

# Getting To Meaning:

## Experiments from the LingLawLab



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Manav Mehta	Sanjna Patel
Anna Petti	Sharan Sekhon
	Rhiannon Stewart

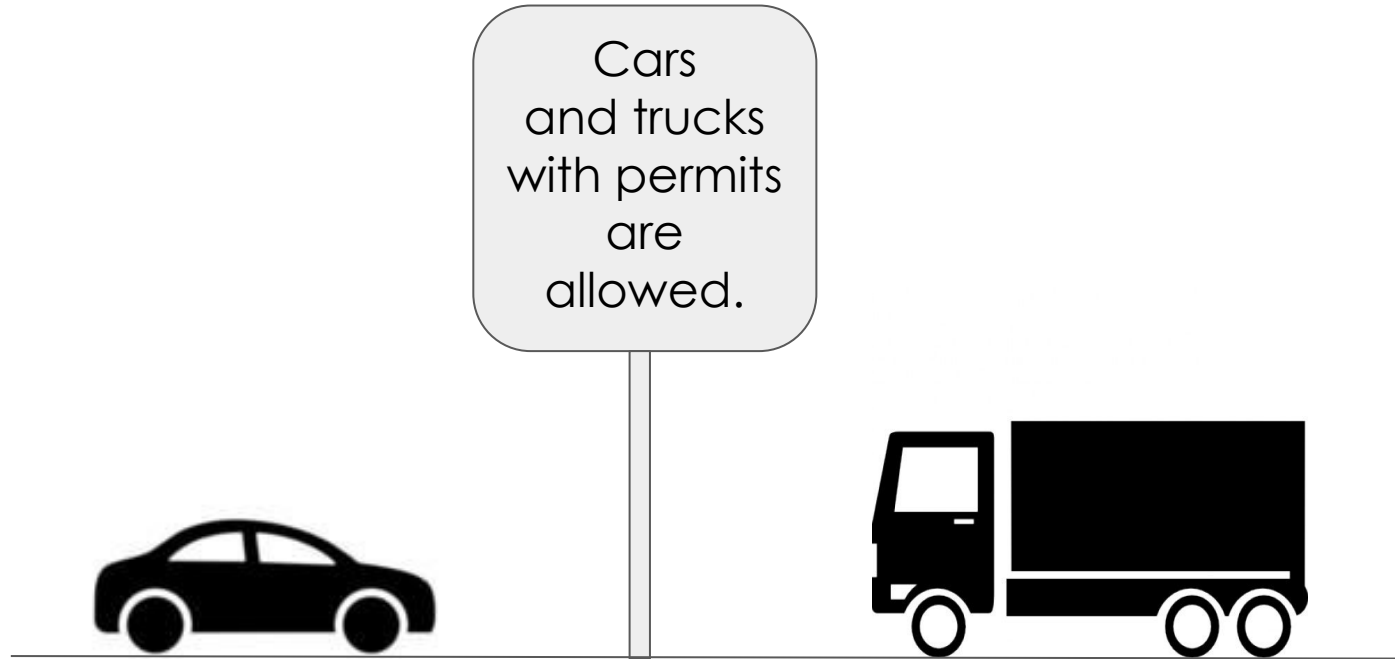
## Overview

- I. Ambiguity experiments
- II. Quantifier experiments
- III. Future experiments: Dialect
- IV. Wrap-up
- V. References

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## Overview: Three Experiments



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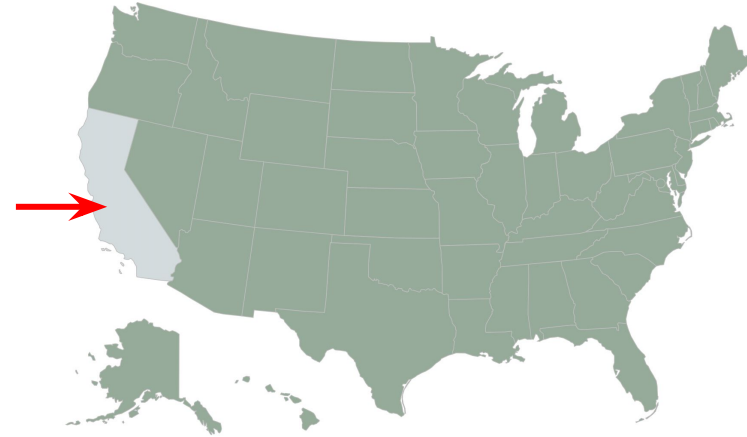
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the defendant is “guilty of  
**[each element of]** the crime  
beyond a reasonable doubt”

## Overview: Three Experiments

For you to find a defendant guilty of a crime, you must believe that

the defendant is “guilty of ~~each element of~~ the crime beyond a reasonable doubt”



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# Overview: Three Experiments



