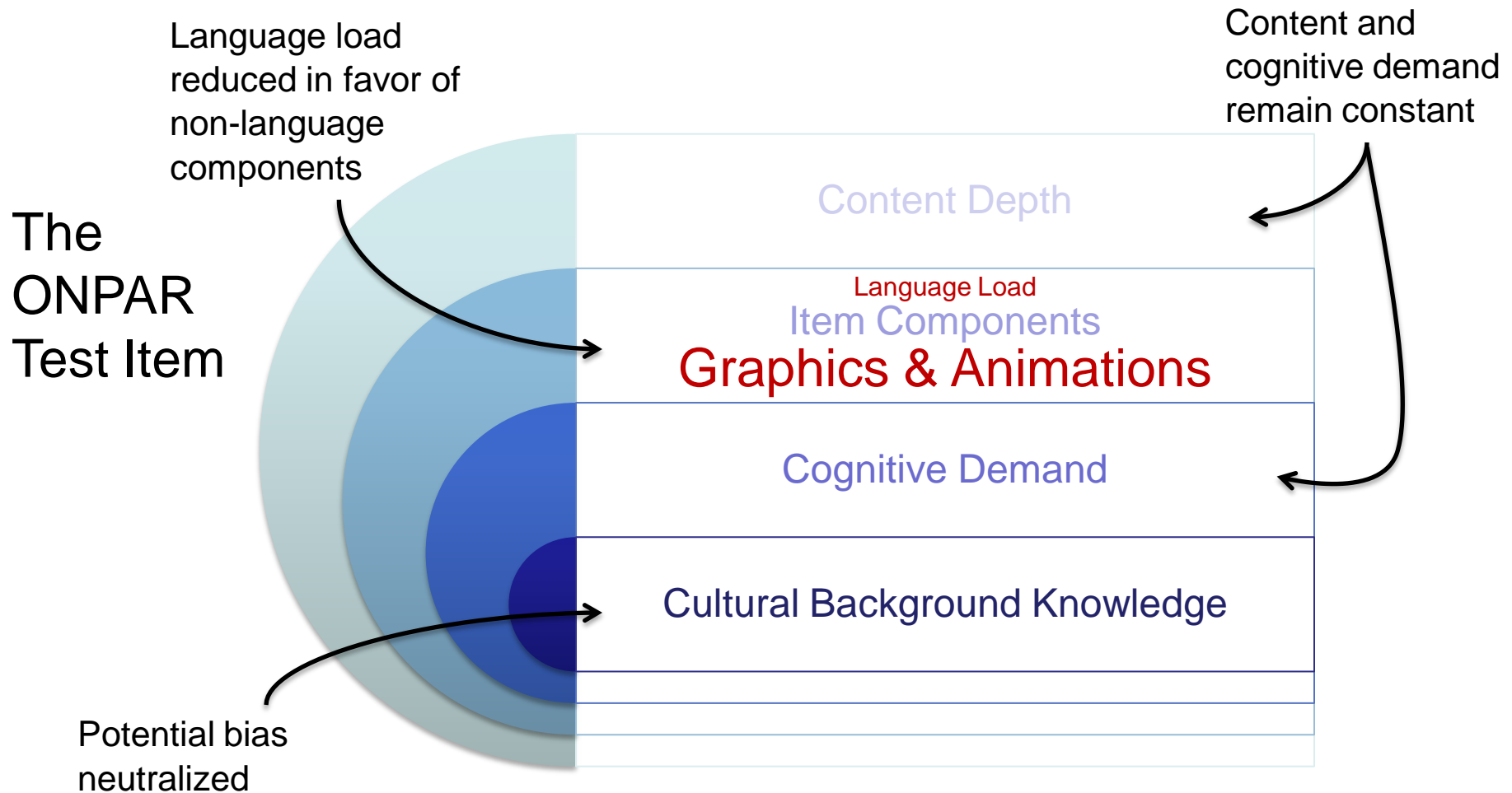
- Because of their lack of English language skill, English Language Learners (ELLs) do not perform well on:
 - Traditional paper-and-pencil based tests
 - Reading and writing demands exceed their capabilities
 - Multiple-choice items
 - Required discriminations between choices require fine-tuned language skills
 - Constructed-response
 - Productive language skills are lacking
 - Tests requiring cultural and background knowledge outside their experience
 - Unfamiliar contexts can confuse, rather than assist comprehension

How do you reliably assess science and math for ELLs who have real knowledge and skills in these areas?

