Hi everyone, I'm Lauren from the University of New Hampshire and welcome to my presentation on "Predicting Cohesive Comprehension Based on Individual Differences and Genre Effects."

## successful text comprehension

when a reader has constructed a
*coherent* & meaningful mental
representation of a text

**FACTS**

(McNamara & Magliano, 2009; Magliano et al., 1999)

Readers have successfully comprehended a text when they have constructed both a *coherent* and meaningful mental representation of it.

Coherence-building processes occur when readers, not only process and understand the individual facts of a text, but expand on it by generating inferences and/or elaborations from their own life experiences or prior knowledge.

However, it should be noted that coherence is a different concept than cohesion.

# successful text comprehension

when a reader has constructed a
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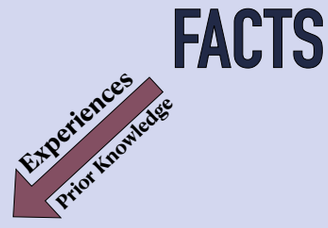
representation of a text




(McNamara & Magliano, 2009; Magliano et al., 1999)

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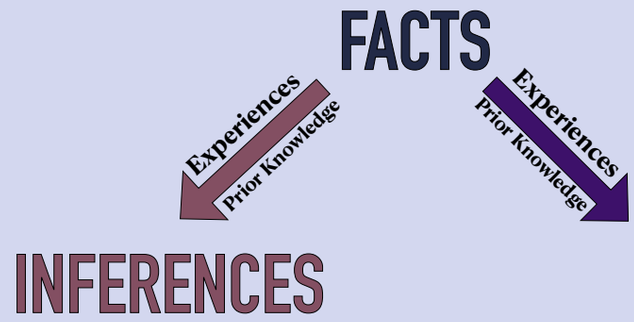


(McNamara & Magliano, 2009; Magliano et al., 1999)

# successful text comprehension

when a reader has constructed a
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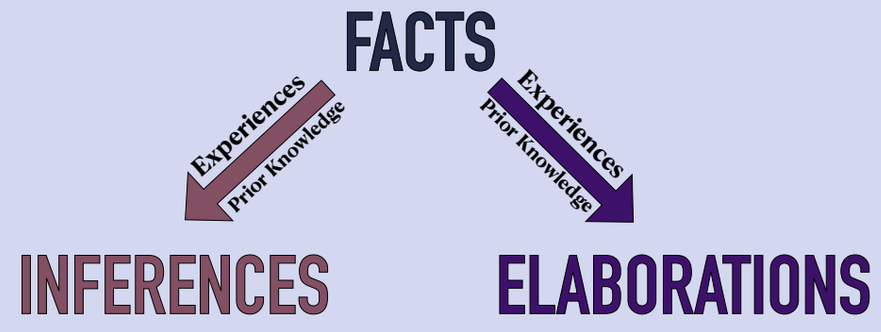
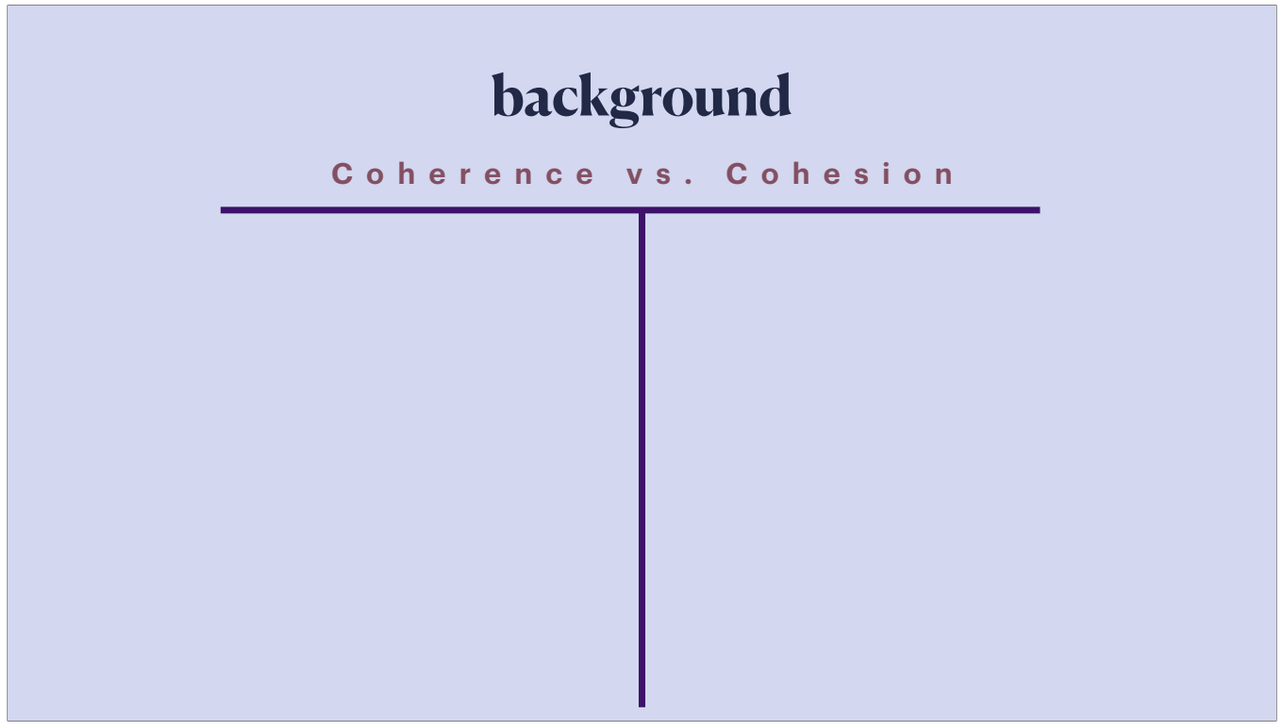



(McNamara & Magliano, 2009; Magliano et al., 1999)

# background

## Coherence vs. Cohesion



Whereas coherence is a property uniquely between the reader and text, cohesion is a linguistic property of a text.