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# Overview

## I. **Ambiguity experiments**

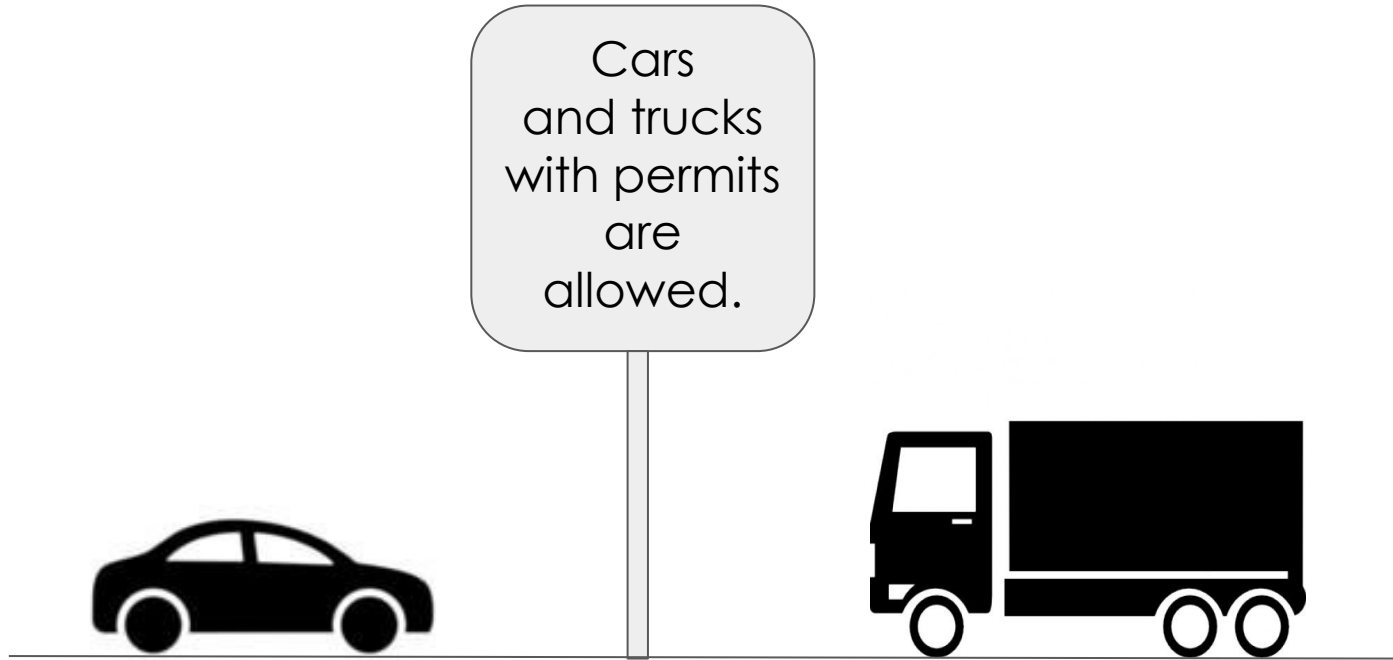
II. Quantifier experiments

III. Future experiments: Dialect

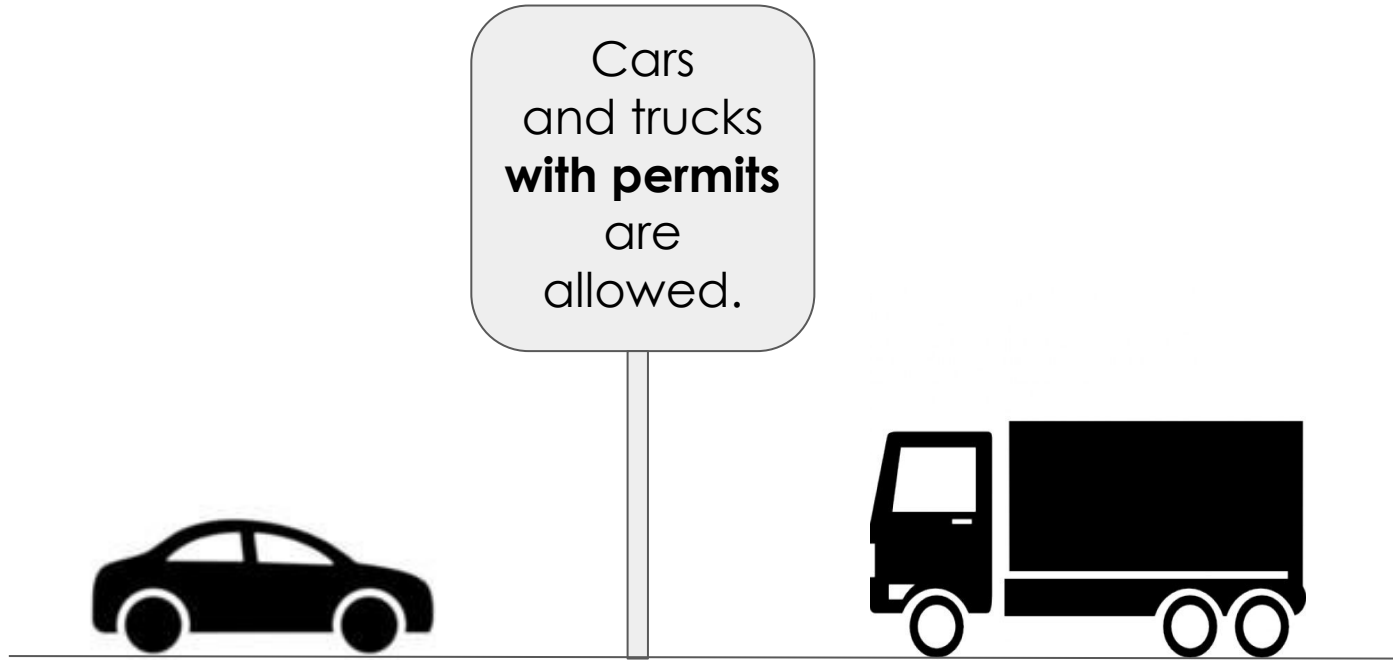
IV. Wrap-up

V. References

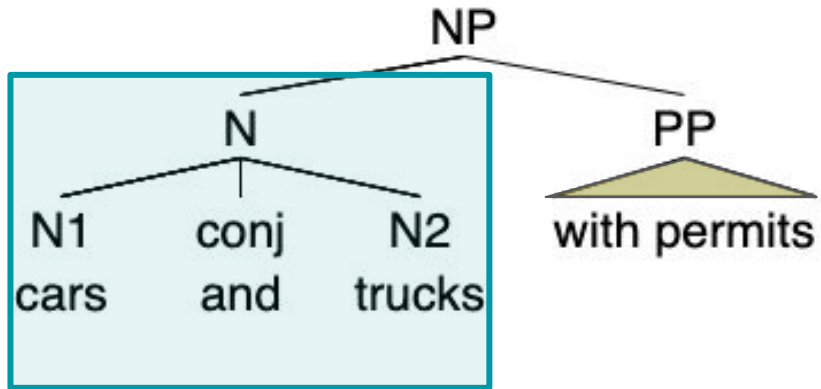
# Ambiguity Experiments



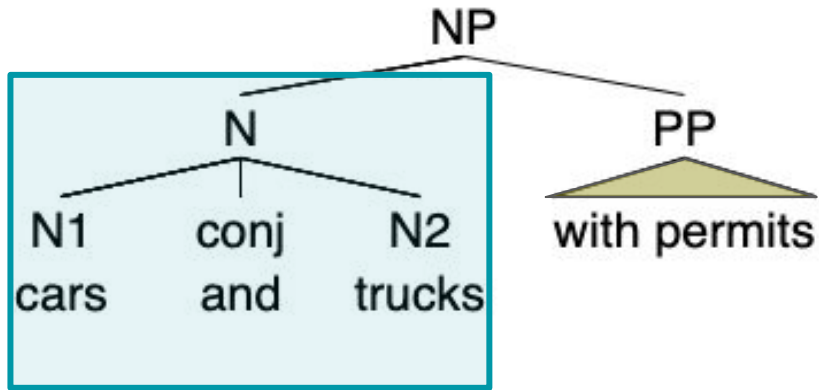
# Ambiguity Experiments



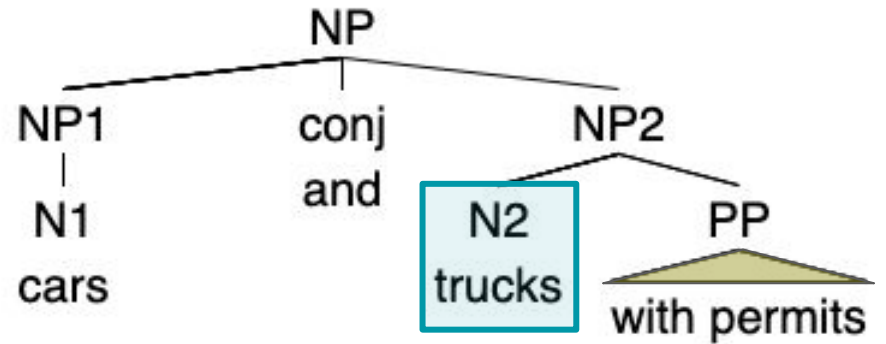
PP has **wide scope**



PP has **wide scope**



PP has **narrow scope**