Equity Imbalance in Content Testing for ELLs



Rebalancing Items for ELLs



- Item development
 - Create a core of items in science and math that successfully addresses a common set of standards at high depth of knowledge
 - Reduce the language load of these items without sacrificing content and cognitive complexity
 - Support access as needed in a reduced language context
 - Deemphasize multiple-choice item types in favor of item types more accessible to ELLs
- Test development
 - Supplement the core items with a set of items that reflect more local standards and lower depth of knowledge
 - Demonstrate comparability of test to traditional tests
- Computer-based testing
 - Integrate distribution, scoring, and reporting functions within a computer-based test delivery platform
 - Develop automatic scoring algorithms for each item

ONPAR Item Types—Part 1

ONPAR Item Types

Item Type	Response Option	Description
Multiple Choice	Point and click	Alternatives represent a plausible set of options, only one of which will be correct.
Extended Multiple Choice	Point and click	Same as multiple choice, but with more than 5 and less than 20 possibilities. Could also involve selecting 2 choices from a list.
Ordering	Drag and drop	Arrange objects into a specified order or insert objects into the correct location.
Matching	Drag and drop	Match items in one column to items in another.
Select and Classify	Point and click; Drag and drop	Select words and/or images and arrange them into categories.
Simple Relational Statement	Point and click	Select a word or image that fits into a statement frame (grid). End result constitutes a well-formed proposition. Choices may be conditioned or unconditioned. Logical phrases (and/or/but cause/effect) could connect boxes.
Representational Modeling	Tool box; Connect points or objects	Use static or dynamic tools from a tool box to construct a response or complete a structured diagram.

Bolded item types are currently in use in ONPAR items.

ONPAR Item Types—Part 2

ONPAR Item Types (con't)

Item Type	Response Option	Description
Graphical Modeling	Point and click; Drag and drop; Slider bar	Model data by completing a graph (e.g., shading a portion of a geometric shape, drawing a line to represent trends in data, extending a bar graph).
Stimulus Manipulation	Visual highlighting; Slider bar; Menu bar	Manipulate an image or an animation.
Free/Open Response	Key padding; Drawing	Could be a keypad, calculator response, or construction of mathematical sentences.
Complex Relational Statements	Drag and drop; Key padding	Complex type supported by a rich or extensible representation allowing for multiple means of engagement.
Problem Solving Vignette	All	A group of items that relate to each other and to a common stimulus with the goal of solving a problem.
Thematic Probing	All	A group of items that together involve a common or closely related stimulus. The items could be dependent on each other.
Schema Completion	Drag and drop	Complete a schematic diagram, picture or table by selecting appropriate options from a group of choices

Bolded item types are currently in use in ONPAR items.

Item Standardization Features

- Text and Font properties
- Icons
- Response options
- Item stimulus
- Response space
- Navigation buttons

What explains Moon phases?

Match

and

Earth absorbs
Moon reflects

? ? sunlight

Question: 1 of 1



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Navigation Bar

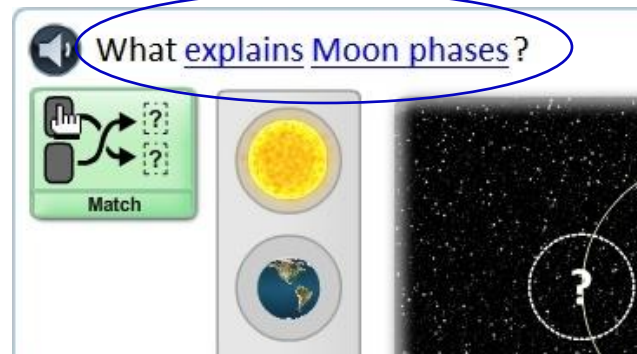
- Includes buttons to initiate an item, replay animations, reset the response space, submit items, and move between parts of items that contain multiple parts.
- Bar also contains question tracking indicator.
- Grayed out buttons are not available in the current context.
- Plans to develop a status bar within an item



