



# Using Differential Item Functioning to Investigate the Impact of Testing Accommodations on an English Language Arts Assessment for Students Who are Blind and Visually Impaired

Elizabeth Stone

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# TARA™

The Technology Assisted Reading Assessment (TARA™) project has two main purposes:

- To research and develop standards-based reading assessments for students who are blind or visually impaired
- To research the design and development of an alternate assessment of modified achievement standards in reading for examinees who are blind or visually impaired

The current study is part of the research phase of the project.



# Nature and Purpose of Study

- Evaluate comparability of measurement characteristics for students without disabilities and students who are blind or visually impaired
- English Language Arts component of large-scale state standards test for 4<sup>th</sup> and 8<sup>th</sup> grades
- Differential Item Functioning (DIF)
- a priori DIF hypotheses



# Description of Test

- ELA component of large-scale state standards test
- 75 multiple choice questions for each grade

	Standard	Grade 4		Grade 8	
		Number of Questions	Percentage of test	Number of Questions	Percentage of test
Reading	WORD ANALYSIS, FLUENCY, AND SYSTEMATIC VOCABULARY DEVELOPMENT	18	24%	9	12%
Reading	READING COMPREHENSION	15	20%	18	24%
Reading	LITERARY RESPONSE AND ANALYSIS	9	12%	15	20%
Writing	WRITTEN AND ORAL ENG. LANG. CONVENTIONS	18	24%	16	21%
Writing	WRITING STRATEGIES	15	20%	17	23%

- **Note:** The 4<sup>th</sup> grade assessment also contains an essay component that was not analyzed and will not be discussed.



# Description of Samples: General Notes

- Reference group is sample from all such students in the grade
- DIF sample size typically at least 100, so some groups were combined
- State has large English Language Learner (ELL) population
  - Sample sizes weren't large enough for ELLs and non-ELLs to be separated
  - Results were comparable using combined and non-ELL only reference group



# Description of Samples: Summary Statistics

Grade	Summary Statistics	Students without Disabilities	Students who are Blind or Visually Impaired	
		Reference	Large Print	Large Print or Braille
			Focal	Focal
4	N	30225	105	141
	Mean	48	37	37
	SD	14	15	15
8	N	30069	74	98
	Mean	46	34	35
	SD	12	12	14



# Differential Item Functioning (DIF)

Compares performance on an item by reference and focal groups using matching criterion

- Matching criterion: ELA score
- Mantel-Haenszel method
- ETS delta DIF categories



# a priori DIF Hypotheses

- **POSITION** First 20% or last 20% of test
- **VISUAL CONTENT** Complex or distracting
- **TEXTUAL CONTENT** Insensitive or offensive
- **LANGUAGE** Multiple meanings; homophones; unusual syntax
- **FORMAT** Contracted vs. uncontracted braille