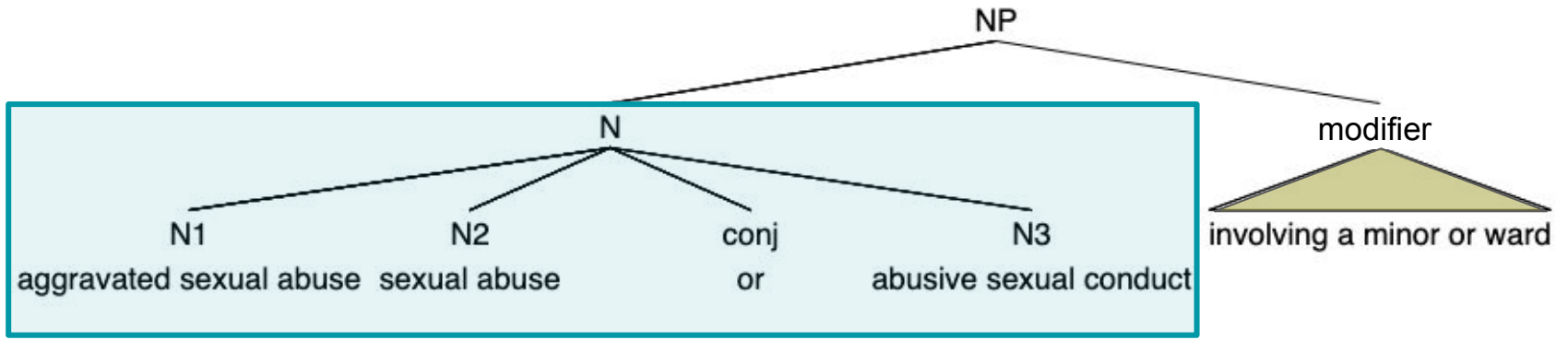
## Lockhart v. US (2016)

“prior state convictions for crimes relating to  
[aggravated sexual abuse], [sexual abuse], or [abusive sexual conduct]  
***involving a minor or ward.***”



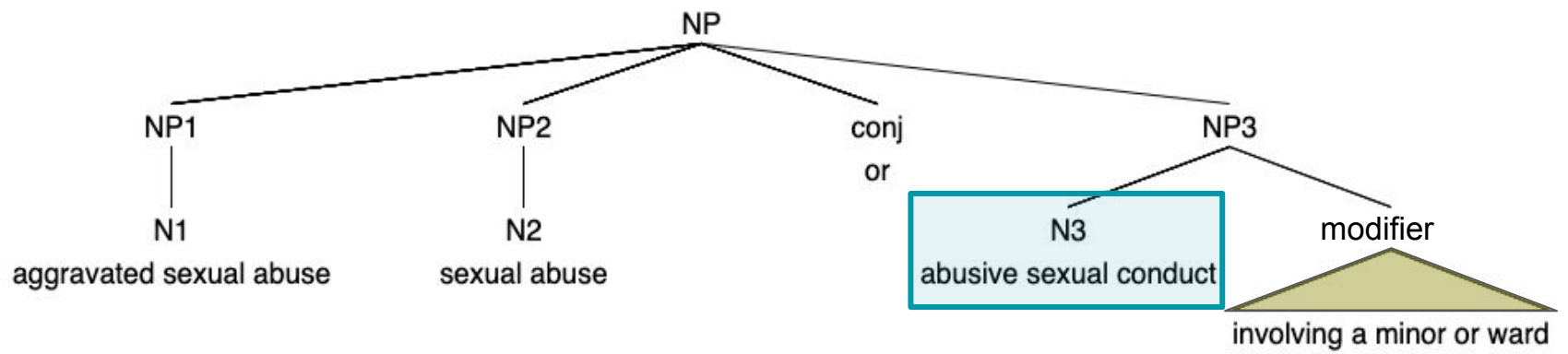
# Lockhart v. US (2016)

wide scope



# Lockhart v. US (2016)

narrow scope



## Lockhart v. US (2016)

The Majority Opinion: **narrow scope**

“prior state convictions for crimes relating to  
[aggravated sexual abuse], [sexual abuse],  
or **[abusive sexual conduct]** *involving a minor or ward.*”



Justice Sonia Sotomayor

“[a defensive catcher],  
[a quick-footed shortstop],  
or **[a pitcher]**

*from last year's World Champion  
Kansas City Royals ”*

## Lockhart v. US (2016)

Justice Kagan's dissent: **Wide scope**

“prior state convictions for crimes relating to  
**[aggravated sexual abuse], [sexual abuse],**  
or **[abusive sexual conduct]** *involving a minor or ward.*”

“I will find my client  
a **[house], [condo], or [apartment]**  
*in New York*”