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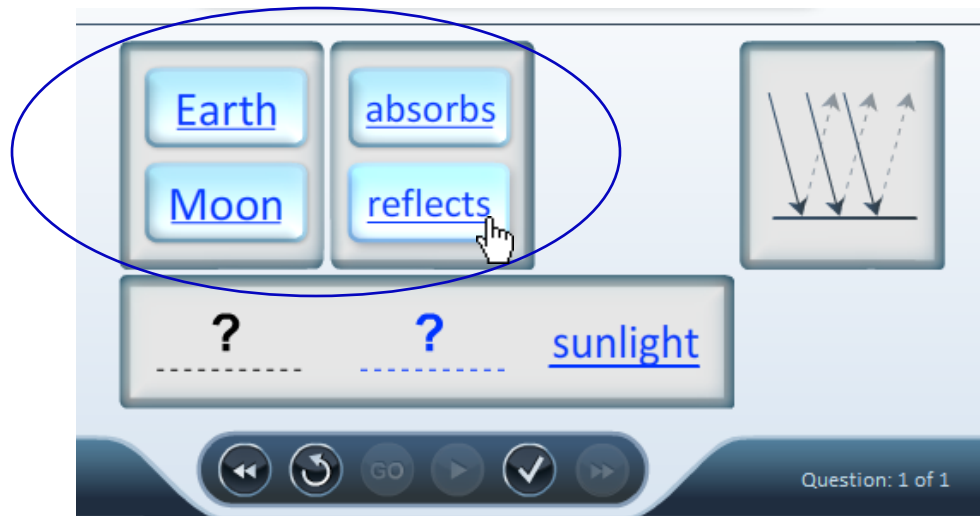
Text Properties

- Prompt uses full sentences.
- Prompt is located in top left corner of item.



Font Properties

- Type face and size are used consistently in all text.
- Words underlined in blue control roll-overs or pop-ups that clue the meaning of the words.



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Speaker Icon

- Activates an English or L1 audio of item prompt
- Korean, Spanish and English audio options

Item Type Icon

- Identifies the item's response mechanism
- Animated to demonstrate response procedure
- Identical in the low and very low language versions
- The same item type may be expressed with different icons, depending on the required type of physical response



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Response Options

- The look, number, and position of response options varies with the item type (and icon).
- In the Schematic completion item type illustrated, the options are represented by a set of illustrations, of which an ordered combination is the correct or key value.
- In the Make a sentence icon, the response options are an ordered list of supported words.
- A roll-over on the icon highlights and identifies the location of the response options and response space.

What explains Moon

Match

and

Make a sentence

Earth absorbs

Moon reflects

? ? sunlight

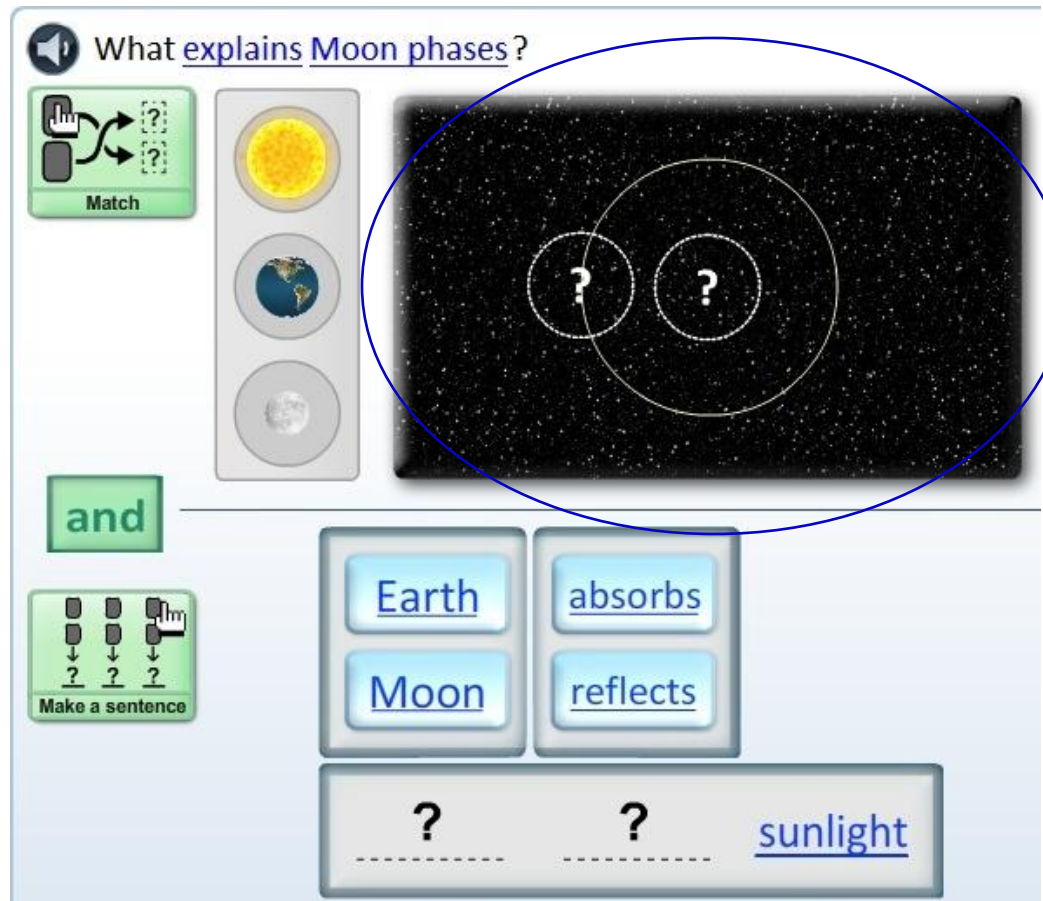
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Item Stimulus

