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## Introduction

Readers often fail to notice semantic anomalies such as, "It is well known that Moses took two of each kind of animal on the Ark" (e.g., Erickson & Mattson, 1981; Barton & Sanford, 1993). The dependent measure in these studies involved an explicit detection task. Using reading time as a measure, Williams, Cook, and O'Brien (2018) found that readers experience a disruption measured by slowed reading times on sentences containing semantic anomalies, but in many instances this occurs only after a delay (on the sentence after the target).

Williams et al. (2018) explained their results within the context of the RI-Val model (O'Brien & Cook, 2016a; O'Brien & Cook, 2016b) and the coherence threshold in particular. The coherence threshold marks the point at which comprehension is deemed sufficient for the reader to move on in the text. Williams et al. (2018) found that when the coherence threshold was set relatively low, readers were not disrupted by semantic anomalies, or they were only disrupted after a delay. In contrast, when the coherence threshold was set relatively high, readers experienced an immediate disruption.

Williams et al. (2018) were able to successfully raise the coherence threshold with a task-based manipulation; they provided the reader with three comprehension questions after each passage, thereby encouraging more careful reading. The current study investigated a way of manipulating the readers' coherence threshold by using a text-based manipulation: An inconsistency was placed before the semantic anomaly in the text. If encountering an inconsistency alerts the reader to be more careful, it should raise the coherence threshold, and as in Williams et al. (2018), readers should notice the subsequent semantic anomaly immediately.

**Table 1. Sample Passage from Experiment 1**

**Consistent Introduction**  
Tom taught a **Bible studies** class at his local **church**. He loved giving lectures and helping people in their **religious pursuits**. His favorite part of the job was discussing and analyzing the **Bible**. He always felt a sense of mysticism when he opened that ancient text that had been written so long ago. Tom was a good teacher and the people in his **church** love to ask him questions.

**Inconsistent Introduction**  
Tom wanted to be a **Bible studies** teacher, but it was impossible because his **church** was too small to offer classes. Still, he loved going to **church** and engaging in **religious pursuits**. Even though he didn't end up teaching about the **Bible**, he still enjoyed discussing and analyzing it. He always felt a sense of mysticism when he opened that ancient text that had been written so long ago.

### Background

Tom was an avid reader who enjoyed many different kinds of magazines and books. There were piles of books all over his house and a bookshelf in every room. Each morning, Tom started his day by eating a bowl of cereal and reading. One morning when Tom got up to start his day he found that he had more time than usual. He did not need to be into work early, so he took his time getting up and making breakfast.

**Target Sentence:** He would use this time to plan his next Bible class.

**Spillover Sentence:** Tom sat down with his breakfast and started to plan.

### High Context

Tom decided to read some of the **Bible**. He began with the **Old Testament** and the many stories found within its chapters. Tom read about the **beginning of mankind** and a **great flood that God had used to punish His people**. Tom was devotedly **religious**, and he thought that by reading about prominent **religious** figures he would better understand his own faith and be more knowledgeable for discussions with members of the church.

One new piece of information Tom learned was that

**Target Sentence:** Noah/Moses brought two animals of each kind on the ark.

**Spillover Sentence:** Tom enjoyed learning about the ark in the Bible.

### Closing

Eventually, Tom's eyes grew tired and he got up to take a break. He packed his bags for work and thought about all the interesting things he had read about.

## Experiment 1

In Experiment 1 an attempt to increase the readers' coherence threshold was made by placing a contradiction immediately before a semantic anomaly in short experimental texts.

### Method

**Participants:** 48 undergraduate students participated in each experiment.

**Materials:** 24 experimental passages were adopted from Williams et al. (2018). An example is provided in Table 1. Each passage began with one of two introductions: **Consistent** or **Inconsistent**. This was followed by the first target sentence that was either consistent or inconsistent with the introduction. The second half of each passage contained contextual information that was supportive of both the correct and incorrect version of the second target sentence. The second target sentence was either **Correct** or **Incorrect** (i.e., contained a semantic anomaly or not). In each experiment, four sets of materials were created. Each passage appeared once in each of the four conditions: Consistent-Correct, Consistent-Incorrect, Inconsistent-Correct, and Inconsistent-Incorrect.

