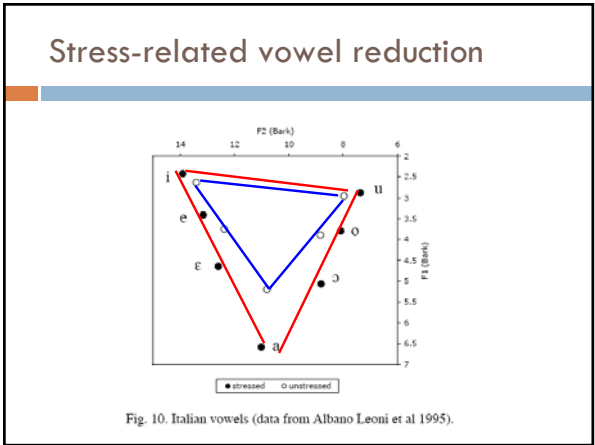


# EXPERIMENTAL RESEARCH IN LINGUISTICS

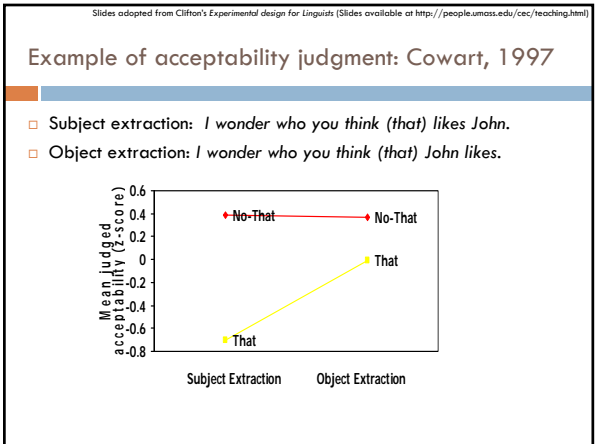
Alan Yu, University of Chicago

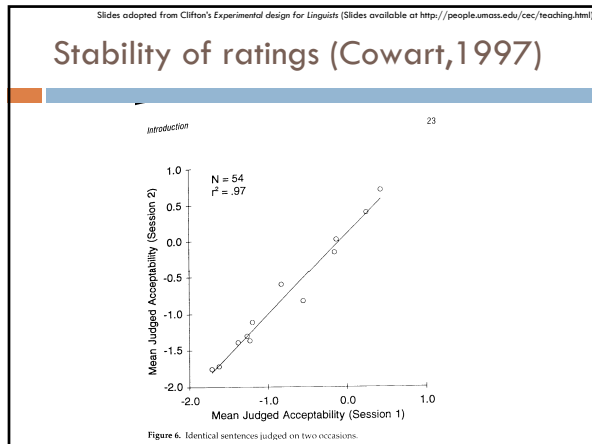
- ## Plan
- Why should linguists do experiment?
  - How should linguists do experiments?

- ## Why should linguists do experiments?
- To supplement linguists' intuitions
  - To test predictions of a theory
  - Because it's fun!



- Slides adopted from Clifton's Experimental design for Linguists (Slides available at <http://people.umass.edu/cec/teaching.html>)
- ## Acceptability judgments
- Check theorists' intuitions about acceptability of sentences
    - Acceptability, grammaticality, naturalness, comprehensibility, felicity, appropriateness...
  - Aren't theorists' intuitions solid?





- Slides adopted from Clifton's *Experimental design for Linguists* (Slides available at <http://people.umass.edu/cec/teaching.html>)
- ## Sometimes linguists are wrong...
- Superiority effects
    - I'd like to know who hid it where.
    - \*I'd like to know where who hid it.
  - Ameliorated by a third wh-phrase?
    - ?I'd like to know where who hid it when.