Coherence represents a holistic understanding where one makes meaningful connections or interpretations between ideas of the text. However, cohesion is more representative of how connected words and sentences are within discourse.

Coherence is also a necessity for comprehension, whereas cohesion can only aid in it. Therefore, these concepts are NOT mutually exclusive. For example, my to-do list may be cohesive but not very coherent to anyone else reading it.

# background

## Coherence vs. Cohesion

| | |
|---|---|
| property of the relation between the reader and the text | property of a text |

# background

## Coherence vs. Cohesion

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| how connected ideas are of readers' interpretations of text | how connected words and sentences are in discourse |

# background

## Coherence vs. Cohesion

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| necessary for comprehension | can aid in comprehension |

# background

## Coherence vs. Cohesion

property of the rel … of a text
the reader an…

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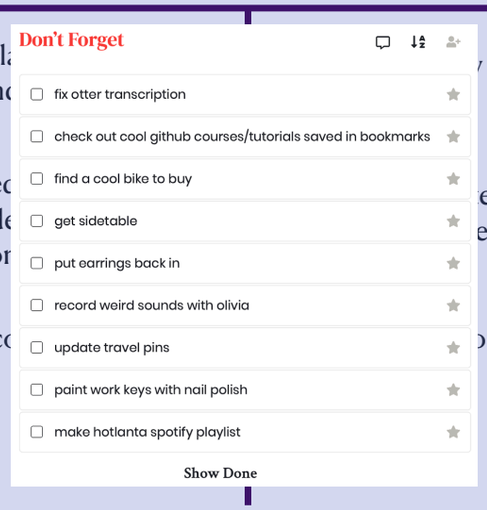
interpretatio…

necessary for c… …omprehension



# think-aloud procedures

examines coherence-
building processes
while reading

In order to examine the coherence-building process while reading, think-aloud procedures are used where readers are stopped as specific target sentences to report their thoughts before continuing on to read.

# think-aloud procedures

examines coherence-building processes while reading

**report thoughts**

# think-aloud procedures

examines coherence-building processes while reading

**report thoughts**

# cohesion & think-alouds

(Allen et al., 2016; 2015)

Think-aloud responses can then be analyzed for cohesion.

The cohesion of readers' think-alouds depends on the reader successfully developing coherent representations while reading.

This is then used to measure readers' coherence of the text and has been previously found to be associated with certain individual differences such as reading skills and vocabulary knowledge.

# cohesion & think-alouds

depends on reader successfully developing coherent representations while reading

(Allen et al., 2016; 2015)

# cohesion & think-alouds

depends on reader successfully developing coherent representations while reading

cohesion of think-alouds used to measure readers' coherence of text

(Allen et al., 2016; 2015)

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cohesion of think-alouds used to measure readers' coherence of text

associated with:

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associated with:

**reading skills**

(Allen et al., 2016; 2015)

## cohesion & think-alouds

depends on reader successfully developing coherent representations while reading

cohesion of think-alouds used to measure readers' coherence of text

associated with:

**reading skills** **vocabulary knowledge**

(Allen et al., 2016; 2015)

# individual differences

comprehension performance tied to working memory & reading skill

Many individual differences have been linked to a reader’s liklihood of successfully developing coherent representations during reading and thus examining individual differences in relation to think-aloud properties may provide insight on how these differences manifest themselves during the reading process.

2 individual differences that have previously been found to be connected with text comprehension are working memory and reading skill, both of which are positively correlated with comprehension.

# individual differences

comprehension performance tied to working memory & reading skill

# individual differences

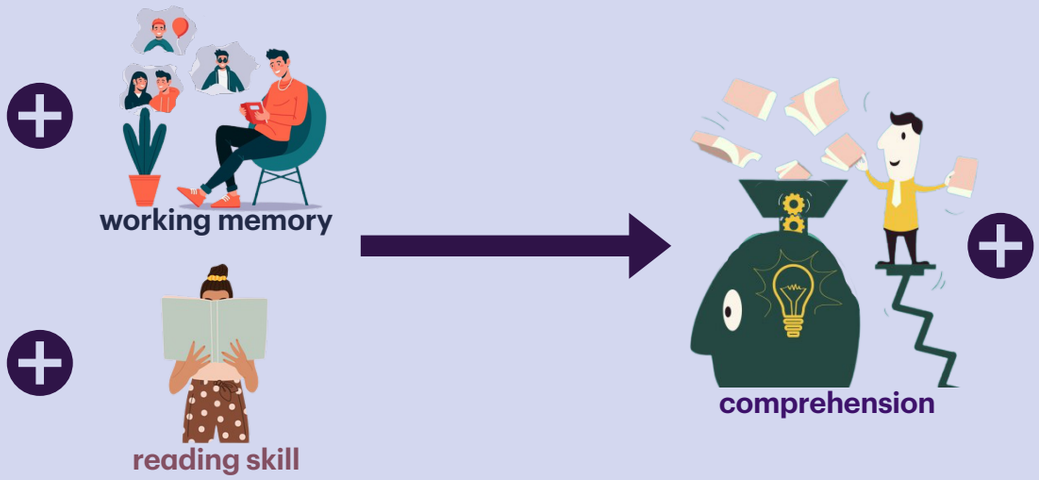
comprehension performance tied to working memory & reading skill

working memory

reading skill

# individual differences

comprehension performance tied to working memory & reading skill



# current study

examines how cohesion manifests across different text genres

The current study examines how cohesion manifests across different text genres. The genres used here were history and science.