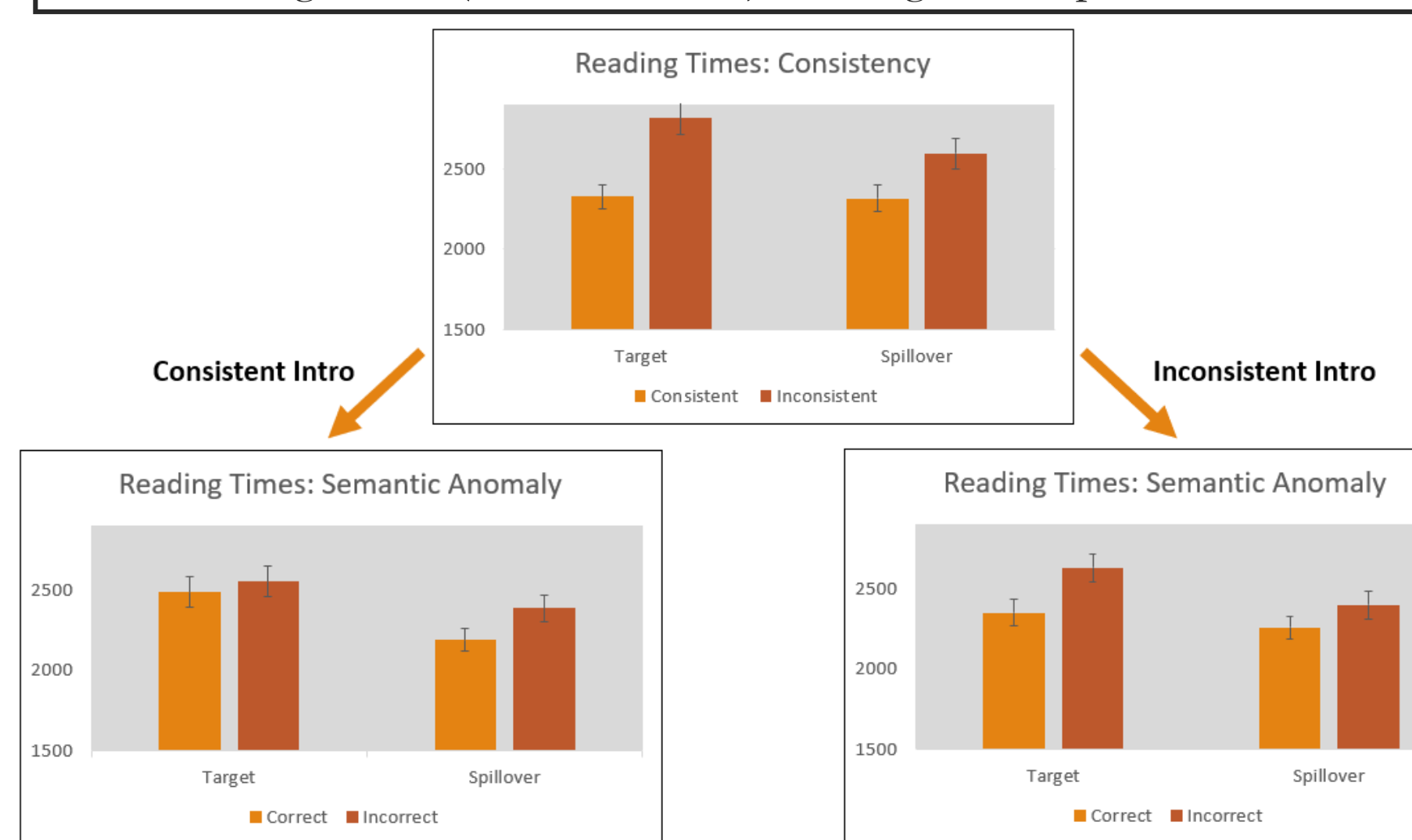
**Procedure:** Participants read through each passage line-by-line on a computer. Reading times were collected on the mid-passage target and spillover sentences as well as on the semantic anomaly target and spillover sentences. At the end of each passage participants answered one comprehension question.

