



# Investigating the interaction of reading comprehension ability measures and text type

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## Introduction

- Current research investigating cognitive differences between readers of varying skill levels has identified working memory capacity and metacomprehension as two important constituents of reading ability. Skilled readers with early and continued exposure to reading obtain these cognitive skills to comprehend texts better than less-skilled readers (Lonigan, 2006); Whitehurst & Lonigan, 1998).
- The first constituent, working memory (WM) refers to a person's ability to hold and manipulate information (Nouwens, Groen, & Verhoeven, 2017). Previous research has demonstrated that individuals with higher WM capacity were better able to focus on assigned tasks and manipulate more information at one time, which increased their ability to comprehend text (McNamara & Scott, 2001).
- The second constituent is metacomprehension, a component of metacognition referring to a reader's ability to judge their own comprehension of a text. Metacomprehension has been shown to be positively correlated with reading comprehension ability, indicating that high-skilled readers typically have higher levels of metacomprehension (Lin, Moore, & Zabrocky, 2000).
- Comprehension may vary with text type. Narrative texts have been found to be easier to comprehend than expository texts, as expository texts attempt to provide more in-depth information and require more cognitive resources for comprehension (Eason, Goldberg, Young, Geist, & Cutting, 2012).
- Different reading comprehension tests (e.g. Nelson-Denny Reading Test (NDRT; Brown, Fishco, & Hanna, 1993) and the Multi-Media Comprehension Battery (MMCB; Gernsbacher, 1997)) predict performance differently depending on text type. The NDRT has been shown to be a better predictor of reading comprehension for narrative texts while the MMCB has been shown to be the better predictor for expository texts. These differences are also evident when reading skill is accounted for (McDaniels, Hines, & Guyunn, 2002).
- Currently, there is little research comparing multiple reading comprehension tests and how performance on these tests interacts with text type. Integration of a third comprehension test will allow future research to determine the best practices for testing expository and narrative text comprehension.

## Research Questions

- In Experiment 1, our goal was to find correlations between three common reading comprehension tests: the NDRT, the Gates-MacGinitie Reading Test (GMRT; Gates & MacGinitie, 2000), and the MMCB. We also examined correlations between the tests and a working memory task as well as a metacognitive questionnaire.
- In Experiment 2, our goal was to predict reading performance for both an expository (e.g. educational) and narrative (e.g. leisurely) text using one of the three reading tests. We also aimed to determine which reading test would be best suited for specific text types.

## Methods

### Experiment 1:

Participants consisted of 77 undergraduate students from the University of New England. They were given either research credit or a \$20 gift card for their participation.

1. Participants were assigned to take three reading comprehension tests (NDRT, GMRT, and MMCB) in a random order to measure their reading comprehension ability.
2. They also completed a reading span task from the Psychology Experiment Building Language (PEBL; Mueller & Piper, 2014) as a measure of working memory, and the Metacomprehension Strategy Index (MSI; Schmitt, 1990) to measure their metacognitive awareness level.
3. To conclude the study, participants completed a demographic questionnaire.

### Experiment 2:

Participants consisted of 307 undergraduate students at the University of New England. They were given either research credit or a \$10 gift card for their participation.

1. Participants were assigned to read both an expository and narrative text on a computer, and then answer comprehension questions based on the text they read.
2. They were randomly assigned to take either the NDRT, GMRT, or MMCB to measure their reading comprehension performance.
3. To conclude the study, participants completed a demographic questionnaire.

## Materials

### Sample GMRT Passage:

Sometimes – not very often – we get two full moons in one month. That second full moon is called a “blue moon.” No one knows why. Now we say “once in a blue moon” to mean “once in a long time.”

### Sample Narrative Passage:

On a typical summer morning, Antonina leaned on the wide flat ledge of the terrace wall. Not all the bellowing, wailing, braying, and rumbling around her originated outside—some issued from the subterranean bowels of the villa, others from its porch, terrace, or attic. The Zabinskis shared their home with orphaned newborn or sick animals, as well as pets, and the feeding and schooling of lodgers fell to Antonina.

### Sample PEBL Working Memory Task:

Directions: “In this task, you will try to memorize letters you see on the screen while you also read some sentences.”

Directions for the letter memory task: “Try to remember each letter in the order they are presented. When you have selected the letters, and they are in the correct order, hit the ENTER button. If you have any questions, knock on the door for the research assistant.”