We also examined how individual differences manifest within reader think-alouds: again, focusing specifically on working memory and reading skills.

## current study

examines how cohesion manifests across different text genres

**vs.**

# current study

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examines how individual differences manifest within reader think-alouds

## current study

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# current study

examines how cohesion manifests across different text genres

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vs.

# current study

examines how cohesion manifests across different text genres

HISTORY vs. SCIENCE

examines how individual differences manifest within reader think-alouds

working memory

vs.

reading skill

# method

n = 119

119 students completed assessments of reading skills (using the Gates-Macginitie Reading Test) and working memory (the Operational Span Task).

Students then read both a history (either on the Civil War or labor workers) and science (either on evolution of erosion) text.

# method

individual

differences

n = 119

# method

individual

differences

n = 119

**working memory**

**reading skills**

# method

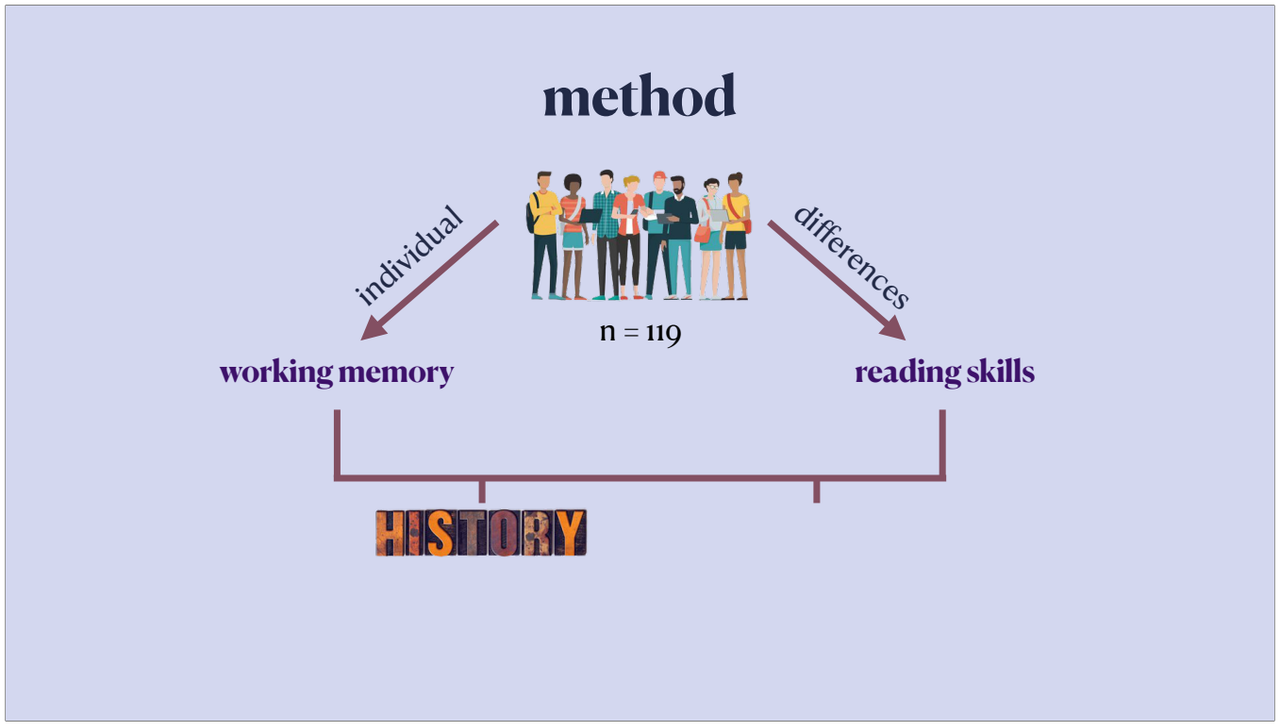
individual

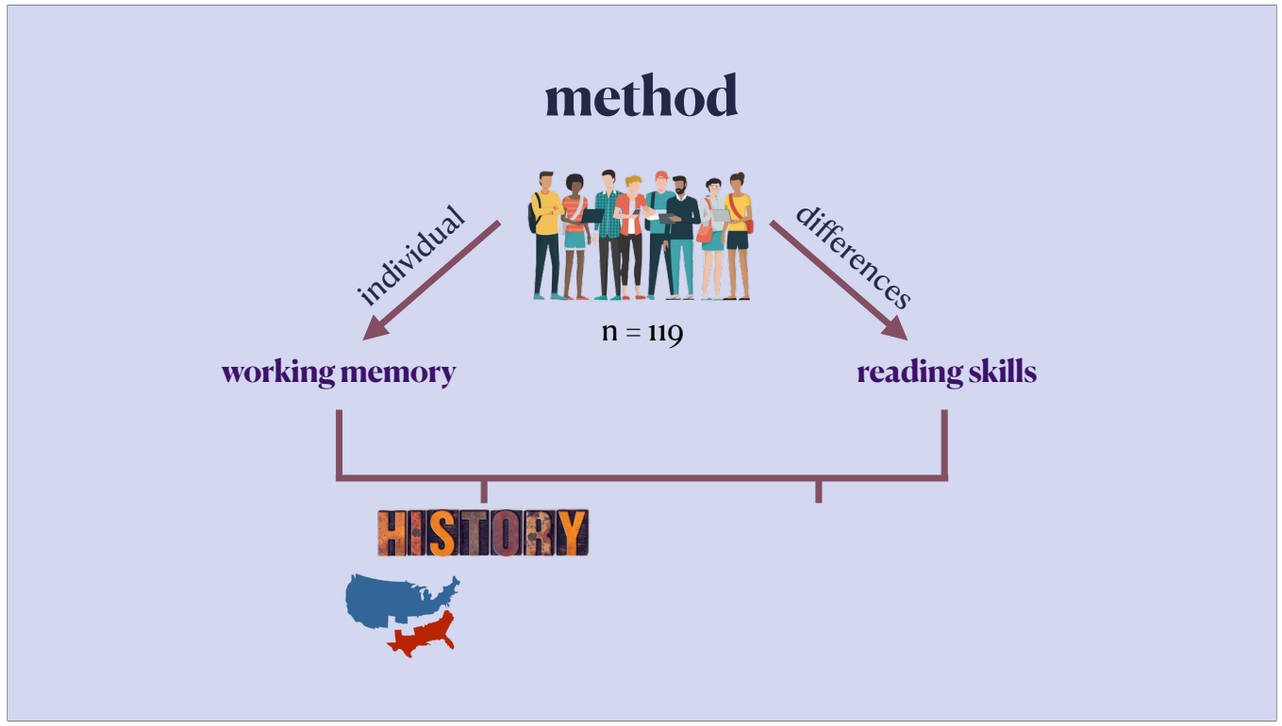
differences

n = 119

working memory

reading skills


method
individual
differences
n = 119
working memory
reading skills
HISTORY


method
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# method

individual

differences

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# method

individual

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working memory

reading skills

HISTORY

SCIENCE

# method

individual

differences

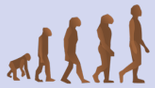
n = 119

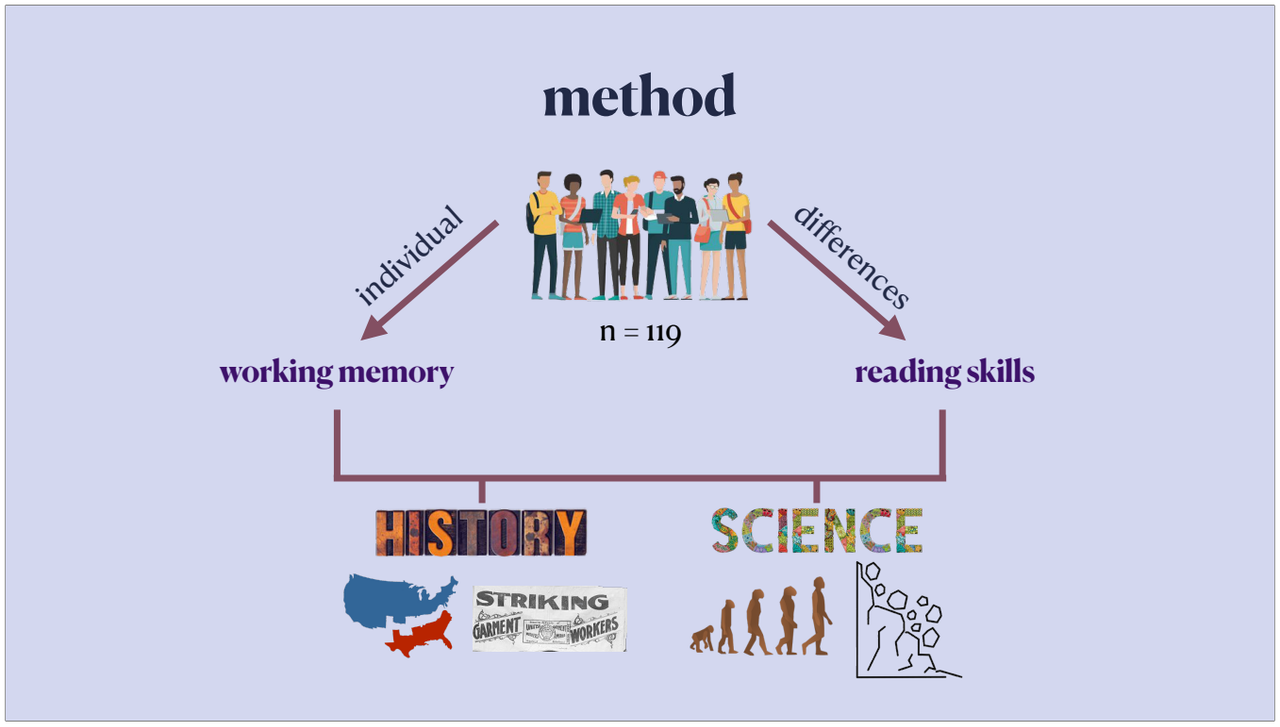
working memory

reading skills

HISTORY

SCIENCE




method
individual
differences
n = 119
working memory
reading skills
HISTORY
SCIENCE
STRIKING
GARMENT
WORKERS

# method

Participants read each text line-by-line on computers and were asked to report their thoughts after each sentence.

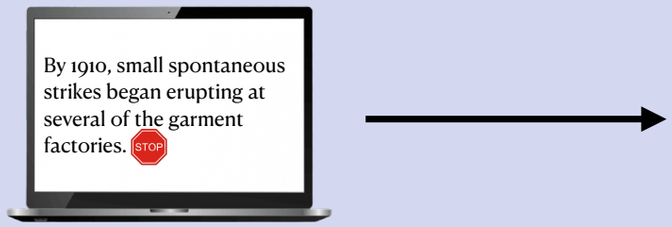
Think-aloud responses were analyzed for cohesion using, the natural language processing tool, TAACO.

We then looked at 3 different levels of cohesion: sentence, paragraph, and synonym level.