- The item stimulus provides the situational context for the item's content.
- The structure of the stimulus varies with the item type. In many instances the stimulus is animated.
- The response space can be structurally included in the stimulus (as illustrated here).
- The stimulus occupies the center right of the item

What explains Moon phases?



Match

and

Make a sentence

Earth Moon absorbs reflects


? ? sunlight

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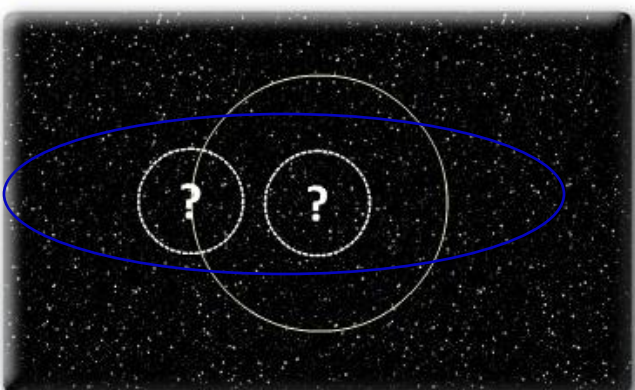



Response Space

- The structure of the response space varies with the item type.
- The space is typically located within or below the stimulus area.
- The response space is typically cued with a “?” bounded within a dotted line frame.

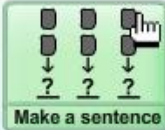
What explains Moon phases?



Match



and



Make a sentence

Earth	absorbs
Moon	reflects

? ? sunlight

- Tutorial
- Mystery substances
- Build Cube
- Buoyancy
- Force Box
- Pond Ecosystem

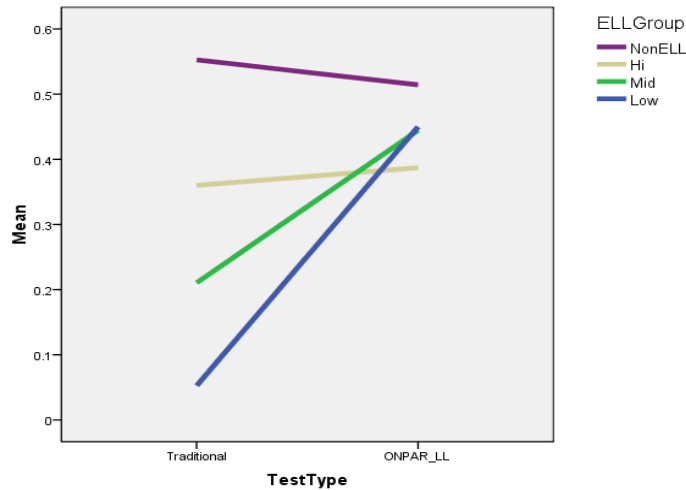
Research Agenda: ONPAR Science Grant & Math Grant

- Cognitive labs with:
 - ELLs at different levels of proficiency
 - Native English speakers
- Independent judgment review of cognitive demands in both ONPAR and standard items to verify:
 - Science and math targets
 - Cognitive demands in ONPAR and standard items
 - Facilitative and/or inhibitory effects of construct-irrelevant item components
- Controlled studies with science items using ONPAR and standard items
- Large-scale study with math items to investigate convergent and discriminant validity vs. other salient indicators