# Grade 4 Results

## B or C DIF

Hypothesized  
to show DIF

	Yes	No	
Yes	3	41	44
No	6	25	31
	9	66	75



# Grade 8 Results

## B or C DIF

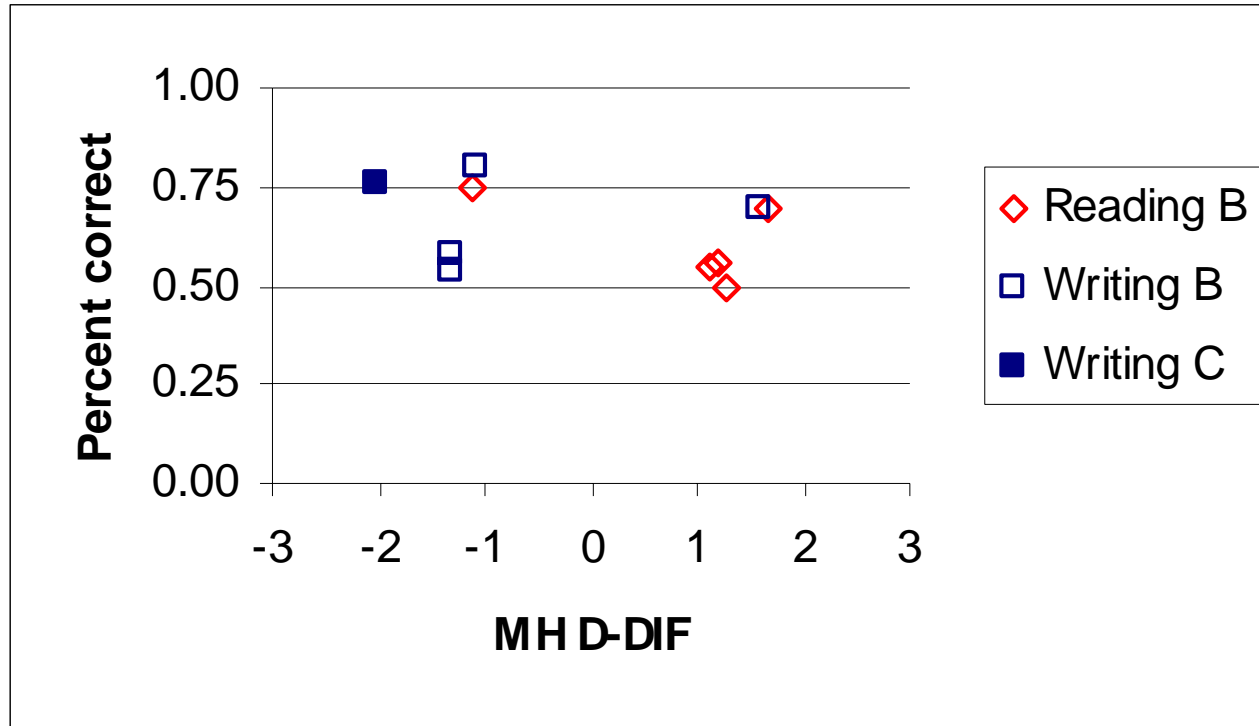
Hypothesized  
to show DIF

	Yes	No	
Yes	4	5	9
No	6	60	66
	10	65	75



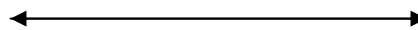
# Grade 4: Students without disabilities compared with students who are blind or visually impaired using a large print form