### Results

Reading times on the first target sentence were slower when the introduction was in the inconsistent condition than when the introduction was in the consistent condition. This difference carried over to the spillover sentence. This is a well-established finding which occurred across all three of the current experiments and will not be discussed further. When the introduction was in the consistent condition, and there was no disruption on the semantic anomaly target sentence, but there was a reliable disruption on the semantic anomaly spillover sentence. In contrast, when the introduction was in the inconsistent condition there was a reliable disruption on both the semantic anomaly target sentence and the spillover sentence.

**Figure 1: Experiment 1**

Mean Reading Times (in Milliseconds) for Target and Spillover Sentences



## Experiment 2

In Experiment 1 the initial inconsistency used information related to the semantic anomaly. Experiment 2 attempted to replicate these results with passages in which these two sections were contextually unrelated.

The only change from Experiment 1 was that the first halves of the passages did not contain any references to the context of the later semantic anomaly. An example is provided in Table 2.

## Experiment 2 cont.

**Table 2. Sample Passage from Experiment 2**

### Consistent Introduction

Tom was an avid reader who enjoyed many different kinds of magazines and books. There were piles of books all over his house and a bookshelf in every room. Each morning, Tom started his day by eating a bowl of cereal and reading the morning paper. He wanted to stay up to date with current news and found this morning ritual to be both relaxing and informative.

### Inconsistent Introduction

Tom was an avid reader who enjoyed many different kinds of magazines and books. There were piles of books all over his house and a bookshelf in every room, but no newspapers. Tom found reading about current events to be depressing and preferred to read things that allowed him to escape reality. Each morning, Tom started his day by eating a bowl of cereal and reading.

### Background

One morning when Tom got up to start his day he found that he had run out of his regular cereal. He didn't have time to go to the store before work. He decided to make a tall cup of coffee instead. It was important that he be on time to work that day because he had an early meeting. Tom worked very hard, but when he had any free time, he would sneak away to the break room and read as much as he could.