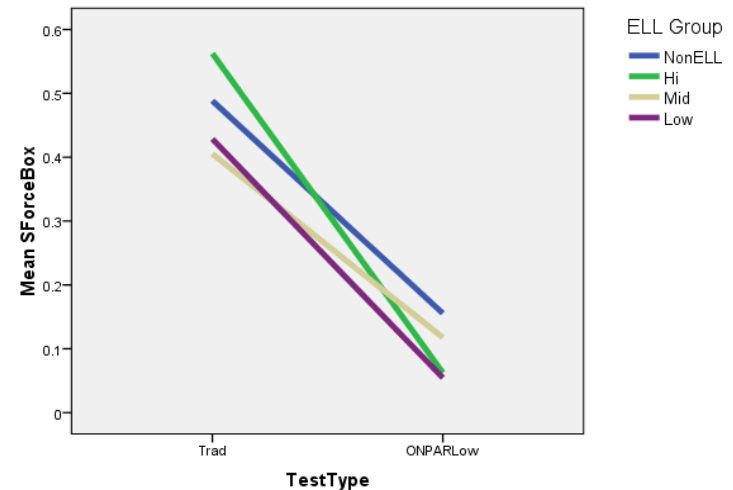
Timeline

- Cog Labs
 - Computer-based testing issues—Spring 2008
 - Cognitive-Linguistic issues—Spring 2009
- Judgment Reviews
 - Science—Jan 2009
 - Math—Jan 2010
- Controlled Studies
 - Science 8th Grade—Spring 2008 & Fall 2008
 - Science 4th Grade—Fall 2008
- Large-Scale Trials
 - Math—Fall 2009
 - Science—Fall 2009

Pond Ecosystem Grade 4



Force Box Grade 8



Pond Ecosystem (Grade 4)

- Shows convergence of scores on the ONPAR form. This is the desired result.

Force Box (Grade 8)

- The range of scores on the two forms is very similar, however, the scores on the ONPAR form are much lower than on the traditional form.
 - The Force Box item has a very different guessing parameter on the two forms.
 - Chance on Traditional: $1/4$
 - Chance on ONPAR: $1/2 * 1/2 * 1/2 * 1/2 = 1/16$
 - The Force Box item may be getting at deeper science – further investigation is required.

Large variation in computer skills

- Practice items in tutorial are critical to accessibility

Large variation in science curriculum

- In some cases, we turned to higher grade level students to determine clarity of item tasks

Screen elements

- Images and animations can be effective at setting context
- Some text is required to clarify item task
- Students need some assistance with different item types – interactive icons
- Rollover supports that highlight relevant area of the screen help to clarify task
- Too much information on the screen is distracting
 - Focus needs to be on the question, not on the supports
 - All information on the screen must be relevant to task and target
- Supports used more frequently on “difficult” questions
- Multiple screen items introduce additional challenges
 - Carry-over critical information between screens
 - Clearly identify new information on screens
- Iconic imagery - question marks / arrows have multiple meanings

- Alternate item types generally seem to be an effective way to get at high depth of knowledge for ELL students, with the support of 10 minute tutorial. We are finding that the animations and images we are using generally seem to be effective in replacing large amounts of text. Also, our general strategy of reducing amount of language, and supporting items using rollovers and animated icons seems to reduce access issues for these students.
 - Alternate item types
 - Reduced language
 - Interactive icons
 - Images and animations
 - Tutorial
 - Review page
- Our research results are showing that a balance of the right amount of information is critical. Images and animations provide different information than text, so we need to ensure we are showing exactly what we intend.

- Developing a linguistic framework to guide development of future items.
- Continuing with the development of science items and plan a field test for early 2010.
- Using the science project as a starting point, we are now developing math items based on similar design principals.
- Initial field test for math items planned for Fall 2009
- Research results are showing good results with this strategy, but we need more students and more trials

Advantages & Disadvantages to ONPAR Approach

- Advantages
 - Creates more equitable items for ELLs (and perhaps other special populations)
 - Aligns better with inquiry-based and interactive instructional approaches
 - Offers possibility of embedding and integrating accommodations for test takers
 - More motivating for test takers
- Disadvantages
 - Cost of item construction is higher than for traditional items
 - Assessment targets focused specifically on academic language are not treatable
 - Requires technical infrastructure for testing which is still not universally available



Advantages and
Disadvantages of
ONPAR Items
Versus
**TRADITIONAL
ITEMS**



The ONPAR Project

Thanks you

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