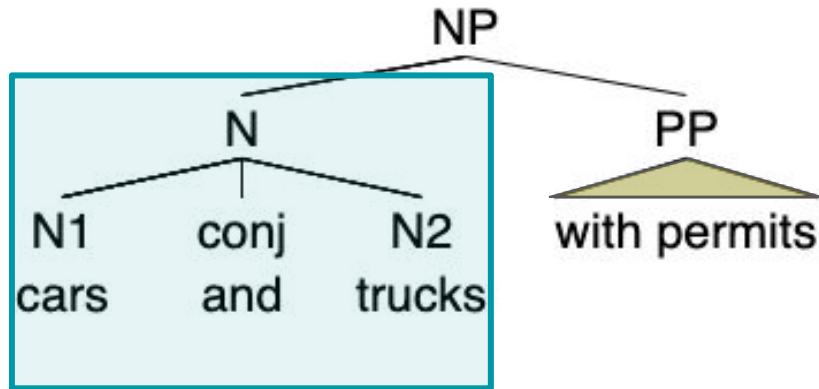
*“the completely ordinary way that people speak and listen, write and read”*

Justice Elena Kagan

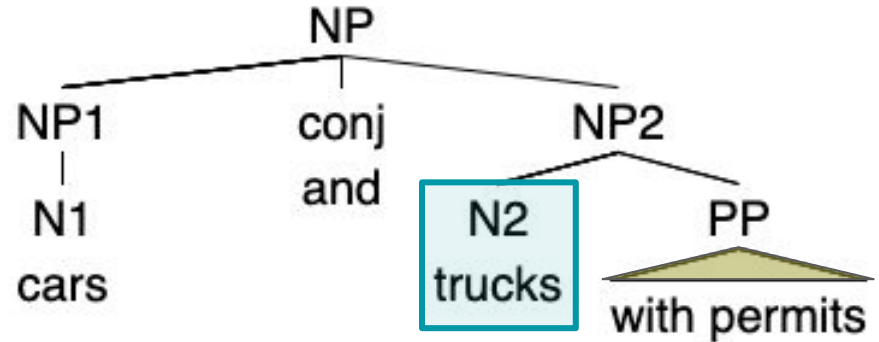


Cars and trucks **[with permits]** are allowed.

## wide scope



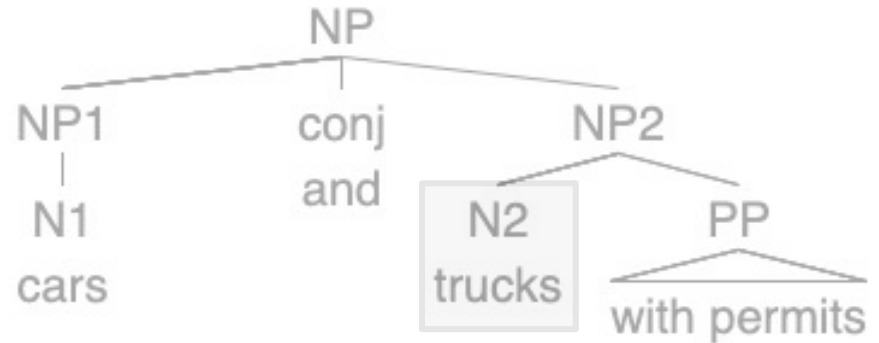
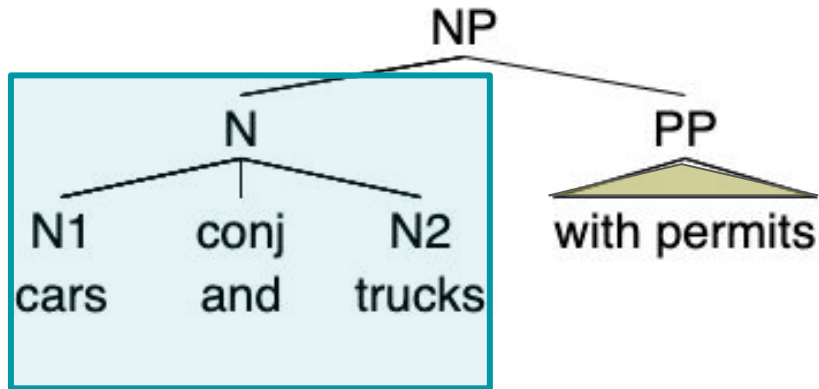
## narrow scope



**Hypothesis 1: Wide scope is preferred.**



## Hypothesis 1: Wide scope is preferred.



## Hypothesis 1: Wide scope is preferred.

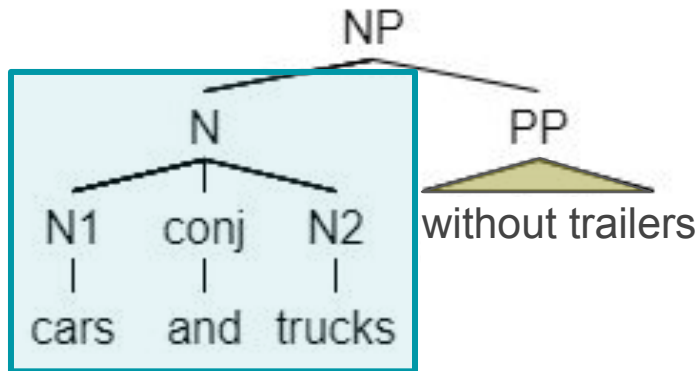
Cars and trucks **[with permits]** are allowed.