**Target Sentence:** He enjoyed staying up to date with current events

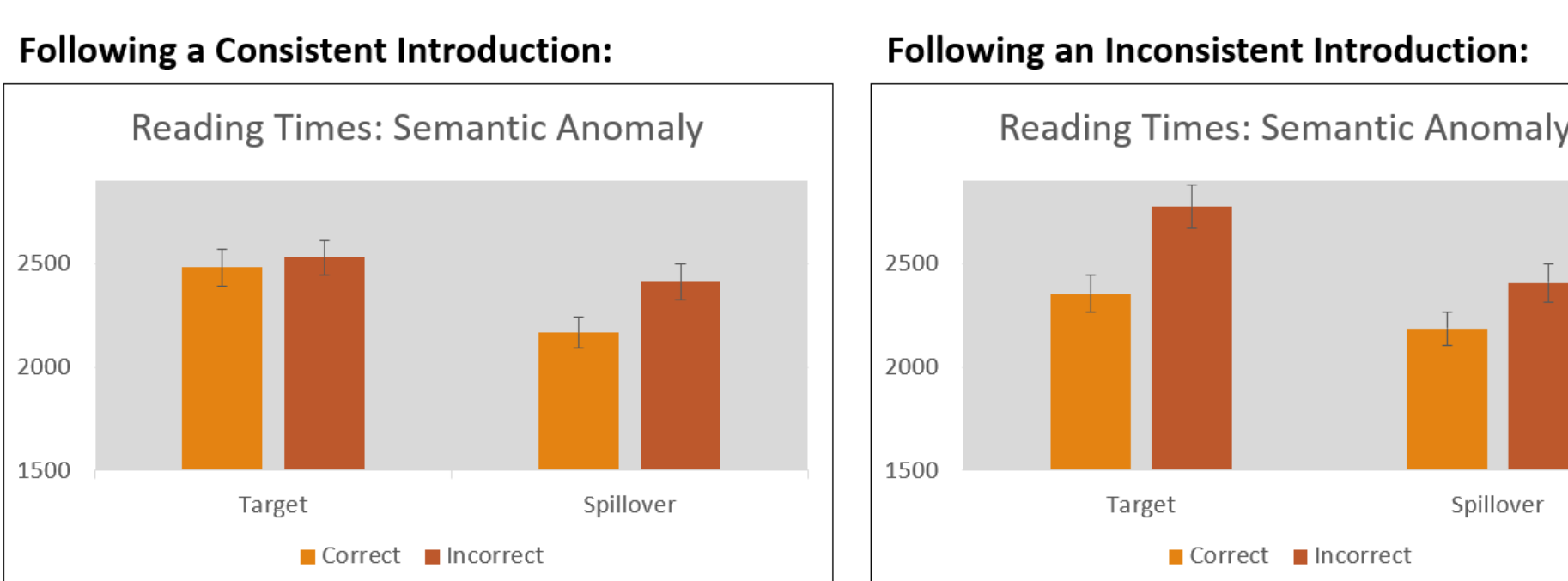
**Spillover Sentence:** Tom sat down with his cup of coffee to read.

### Results

The pattern of reading times for the semantic anomaly were the same as in Experiment 1. Following a consistent introduction the disruption from the anomaly was evident only on the spillover sentence. In contrast, following an inconsistent introduction the disruption occurred on both the target and spillover sentences.

**Figure 2: Experiment 2**

Mean Reading Times (in Milliseconds) for Target and Spillover Sentences



## Experiment 3

Experiment 3 was designed to investigate whether the coherence threshold would remain high with greater distance between the inconsistency and the semantic anomaly.

The same materials and procedure as Experiment 2 were used. The only change was that 6 lines of filler text were added between the first spillover sentence and the high context section. This created greater distance between the initial inconsistency and the semantic anomaly. The filler was neutral and did not contain any mentions to the inconsistency or anomaly.

### Results

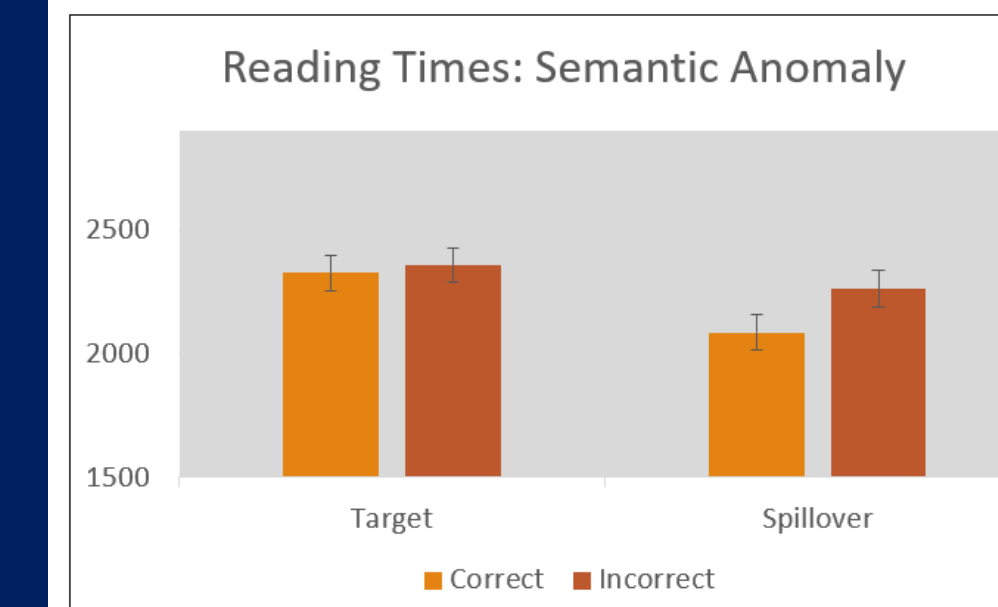
Despite the added distance between the inconsistency section and the semantic anomaly section, the pattern of reading times remained the same. The effect of the semantic anomaly was delayed to the spillover sentence following a consistent introduction but appeared on the target sentence following an inconsistent introduction.

