

## Today's topics:

- **Reading a research article**
- **Research design**
- **Patterns in English spelling**

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*Background:*

- Treiman, Kessler, & Bick (2002)

# 0. Key points today

- The structure of a quantitative research project
- Research design
  - Research questions, big-picture and measurable
  - Designing an experiment
- Application: Patterns in English spelling (Treiman, Kessler, & Bick 2002)

# 1. Structure of a quantitative research project

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  1. State the **question**
  2. Form a **hypothesis**
  3. List your **materials**
  4. State your **methods**
  5. Give your **results**
  6. State your **conclusions**
- Which are part of carrying out an **experiment**?

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- } *experiment*
- *from experiment*

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## Research question | What we want to know

- **Big-picture** research question
  - Connection to big ideas — “Why do we care?”

# 1. Structure of a quantitative research project

## Research question | What we want to know

- **Big-picture** research question
  - Connection to big ideas — “Why do we care?”
- **Measurable** research question
  - What the researcher is going to do in the study
  - **Quantitative**: Is A **bigger than** B? Does Y **increase with** X?
  - Addresses some aspect of the big-picture research question
- Where might researchers find their RQs?

# 1. Structure of a quantitative research project

## The experiment design | What we do

- These aspects of the project follow from the research questions:
  - Design of the **experiment** (“materials”+“methods”)
    - **Materials** (stimuli, etc.)
    - **Participants** — what characteristics matter?
    - **Task** — what will participants do?
- Work backward from these to state a specific...
  - **Hypothesis** — what quantities do you predict to be the same or different, and why?



# 1. Structure of a quantitative research project

## Reporting and interpreting results | What we find

- What did the experiment **find**?
  - **Report** and/or **summarize** data
  - Draw **inferences** (generalizations) from data
  - Use **statistics** and **data tables** or **data graphics**
- End with **discussion** and **conclusions**: How do the results **answer** the research questions?
  - Was the hypothesis confirmed?
  - What big-picture implications does this have?

## 2. Scientific research articles: Overview

- Have you read a scientific research article before?

## 2. Scientific research articles: Overview

- What is a peer-reviewed journal?
  - How does peer-review work?
  - What are the goals of the peer-review process?

## 2. Scientific research articles: Overview

- What information is in the bibliographic citation for a journal article?

Treiman, Rebecca, Brett Kessler, & Suzanne Bick. 2002.  
Context sensitivity in the spelling of English vowels.  
*Journal of Memory and Language* 47 (3): 448–468.

- Links:
  - [This article](#) (via UNC Libraries)
  - [JML web site](#)

## 2. Scientific research articles: Overview

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How do these relate to the “steps of the scientific method”?

## 2. Scientific research articles: Overview

- What are the typical sections in a scientific article?

How do these relate to the “steps of the scientific method”?

- Abstract
- Introduction / Background / Previous Studies
- Experiment  $n$  (repeat as needed)
  - Methodology: Participants, materials, etc.
  - Results and Discussion
- General Discussion / Conclusion / Implications

### 3. Process for reading a research article

#### 1. Get a **general overview** of the article

- Overview of the research questions, the author's position, and the experiment's results  
*(Where in the article can we look for these?)*
- Preview of the structure of the article

## 3. Process for reading a research article

### 1. Get a **general overview** of the article

- Overview of the research questions, the author's position, and the experiment's results
  - Abstract
  - General Discussion / Conclusion
- Preview of the structure of the article
  - Read all the section headings



## 3. Process for reading a research article

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  - What are the big-picture research questions?
  - Why are these questions worth asking? (What do we already know?)

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### 3. Understand the **structure** and **goals** of each **experiment**

- What are the **measurable research questions**?
- What are the **hypotheses**?
- How was the experiment **designed**, and why?  
Can you see any flaws or points of **concern**?

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Can you see any flaws or points of **concern**?
- Sections on each experiment (methodology)

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- What **numerical results** were found?
- How can the **patterns** in the data be summarized?
- Are the patterns in the data **unlikely** to be a coincidence?

### 3. Process for reading a research article

#### 4. Understand the **results** of each **experiment**

- What **numerical results** were found?
- How can the **patterns** in the data be summarized? → **descriptive** statistics / data graphics
- Are the patterns in the data **unlikely** to be a coincidence? → **inferential** statistics
  - Sections on each experiment (results)
  - Results should be presented with statistics

### 3. Process for reading a research article

5. Consider what the **results** of the experiments are supposed to show about the **research questions**
  - What do the authors think the results mean?
  - Do you agree, or can you see an alternative interpretation?

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- What do the authors think the results mean?
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- General Discussion / Conclusion / Implications



## 4. Big-picture research questions

### Discussion

- What are some of the **big-picture research questions** you identified in Treiman et al. (2002)?
- **Big-picture** research question
  - Connection to big ideas — “Why do we care?”
- **Measurable** research question
  - What the researcher is going to do in the study
  - **Quantitative:** Is A **bigger than** B? Does Y **increase with** X?