## Hypothesis 1: Wide scope is preferred.

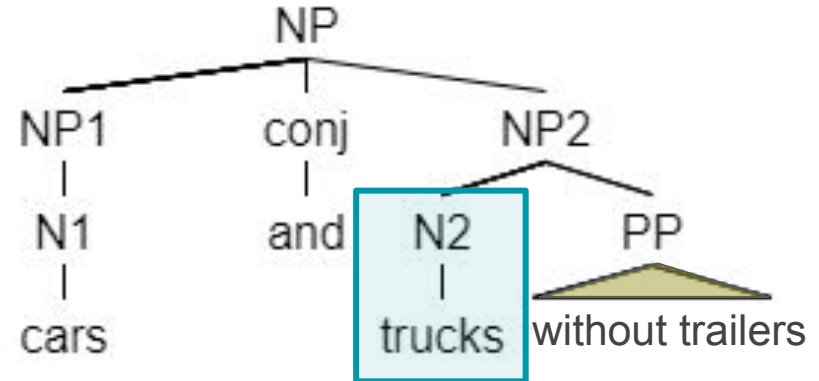
Cars and trucks **[with permits]** are allowed.

Cars and trucks **[without trailers]** are allowed.

## wide scope

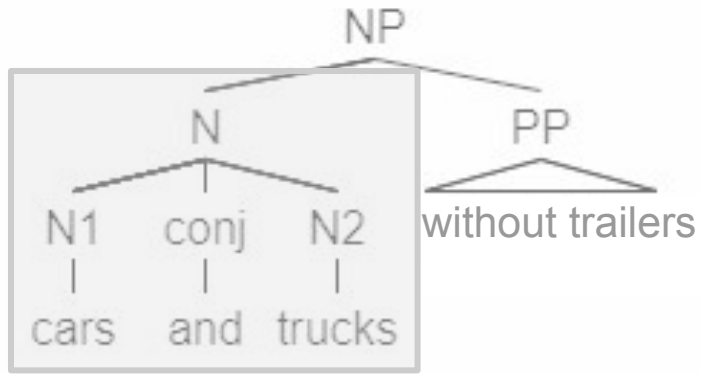


## narrow scope

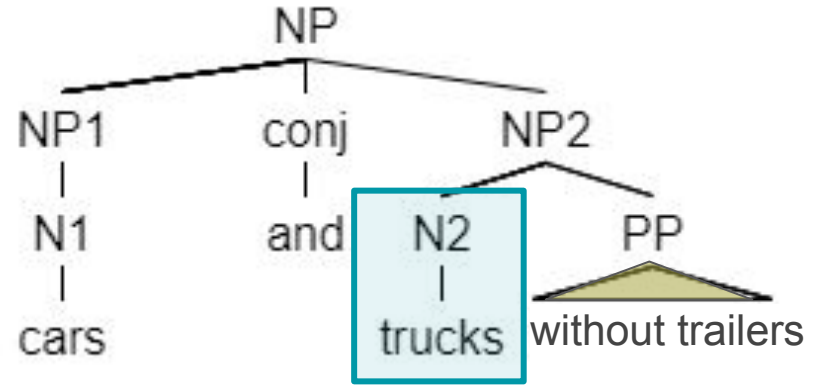


# Ambiguity Experiments

wide scope



narrow scope



**Hypothesis 1: Wide scope is preferred.**

**Hypothesis 1: Wide scope is preferred.**

**Hypothesis 2: Semantic bias can weaken a wide-scope preference**

**Hypothesis 1: Wide scope is preferred.**

**Hypothesis 2: Semantic bias can weaken a wide-scope preference**

**but there's one more thing...**



Cars and **trucks** **[without trailers]** are allowed.

Cars and **trucks** [without trailers] are allowed.

Two curved arrows, one above and one below the word 'trucks', pointing in opposite directions to form a circle around it.

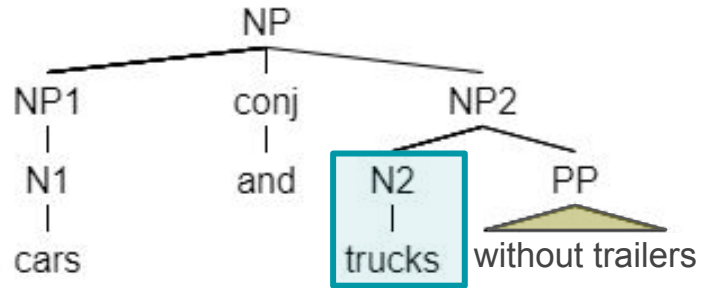


Cars and **trucks** [without trailers] are allowed.