# method

By 1910, small spontaneous strikes began erupting at several of the garment factories.
STOP

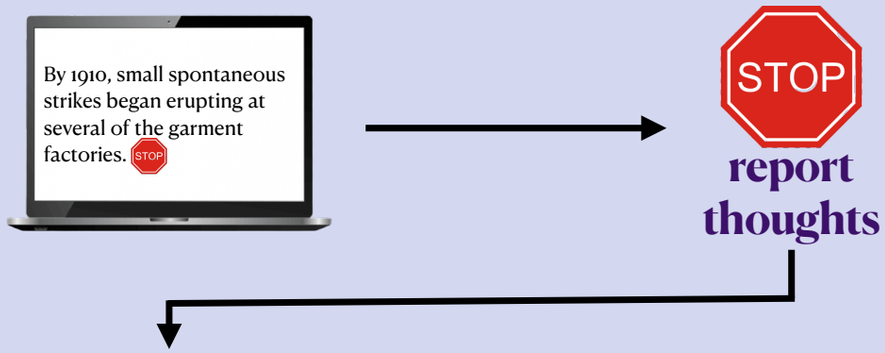
# method


By 1910, small spontaneous strikes began erupting at several of the garment factories.
STOP

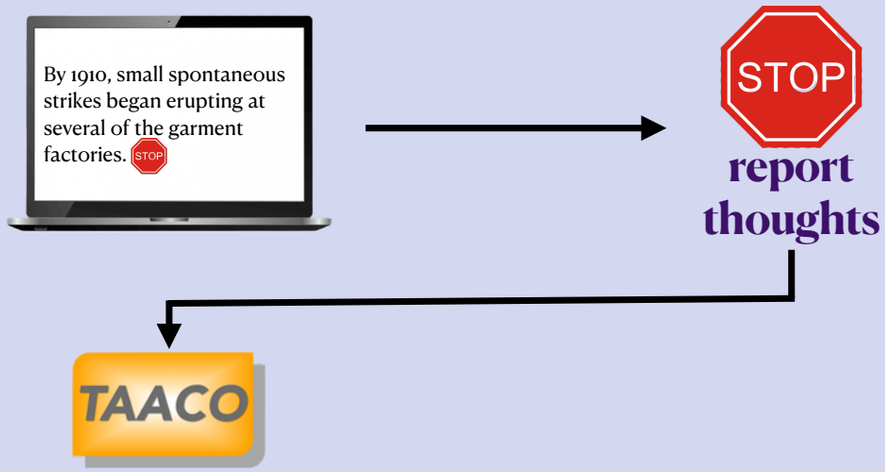
# method

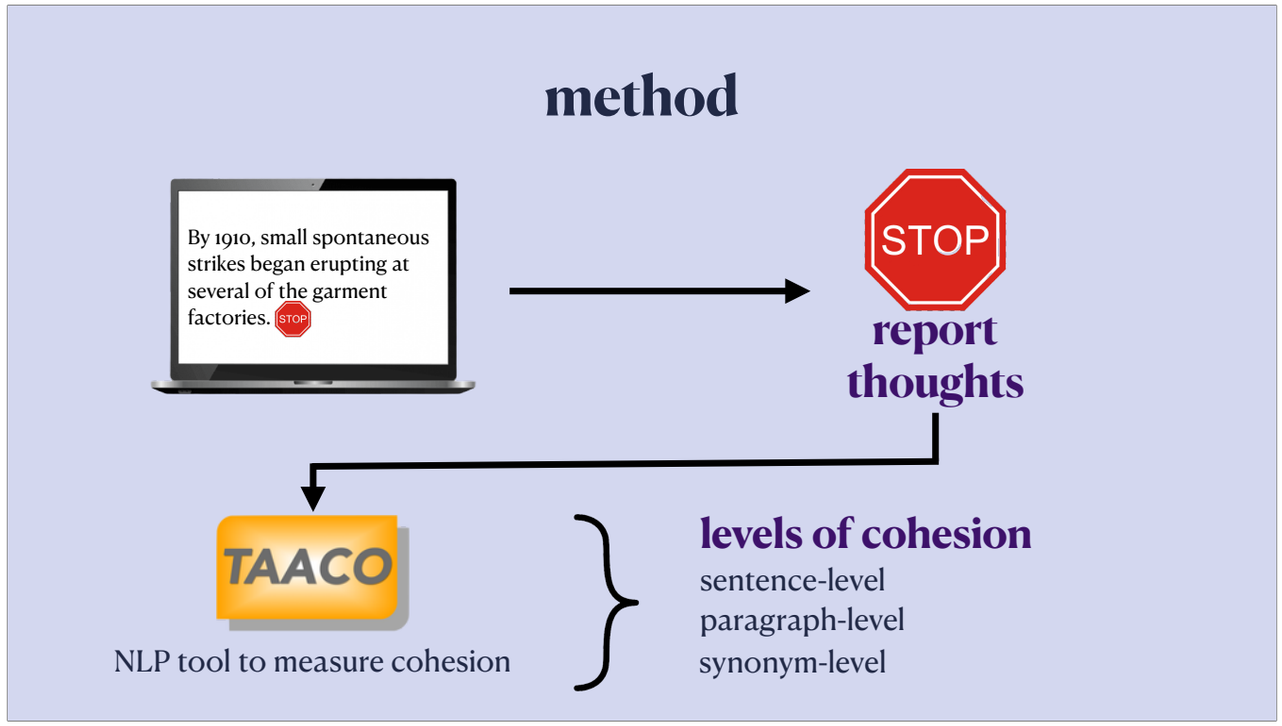
report thoughts

# method


By 1910, small spontaneous strikes began erupting at several of the garment factories.
STOP
STOP
report
thoughts

# method


By 1910, small spontaneous strikes began erupting at several of the garment factories.
STOP
STOP
report thoughts
TAACO
NLP tool to measure cohesion


method
By 1910, small spontaneous strikes began erupting at several of the garment factories.
STOP
STOP
report thoughts
TAACO
NLP tool to measure cohesion
levels of cohesion
sentence-level
paragraph-level
synonym-level