Easy



Difficult

Favors Students without Disabilities

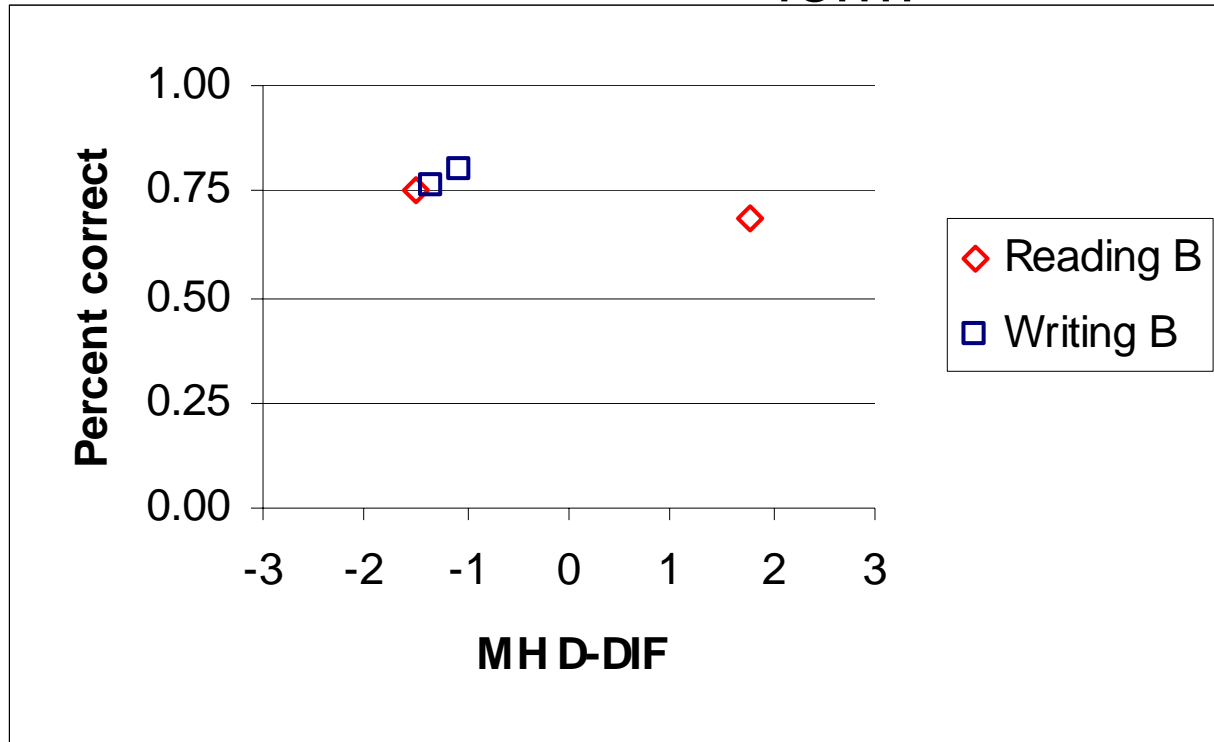


Favors Students who are Blind or Visually Impaired using Large Print



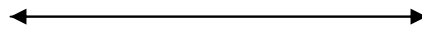
# Grade 4: Students without disabilities compared with students who are blind or visually impaired using a large print or braille form

Easy



Difficult

Favors Students without Disabilities

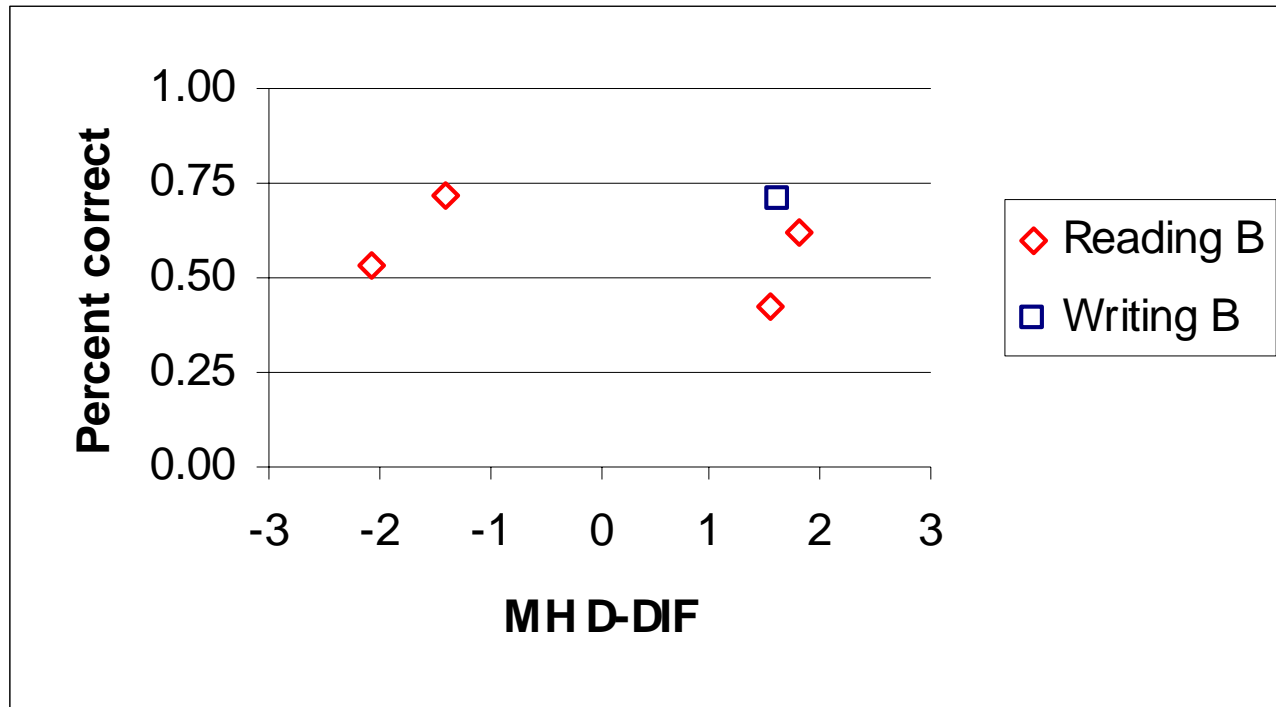


Favors Students who are Blind or Visually Impaired using Large Print or Braille



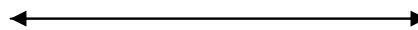
# Grade 8: Students without disabilities compared with Students who are blind or visually impaired using a large print form