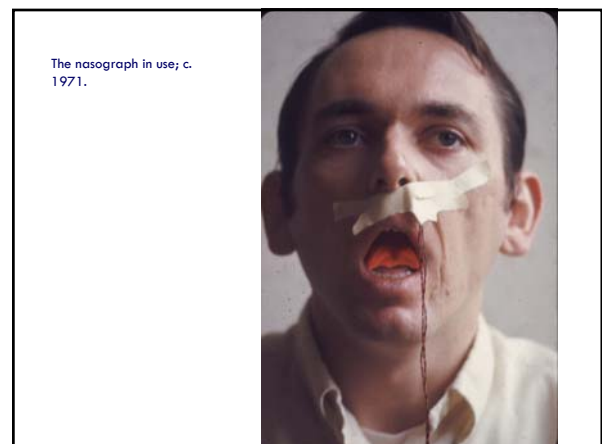
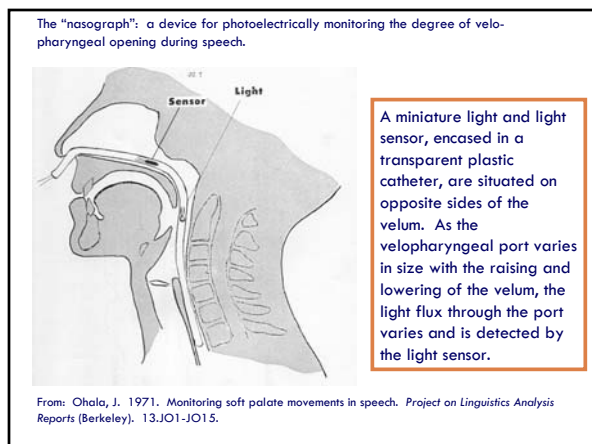
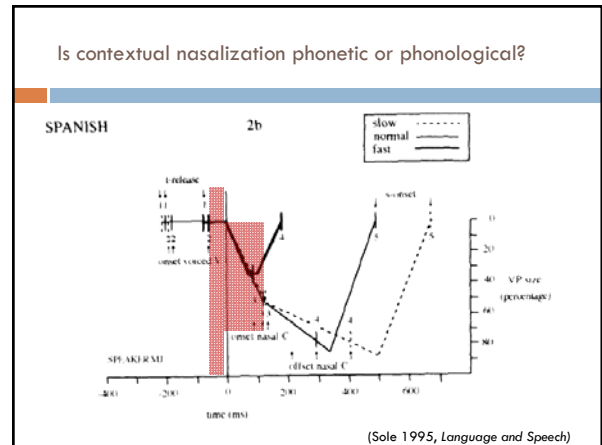
Slides adopted from Clifton's *Experimental design for Linguists* (Slides available at <http://people.umass.edu/cec/teaching.html>)

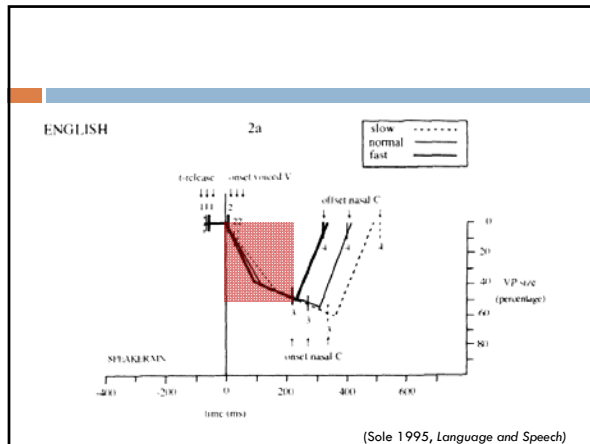
## Paired-comparison preference judgments

a. I'd like to know who hid it where.	86%		
b. (*?)I'd like to know where who hid it.	14%	76%	
c. (*?)I'd like to know where who hid it when.	24%	49%	
d. I'd like to know who hid it where when.			51%

a-b basic superiority violation  
 b-c heads-on comparison, extra wh "when" hurts, doesn't help  
 c-d the "ameliorated" superiority violation, c, seems good when compared to its non-superiority-violation counterpart

Clifton, C. Jr., Fanselow, G., & Frazier, L. (2006). Amnesting superiority violations: Processing multiple questions. *Linguistic Inquiry*, 37(51-68).