## 4. Big-picture research questions

- What do you think about the following statement?

This article investigates whether (English) vowel spellings become more predictable when adjacent consonants are taken into account

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- What do you think about the following statement?

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- This is not an accurate statement about the article — why not?

## 4. Big-picture research questions

- Quick check-in on linguistics concepts
  - Terms to review: **onset, coda, rime**
  - /ɜ̃/ is the same as /ə̃/  
(as in *purple, bird, curl, worth)*

## 4. Big-picture research questions

Some **big-picture RQs** for this paper:

*(more specific)*

- Are adult spellers of English aware of associations between
  - (a) vowels and codas and/or
  - (b) vowels and onsetsthat make vowel spellings more predictable?

## 4. Big-picture research questions

Some **big-picture RQs** for this paper:

*(more general — “Why do we care?”)*

- Are adult spellers of English **aware of patterns** in sound-to-spelling correspondences?
  - Do adults behave as though English spelling is “hopelessly irregular”?
- Is **syllable structure relevant** for adult spellers’ knowledge of context effects on vowel spellings?
  - Does syllable structure play a role in the kind of phonological knowledge that matters for spelling and reading (in English)?

## 4. Big-picture research questions

- A past Padlet question:  
“How do you draw **quantitative** data from what seems like a **qualitative** research question?”
  - This is a really excellent question
  - Many (most??) big-picture research questions, especially when stated in maximally general terms, seem qualitative
  - How do we get from there to quantitative research?

## 4. Big-picture research questions

- A past Padlet question:  
“How do you draw **quantitative** data from what seems like a **qualitative** research question?”
  - The key step here is the **measurable research question**
  - Figure out: **What can we measure** that will **tell us the difference between “yes” and “no”** answers to our big-picture question?



## 5. Measurable research questions

### Discussion

- What is a “**critical spelling**” in this article?  
How does it relate to the “experimental” and “control” contexts in the experiments?

## 5. Measurable research questions

- What is a “**critical spelling**” in this article?
  - a spelling used in real words
  - it is not the most common spelling for the given vowel sound **overall** (or in the **control** context)
  - but it is the most common spelling for that vowel sound in the **experimental** context
- Example:
  - The most common spelling for /i/ is *ea*
  - One critical spelling in Expt 1 is *ee*, which is more common than *ea* before /d/ and /p/

## 5. Measurable research questions

### Group discussion

- State one **measurable research question**
  - Be sure you can state it in *quantitative* terms
  - How does it relate to the big-picture RQ(s)?

## 5. Measurable research questions

Some **measurable RQs** for this paper:

- *Expt 1:* When adults spell nonwords, does the **critical spelling** for a vowel occur more often with experimental codas than with control codas?
- *Expt 2:* When adults spell nonwords, does the **critical spelling** for a vowel occur more often with experimental onsets than with control onsets?

## 5. Measurable research questions

Some **measurable RQs** for this paper:

- *Expt 3*: When adults spell real words that do not contain the critical spelling, are they more likely to **replace** the correct spelling with the critical spelling in the experimental context vs. the control context? (both coda and onset contexts tested)
- *Expt 4*: When adults spell nonwords with the context **across a syllable boundary** from the vowel, is the critical spelling still more likely to occur in the experimental context than the control?

## 5. Measurable research questions

- How do these **measurable RQs** relate to the **big-picture RQs**?

## 6. Experiment design

### Experiment 1

- Is the first sentence in this section a statement of the authors' **measurable research question**?
- Where can we find the authors' **hypothesis** or **prediction** about Expt 1?
  - Does this help pin down the measurable RQ?

## 6. Experiment design

### Experiment 1

- Some points to note about the experiment design
  - Why were **filler items** (sometimes called distractor items) included in the stimuli?
  - In what **order** were the stimuli presented, and why?



## 6. Experiment design

### Experiment 1

- **Materials** (except fillers) are analyzed in Table 1 (Treiman, Kessler, & Bick 2002: 452)
  - What can we see here? How do we read this table?
- How do the materials relate to the **measurable research question**?
  - What are the **conditions** in the experiment?

## 7. Other potential points for discussion

- What are the following hypotheses, and which experiments tested them?
  - The *rime constituency hypothesis*
    - **constituent**: a group of smaller units that behaves as a larger unit  
(we saw this term when we discussed syntax)
  - The *syllable constituency hypothesis*
  - The *adjacency hypothesis*

## 8. For next time

- Next time we will look at the results from Treiman et al. (2002), especially Expt 1 (and 2 if time)
- We will talk about basic concepts in statistics — and why statistical analysis is important in quantitative research papers
  - The Kaplan reading will give you some background in basic statistics concepts