Today's topics:

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

Background (in class):

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

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  3. List your **materials** } ***experiment design***
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1. Structure of a quantitative research project

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- **Big-picture** research question
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- **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 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

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

- Is *Journal of Memory and Language* peer-reviewed?

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  - 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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     - Sections on each experiment (methodology)

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4. Understand the **results** of each **experiment**
    - 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?

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?

     - General Discussion / Conclusion / Implications

4. Big-picture research questions

Discussion

- What are some of the **big-picture research questions** 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

- Is this an accurate statement about Treiman et al. (2002)?

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

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

  - No! — Why not?

4. Big-picture research questions

- Quick check-in on linguistics concepts
  - Terms to review: **onset, coda, rime**
  - **/ɝ/** is the same as /ɚ/
    (as in *p<u>ur</u>ple, b<u>ir</u>d, c<u>ur</u>l, w<u>or</u>th*)
  - **/ɛ/** is the vowel sound in *r<u>e</u>d*

4. Big-picture research questions

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

(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 Padlet question from a past year:
  "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

- "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?
  - This is a new technical term introduced by these authors — what does it mean?

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

Experiment 1

- Is the first sentence in this section a statement of the authors' **measurable research question**?

5. Measurable research questions

Group discussion

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

- Hint: Do the authors state any **hypothesis** or **prediction** when presenting an experiment?
  - Does this help pin down the measurable RQ?

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

- 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