Easy



Difficult

Favors Students without Disabilities

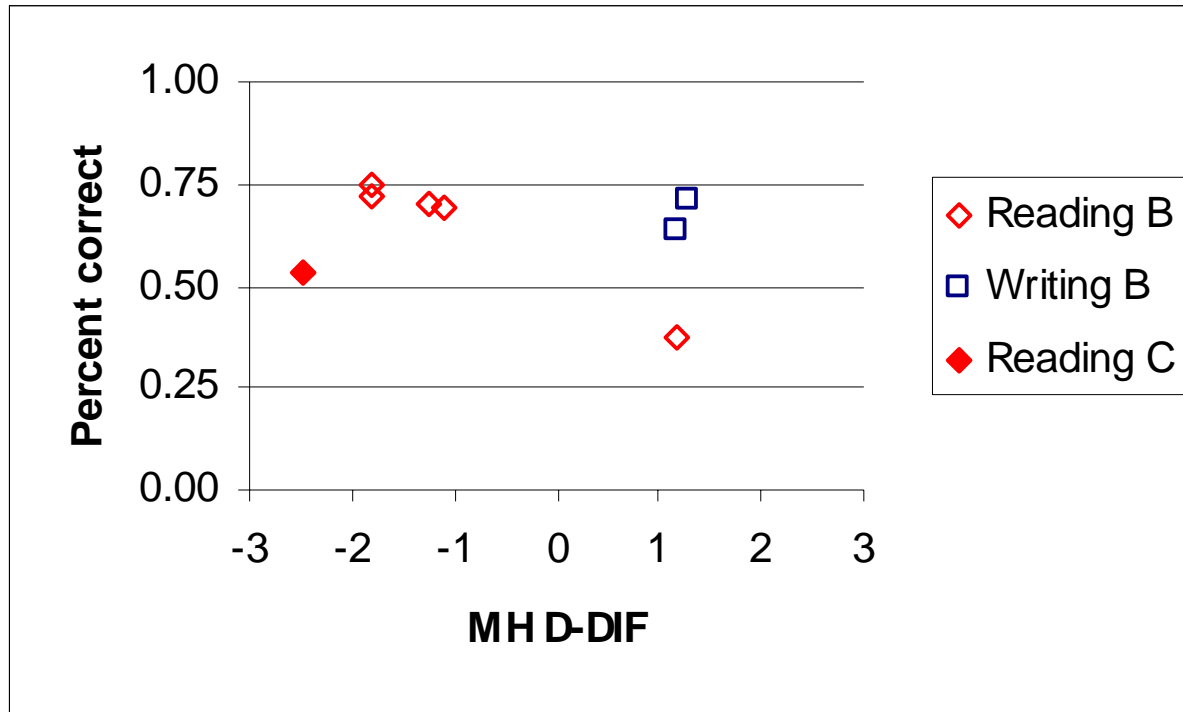


Favors Students who are Blind or Visually Impaired using Large Print



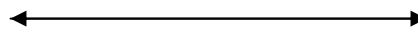
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Easy



Difficult

Favors Students without Disabilities



Favors Students who are Blind or Visually Impaired using Large Print or Braille



# Summary of DIF Results

- Number of DIF items smaller than expected
- DIF over-hypothesized
- Effects did not seem to apply for all items associated with a passage
- Where DIF did seem to show up:
  - Metaphor
  - Items and passages related to how people experience the world (e.g. through touch)
  - Unusual document format
- Where DIF did not seem to show up:
  - Items and passages involving typically “sighted” activities or interests, e.g. photography (in fact, some favor focal groups)



# Discussion

**Caution:** Results may not be typical!

- Sample sizes smaller than desired
- Not enough of each type of item to support inference of pattern

Some inferences can be drawn that may be useful in test development.



# Future Steps

- Examine items and item types across administrations
- Other DIF methods
- Test analysis
- Trend analysis