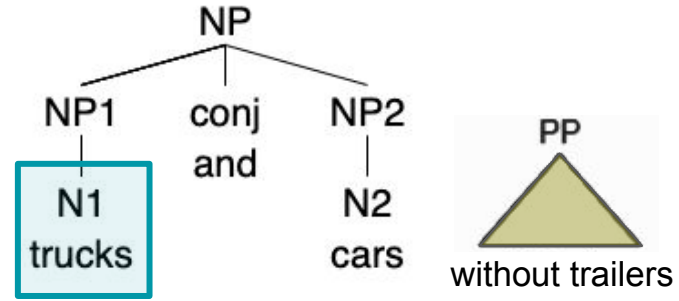
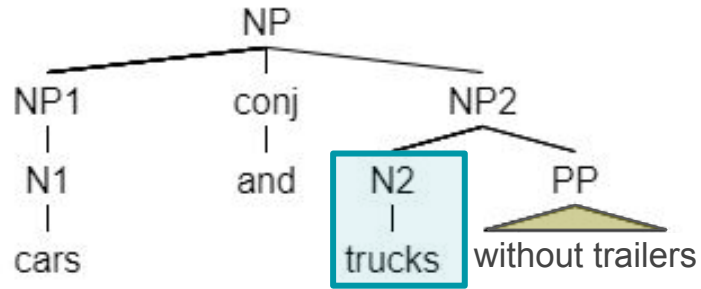
The diagram consists of two curved arrows forming a circle. The top arrow points from the word 'trucks' in the first sentence to the word 'cars' in the second sentence. The bottom arrow points from the word 'cars' in the second sentence back to the word 'trucks' in the first sentence.

**Trucks** and cars [without trailers] are allowed.

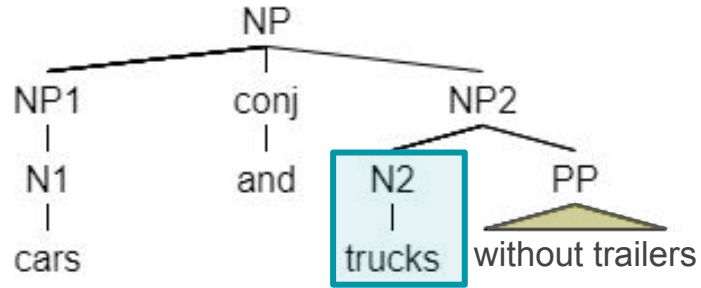
## narrow scope



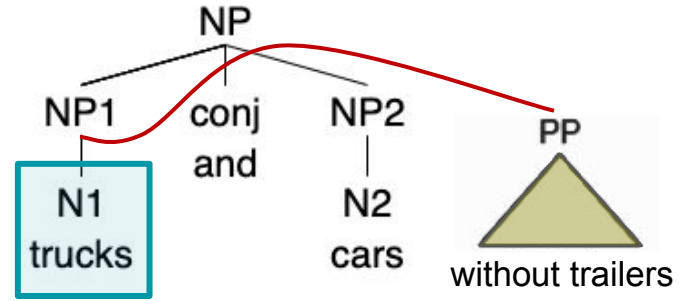
## narrow scope



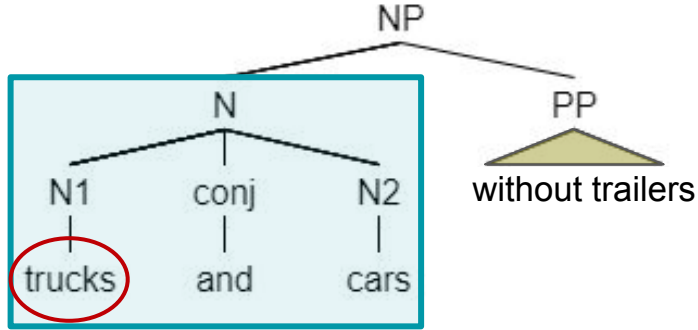
## narrow scope



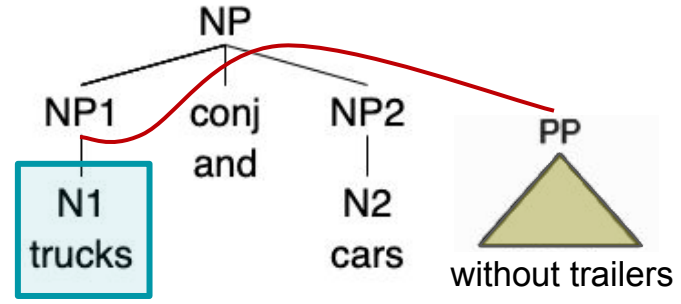
## syntax violation



## wide scope



## syntax violation



**Hypothesis 1: Wide scope is preferred.**

**Hypothesis 2: Semantic bias can weaken a wide-scope preference**

**Hypothesis 3: Syntax will override semantic bias**



## Experiment 1

**Hypothesis 1: Wide scope is preferred.**

**Hypothesis 2: Semantic bias can weaken a wide-scope preference**

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## Experiment 1

**Hypothesis 1: Wide scope is preferred.**

## Experiment 1

Hypothesis 1: Wide scope is preferred.