### Sample MSI Question:

Before I begin reading, it's a good idea to:

- Make sure I can pronounce all the words before I start.
- Use my questions and guesses as a reason for reading the story.
- Check to see if I have read this story before.
- Think of a better title for the story.

### Sample GMRT Question:

To be a “blue moon”, the moon must be:

- Dark
- Long
- Blue
- Full

### Sample Narrative Question:

At the onset of the story, who did the Zabinskis share their home with?

- The homeless
- Animals
- Orphan children
- Soldiers

### Sample Letter Sequence:

- WIX
- GOENFL

### Sample Sentences:

- A giraffe has a long neck.
- Apples grow on wheels.

## Results

### Experiment 1:

Table 1. Correlations for Reading Comprehension Tests, Metacognition, and Working Memory

	1	2	3	4	5
1. Nelson	--				
2. Gates	.65**	--			
3. MMCB	.53**	.58**	--		
4. Meta	.24*	.26*	.18	--	
5. PEBL	.22*	.34**	.32**	.07	--

Note. All coefficients are significant at \*\*p<.01, \*p<.05; two-tailed, N = 77.

### Experiment 2:

Table 2. Correct Recall for Expository Passages for the Three Reading Comprehension Tests

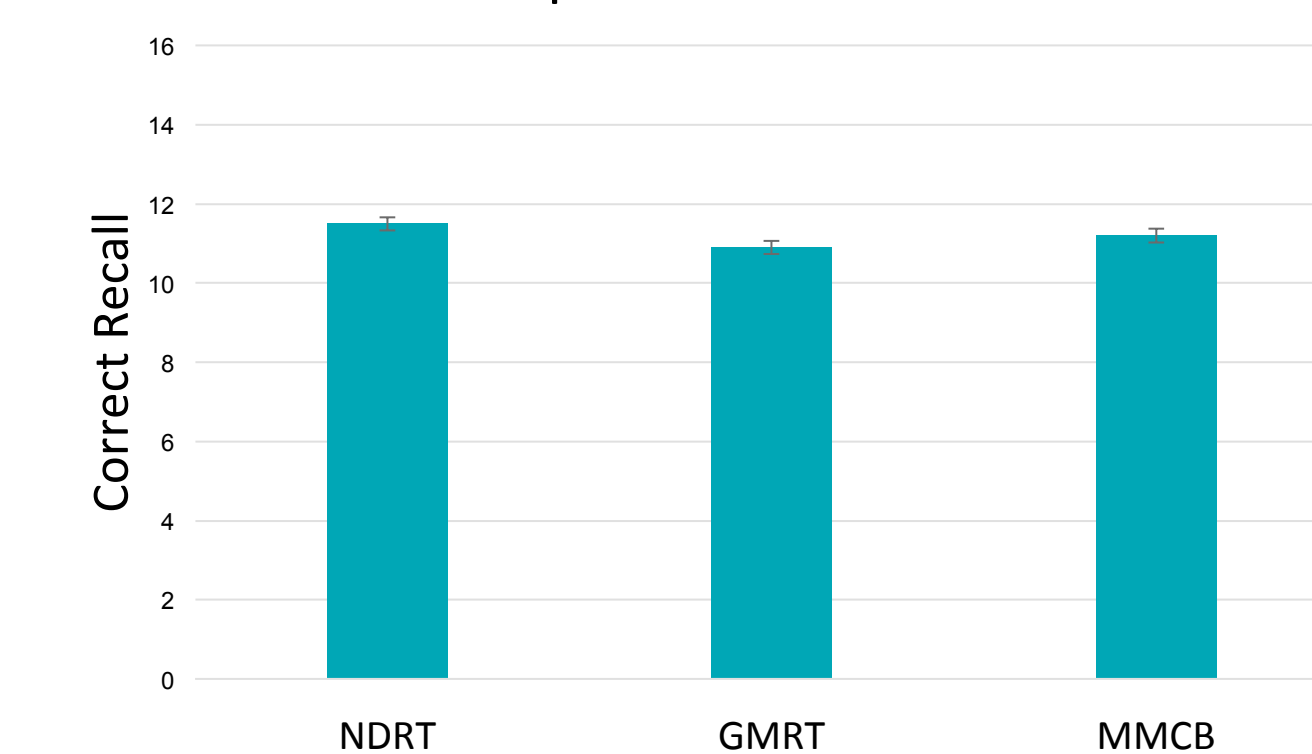
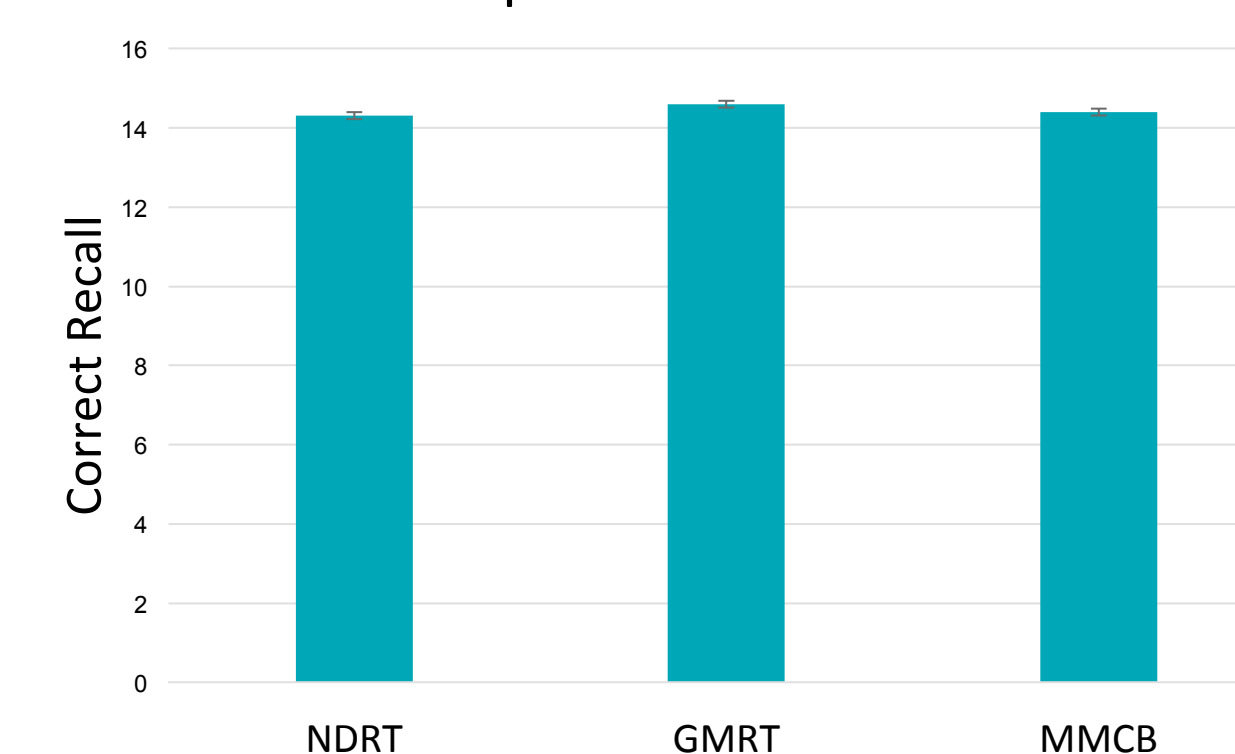


Table 3. Correct Recall for Narrative Passages for the Three Reading Comprehension Tests



## Discussion

- The results of Experiment 1 revealed significant correlations among all three reading comprehension tests, confirming that the measures assess the same skill set. We also observed that all three reading tests were significantly correlated with WM capacity. This is important because previous research has shown that working memory is an important predictor of reading comprehension success (McNamara & Scott, 2001). We also found that metacomprehension is significantly correlated with the NDRT and GMRT, but not the MMCB.
- The preliminary results of Experiment 2 showed that all three comprehension tests significantly predicted performance on both narrative and expository text.
- The results presented in this study are parallel to the findings from McDaniel, Hines, and Guynn (2002) in that the NDRT was a significant predictor of performance on narrative text comprehension and the MMCB was a significant predictor of expository text comprehension. The current results expanded on these previous findings by showing that the GMRT was also a significant predictor of either narrative or expository text comprehension.
- Further analysis of the current data set and follow-up studies will allow us to make more inferences about which tests are best suited for the different text types and inform researchers and educators about which test would be best suited for taking the different cognitive factors that contribute to comprehension into account (e.g., WM or metacomprehension).

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