# results

| Cohesion Index | Working Memory | | | Reading Skill | | |
|---|---|---|---|---|---|---|
| | History | Science | Total | History | Science | Total |
| Adjacent Sentence Overlap | | | | | | |
| Adjacent 2-Sentence Overlap | | | | | | |
| Adjacent Paragraph Overlap | | | | | | |
| Adjacent 2-Paragraph Overlap | | | | | | |
| Adjacent Sentence Noun Overlap | | | | | | |
| Adjacent Sentence Verb Overlap | | | | | | |
| Adjacent Paragraph Noun Overlap | | | | | | |
| Adjacent Paragraph Verb Overlap | | | | | | |

We first examined correlations between individual differences and cohesion. Only one cohesion variable had a significant correlation with working memory: adjacent paragraph verb synonym overlap. However, all but two of the cohesion variables were significantly related to reading skill. These correlations suggest that the connections observed, overall, in readers' think-aloud responses are more strongly related to their reading skill than their scores on the working memory task.

We then examined whether these correlations differed by genre. We found significant, weak negative relationships between cohesion and working memory for history texts, but not for science. We also found, significant, very weak to weak positive correlations between cohesion and reading skill for both the history and science texts, albeit with stronger relations within the history genre. These results suggest that texts may have subtle differential relations to coherence-building processes across different genres.

# results

| Cohesion Index | Working Memory | | | Reading Skill | | |
|---|---|---|---|---|---|---|
| | History | Science | Total | History | Science | Total |
| Adjacent Sentence Overlap | | | -0.110 | | | |
| Adjacent 2-Sentence Overlap | | | -0.091 | | | |
| Adjacent Paragraph Overlap | | | -0.107 | | | |
| Adjacent 2-Paragraph Overlap | | | -0.086 | | | |
| Adjacent Sentence Noun Overlap | | | -0.034 | | | |
| Adjacent Sentence Verb Overlap | | | -0.126 | | | |
| Adjacent Paragraph Noun Overlap | | | -0.047 | | | |
| Adjacent Paragraph Verb Overlap | | | -0.137* | | | |

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# results

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|---|---|---|---|---|---|---|
| | History | Science | Total | History | Science | Total |
| Adjacent Sentence Overlap | | | -0.110 | | | 0.170** |
| Adjacent 2-Sentence Overlap | | | -0.091 | | | 0.179*** |
| Adjacent Paragraph Overlap | | | -0.107 | | | 0.197** |
| Adjacent 2-Paragraph Overlap | | | -0.086 | | | 0.206** |
| Adjacent Sentence Noun Overlap | | | -0.034 | | | 0.202** |
| Adjacent Sentence Verb Overlap | | | -0.126 | | | 0.104 |
| Adjacent Paragraph Noun Overlap | | | -0.047 | | | 0.216*** |
| Adjacent Paragraph Verb Overlap | | | -0.137* | | | 0.133 |

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# results

| Cohesion Index | Working Memory | | | Reading Skill | | |
|---|---|---|---|---|---|---|
| | History | Science | Total | History | Science | Total |
| Adjacent Sentence Overlap | -0.246** | 0.032 | -0.110 | | | 0.170** |
| Adjacent 2-Sentence Overlap | -0.241** | 0.063 | -0.091 | | | 0.179*** |
| Adjacent Paragraph Overlap | -0.248** | 0.048 | -0.107 | | | 0.197** |
| Adjacent 2-Paragraph Overlap | -0.230* | 0.068 | -0.086 | | | 0.206** |
| Adjacent Sentence Noun Overlap | -0.094 | 0.016 | -0.034 | | | 0.202** |
| Adjacent Sentence Verb Overlap | -0.265** | 0.066 | -0.126 | | | 0.104 |
| Adjacent Paragraph Noun Overlap | -0.127 | 0.015 | -0.047 | | | 0.216*** |
| Adjacent Paragraph Verb Overlap | -0.281** | 0.085 | -0.137* | | | 0.133 |

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# results

| Cohesion Index | Working Memory | | | Reading Skill | | |
|---|---|---|---|---|---|---|
| | History | Science | Total | History | Science | Total |
| Adjacent Sentence Overlap | -0.246** | 0.032 | -0.110 | 0.194* | 0.150 | 0.170** |
| Adjacent 2-Sentence Overlap | -0.241** | 0.063 | -0.091 | 0.197* | 0.166 | 0.179*** |
| Adjacent Paragraph Overlap | -0.248** | 0.048 | -0.107 | 0.231* | 0.166 | 0.197** |
| Adjacent 2-Paragraph Overlap | -0.230* | 0.068 | -0.086 | 0.246** | 0.169 | 0.206** |
| Adjacent Sentence Noun Overlap | -0.094 | 0.016 | -0.034 | -0.209* | 0.202* | 0.202** |
| Adjacent Sentence Verb Overlap | -0.265** | 0.066 | -0.126 | 0.099 | 0.118 | 0.104 |
| Adjacent Paragraph Noun Overlap | -0.127 | 0.015 | -0.047 | 0.222* | 0.215* | 0.216*** |
| Adjacent Paragraph Verb Overlap | -0.281** | 0.085 | -0.137* | 0.111 | 0.131 | 0.133 |