## Experiment 3 cont.

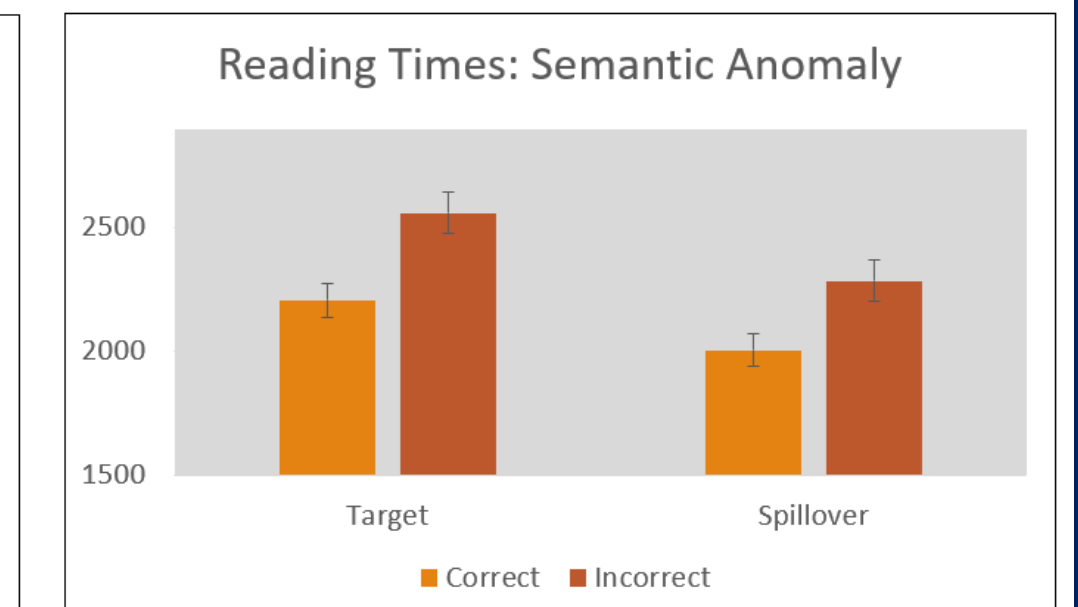
**Figure 3: Experiment 3**

Mean Reading Times (in Milliseconds) for Target and Spillover Sentences

### Following a Consistent Introduction:



### Following an Inconsistent Introduction:



## Discussion

- ❖ These studies replicated the results of Williams et al. (2018); reading a sentence with a semantic anomaly caused a measurable disruption in comprehension which was delayed to the spillover sentence in passages that contained contextual support for both the correct and incorrect terms.
- ❖ When the reader encountered a disruption early in the text, their coherence threshold was raised for the subsequent text. The semantic anomaly created a disruption in reading on the target sentence itself (Experiment 1). This occurred even when the initial inconsistency was contextually unrelated to the semantic anomaly (Experiment 2) or when the distance between the two target sentences was increased (Experiment 3).
- ❖ Not only does the coherence threshold influence the level of validation that occurs before moving on in a text, but a disruption in the validation process can effect the level at which the coherence threshold is set.

## References

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