## How should linguists do experiments?

1. Formulate clear and concise research questions;
2. Identify a suitable experimental task/paradigm;
3. Identify the predictions and the statistical tests required;
4. Run a pilot study;
5. Run the actual test;
6. Present the results;
7. Publish the results!

## Formulate clear and concise research questions

- Ask answerable questions.
- **Independent variable:** variation controlled by experimenter, not by what subject does
  - Operationalization of variables
- **Dependent variable:** variation observed in subject's behavior, perhaps dependent on IV
  - Research Tradition
  - Theory
  - Availability of New Techniques
  - Availability of Equipment

## Identify a suitable experimental task/paradigm

- **Correlational Research:** Determines if two or more variables covary and if so, in what direction and magnitude. No independent variables are manipulated.
- **Factorial Design:** Manipulation of an independent variable while controlling over extraneous variables and observation of change in the dependent variable.
  - **Main Effects:** The separate effects of each independent variable. They are analogous to separate experiments involving those variables.
  - **Interactions:** Exist when the effect of one independent variable changes across the levels of another independent variable.
  - As factors are added, the complexity of the experimental design increases, with increasing numbers of possible main effects and interactions.

## Hay et al. 2006, *Linguistic Review*

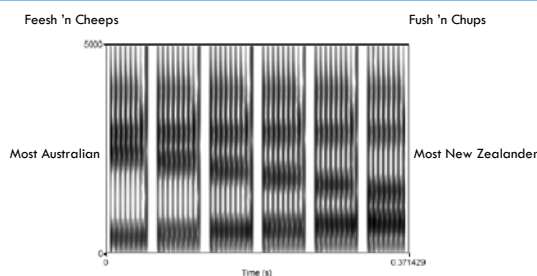


Figure 1. Spectrogram of the six vowels /ɪ/ tokens, ordered from most Australian to least Australian

## Sample sentences

- During the colder months, John and I both wanted to stay fit so we decided to join a yoga class.
- During the colder months John and I both wanted to stay fit.
- Very quickly, I realized that this was actually a horribly uncomfortable bed and that I needed to go back and have it exchanged.
- Very quickly, I realized that this was actually a horribly uncomfortable bed.

## Results: Effects of regional label

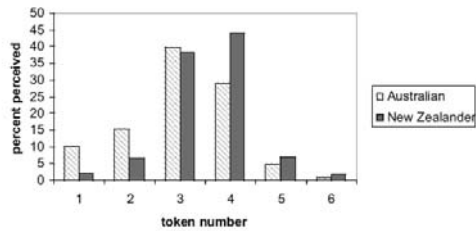


Figure 2. Relative frequency of participants' responses to the /h/ vowels, separated by experimental regional label

## Hay et al. 2006, *Linguistic Review*

Table 3. Analysis of variance for /h/ model (based on 980 responses from 49 speakers)

Factor	d.f.	F	P
regional label (factor+higher order factors)	4	16.87	< .0001
sex (factor+higher order factors)	2	21.98	< .0001
Sentence type	1	11.7	0.0007
fish (factor+higher order factors)	2	3.17	0.0426
social class (factor+higher order factors)	2	4.64	0.0099
experimenter (factor+higher order factors)	2	2.69	0.0682
number (factor+higher order factors)	2	2.18	0.114
regional label * sex (factor+higher order factors)	1	42.88	< .0001
regional label * fish (factor+higher order factors)	1	6.32	0.0121
regional label * social class (factor+higher order factors)	1	8.62	0.0034
experimenter * number (factor+higher order factors)	1	3.84	0.0502

## Identify a suitable experimental task/paradigm

- **Between-subjects experimental designs** are experiments in which different group subjects are randomly assigned to different levels of the independent variable.
- **Within-subjects experimental designs** are experiments in which a single group of subjects is exposed to all levels of the independent variable. They compare treatment effects by looking at changes in performance within each participant across treatments. These are also called repeated measures designs.
- What is the subject pool?