# results

| Cohesion Index | Working Memory | | | Reading Skill | | |
|---|---|---|---|---|---|---|
| | History | Science | Total | History | Science | Total |
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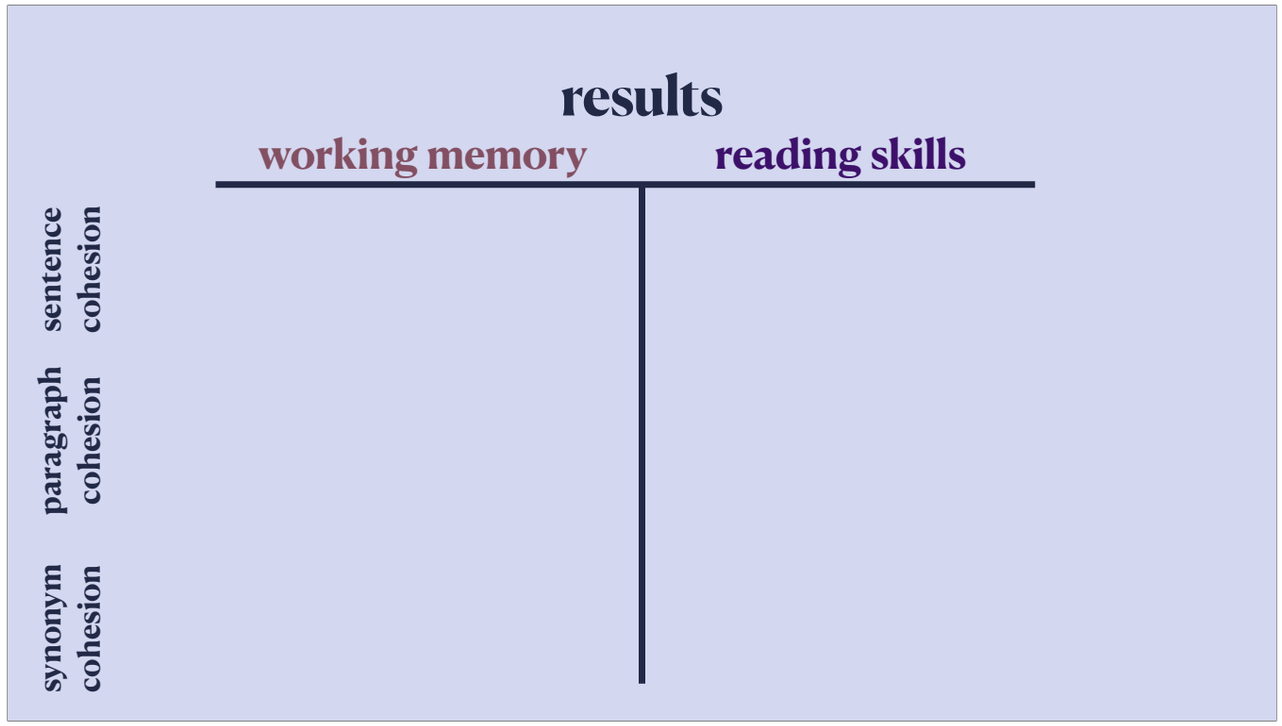



The relationships between genre, individual differences, and cohesion were then examined using linear mixed effects models. These are the highest interaction chi-squares reported at each of the 3 levels of cohesion: sentence, paragraph, and synonym. Significant interaction effects between genre and working memory were found at each level of cohesion. However, in line with our correlation results, no interaction effects were found with reading skills.

