

# Experiment Design

Linguistics 390a  
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## 1 Major Steps in Designing an Experiment

### Step 1: Finding a Starting Point

What phenomenon do you want to look at? This is often the most difficult part. You can approach it in two ways:

a) Start with a theoretical hypothesis

You may be working within a particular theory and run into an important question that you would like to test experimentally.

Example: Quantity Violations are admissible when they are relevant

b) Start with an interesting contrast

You may just run into a fascinating contrast between two sentences that differ only minimally. If your understanding that contrast leads to an interesting theoretical question, this is also a good way of getting started.

Example: (2a) vs. (2b) from yesterday's handout

### Step 2: Turning Step 1 into an experimental design

Flesh out what your experiment is about and how you can investigate it. Depending on your choice above,

a) Decide how to implement your independent variable

What is a good way of expressing the different levels of your independent variable (try to keep changes minimal!)

Example: create a context where a certain value on a scale is particularly relevant (having \$10 to pay for a movie ticket)

b) Formulate a question / hypothesis

What is the contrast about? What is the independent variable?

Example: This contrast involves Quantity, and the change in numbers seems to affect Relevance. So the contrast seems to indicate that Relevance affects Quantity...

Tips:

- You may have to revise your hypothesis and examples as you go along!
- Keep your eyes open for other factors that might come into play!
- Always try to come up with alternative explanations for the effect you are after – ideally, your final design will rule those out or help answer a question about them.
- Try to keep everything the same except for your manipulation!

**Step 3: Decide on a Dependent Variable**

Depending on your hypothesis and the way you implemented it, there may be several options for what to choose as an outcome measure. Test your intuitions about which one seems to yield the clearest result and is most directly related to your theoretical hypothesis!

Types of Tasks and Dependent Measures:**- Truth Value Judgment:**

Is the given sentence true in the context provided?  
Good if IV directly affects interpretation of sentence  
(Measure: % of true judgments)

Example: The 'I have \$8' example.

**- Preferred Interpretation**

Provide two possible paraphrases of a sentence. Which one is better?  
Good if IV affects interpretation in a way that can't be easily tested by asking whether the sentence is true or false.  
(Measure: % of paraphrase x chosen)

Example:

- a) John said Mary went to Europe and Bill did too.
- b) John said Mary went to Europe. Bill did too.
- i) Bill went to Europe.
- ii) Bill said Mary went to Europe.

**- Answering Questions**

Another way of testing effect of the IV on the interpretation  
(Measure: % of answer x chosen)

Example: How many apples were eaten in total? 3 or 9

- a) John and Mary ate three apples.
- b) The couple ate three apples.

- **Rating on a Scale**  
On a Scale from 1 (worst) – to 5 (or 7) (best), rate the following sentences  
Good if IV makes a sentence more complex, awkward, infelicitous, less good sounding  
(Measure: average rating)  
  
Example:  
a) John talked to any woman.  
b) John talked to any woman that came up to him.
- **Grammaticality Judgment**  
Is the following a good sentence of English?  
Good if IV has a pretty strong impact on how good a sentence is (often, it's used in combination with time pressure)  
(Measure: % of grammatical judgments)
- **Fill in the Blank**  
Complete a sentence by filling in a missing part  
Good if IV is directly related to preferring one of two forms  
(Measure: % of form x chosen)  
  
Example: 'The' vs. 'That'  
a) A woman entered the stage from the left. Then another woman entered the stage from the right. \_\_\_\_\_ woman was wearing a dress.  
b) A man entered the stage from the left. Then a woman entered the stage from the right. \_\_\_\_\_ woman was wearing a dress.

You may need to vary these or even come up with your own task, depending on the phenomenon you're looking at.

#### **Step 4 Putting together a Pilot Study**

- Test some of your examples on friends to see if they share your intuition.
- Create 6 to 12 sentences with versions for each condition.
- Make two lists that include half of the sentences in one condition, and the other half in the other condition.  
→ That way, each participant sees every condition several times, but doesn't see the individual sentences more than once!

**Schema:****List 1:**

1a
2b
3a
4b
5a
6b

**List 2**

1b
2a
3b
4a
5b
6a

- **Add 4-12 Fillers:** To keep people from getting too used to seeing the same type of sentences over and over, it's good to add so-called **fillers**. These should involve the same task, but don't need to be in experimental conditions. They're just there to distract participants.

Example: Mary and Bill are talking about siblings. Bill, a single child, says: 'I have a very annoying sister.'

NOTE: In this case, half of the fillers should be true, half false!

- **Formulate Instructions.** Participants need to be clear about what they have to do. Carefully design clear instructions and provide an example.

Example: For each of the examples below, you should indicate whether you think the person is telling the truth or lying.

Example: (use something like the filler above)

- Try to find 8-10 people to take participate in this pilot version.

**Step 5: Running a Full Experiment**

- If your pilot study had promising results, you'll want to run a full experiment.
- You may have to fix problems that arose from the pilot study.
- Everything else is very much like the pilot study, except that you need
  - o More participants (12-24 or more)
  - o More examples (12 - 6 per condition)
  - o More fillers (a 1 to 1 ratio of experimental examples and fillers)