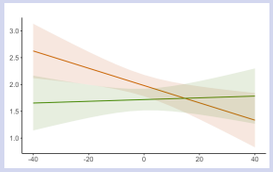
# results

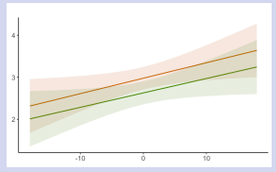
## working memory

## reading skills

### sentence cohesion

Adj. Sentence Overlap
$\chi^2 = 10.1553$
$p < 0.001$




Adj. 2-Sentence Overlap
$\chi^2 = 0.0253$
no interaction

### paragraph cohesion

### synonym cohesion

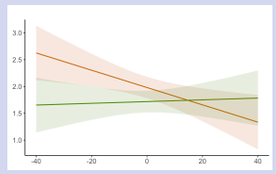
# results

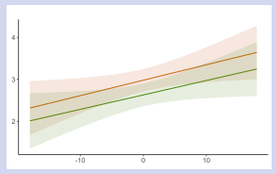
## working memory

## reading skills

### sentence cohesion

Adj. Sentence Overlap
$\chi^2 = 10.1553$
$p < 0.001$

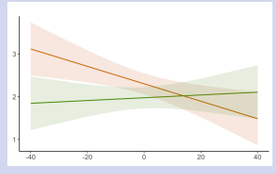


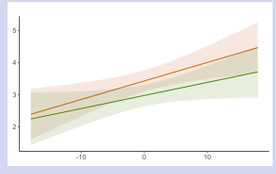




Adj. 2-Sentence Overlap
$\chi^2 = 0.0253$
no interaction

### paragraph cohesion

Adj. Paragraph Overlap
$\chi^2 = 9.6252$
$p < 0.001$




Adj. 2-Paragraph Overlap
$\chi^2 = 0.6039$
no interaction

### synonym cohesion

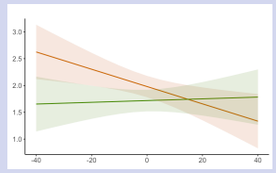
# results

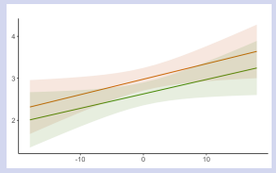
## working memory

## reading skills

### sentence cohesion

Adj. Sentence Overlap
$\chi^2 = 10.1553$
$p < 0.001$

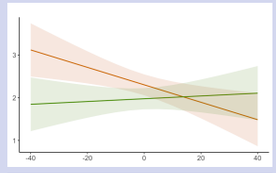


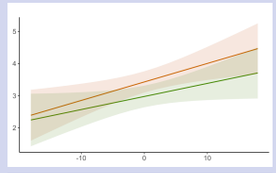


Adj. 2-Sentence Overlap
$\chi^2 = 0.0253$
no interaction

### paragraph cohesion

Adj. Paragraph Overlap
$\chi^2 = 9.6252$
$p < 0.001$

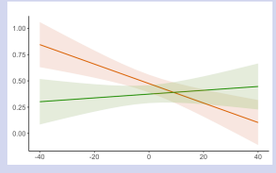


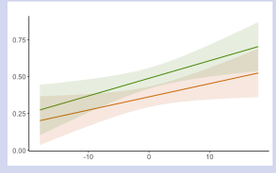


Adj. 2-Paragraph Overlap
$\chi^2 = 0.6039$
no interaction

### synonym cohesion

Adj. Paragraph Verb Overlap
$\chi^2 = 14.2663$
$p < 0.0001$





Adj. Paragraph Noun Overlap
$\chi^2 = 0.4114$
no interaction

# discussion

Overall, our correlation analyses indicated that think-aloud cohesion was significantly correlated with reading skill for both history and science texts, indicating that skilled readers generated more explicit connections amongst the thoughts generated in their think-aloud responses. This is in line with prior work that has found significant relations between reading skill and think-aloud cohesion.

However, working memory was only related to think-aloud cohesion for history texts, and the relation was negative rather than positive. Thus, individuals with higher working memory capacity may establish fewer explicit connections during reading, particularly for history texts.

discussion

HISTORY

SCIENCE

discussion

HISTORY

working memory

reading skill

SCIENCE

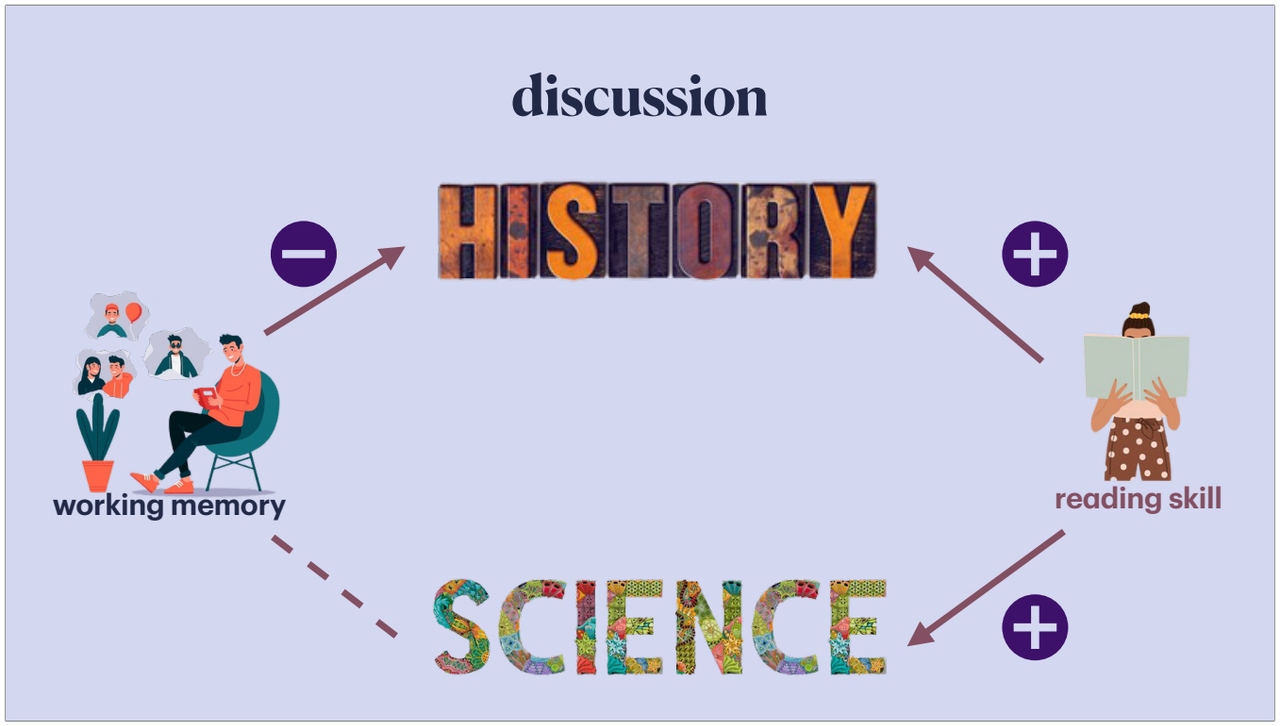
discussion

HISTORY

working memory

reading skill

SCIENCE


discussion
HISTORY
working memory
reading skill
SCIENCE

# discussion

The results discussed suggest that these individual differences may operate in different ways across varied contexts that may have differential demands on skill and capacity.  It also suggests that reading skill may be more related to cohesive think-aloud responses than working memory. Therefore, since reading skill is a malleable skill (unlike working memory), this suggests that difficulties associated with coherence-building may be more easily remedied through reading strategy instruction.  Future research is needed to explore reading strategy as an aid to coherence-building.

# discussion

individual differences are related to one's ability to comprehend texts across various contexts

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individual differences are related to one's ability to comprehend texts across various contexts

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reading skill

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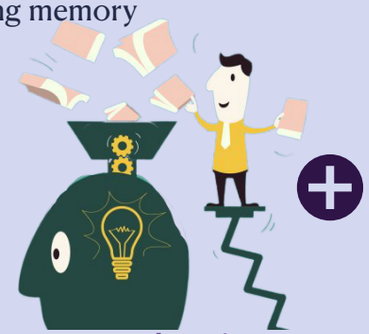
reading skill



comprehension

# questions?

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Thank you for listening to this talk. Please feel free to email me any questions and/or comments to lef1008@wildcats.unh.edu!