(1)  Cars and trucks [with **permits**] are allowed.

## Experiment 1

Hypothesis 1: Wide scope is preferred.

**Hypothesis 2: Semantic bias can weaken a wide-scope preference**

- (1) **Cars and trucks** [with **permits**] are allowed.
- (2) Cars and **trucks** [without **trailers**] are allowed.
- 
- The diagram consists of two green curved arrows. The top arrow points from the word 'trucks' in sentence (2) to the phrase 'Cars and trucks' in sentence (1), with the word 'unbiased' centered above it. The bottom arrow points from the phrase 'Cars and trucks' in sentence (1) to the word 'trucks' in sentence (2), with the word 'biased' centered below it.

## Experiment 1

Hypothesis 1: Wide scope is preferred.

**Hypothesis 2: Semantic bias can weaken a wide-scope preference**

- (1) **Cars and trucks** [with **permits**] are allowed.
- (2) Cars and **trucks** [without **trailers**] are allowed.
- 
- The diagram illustrates the relationship between the two sentences. A curved arrow labeled "unbiased" points from sentence (2) to sentence (1). A curved arrow labeled "biased" points from sentence (1) to sentence (2). In sentence (1), "Cars and trucks" is circled. In sentence (2), "trucks" is circled.

## Experiment 1

**Subjects:** 63 US citizens over 18

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**Subjects:** 63 US citizens over 18  
Recruited via Lucid to match the US population

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**Subjects:** 63 US citizens over 18  
Recruited via Lucid to match the US population

**Tool:** Online survey

- 12 test sentences
- 12 distractor sentences
- a multiple-choice question followed each sentence



## Experiment 1

### Test sentence:

Cars and trucks with permits are allowed.

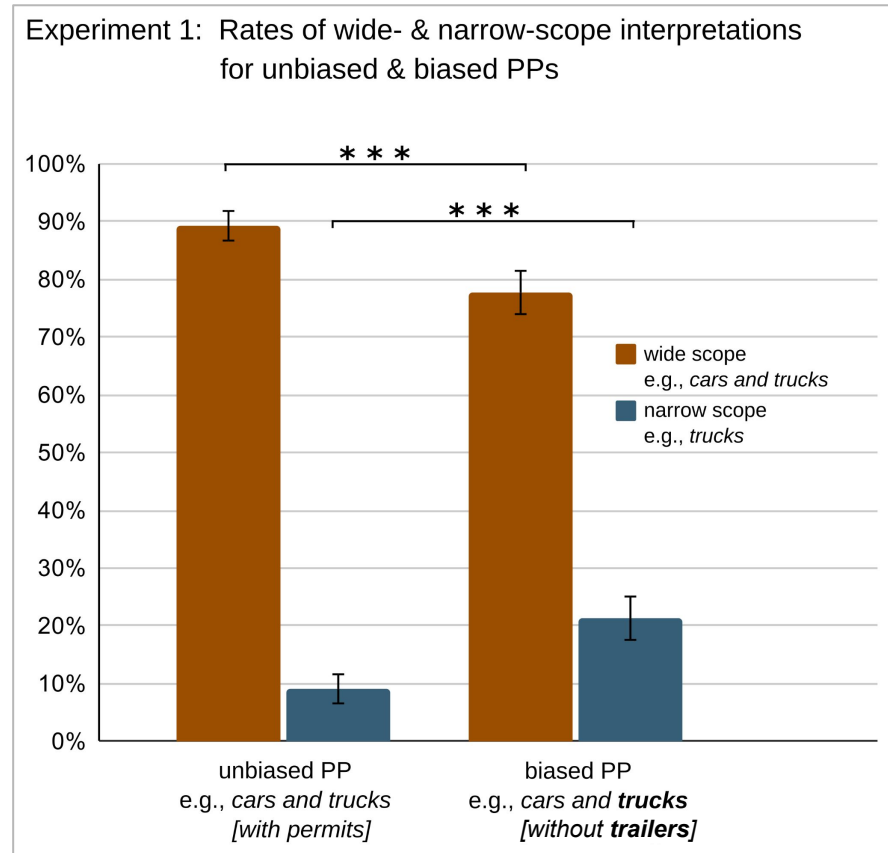
What must have a permit?

- Cars
- Trucks
- Cars and trucks
- None of the above

## Experiment 1

Hypothesis 1: Wide scope is preferred.

Hypothesis 2: Semantic bias can weaken a wide-scope preference

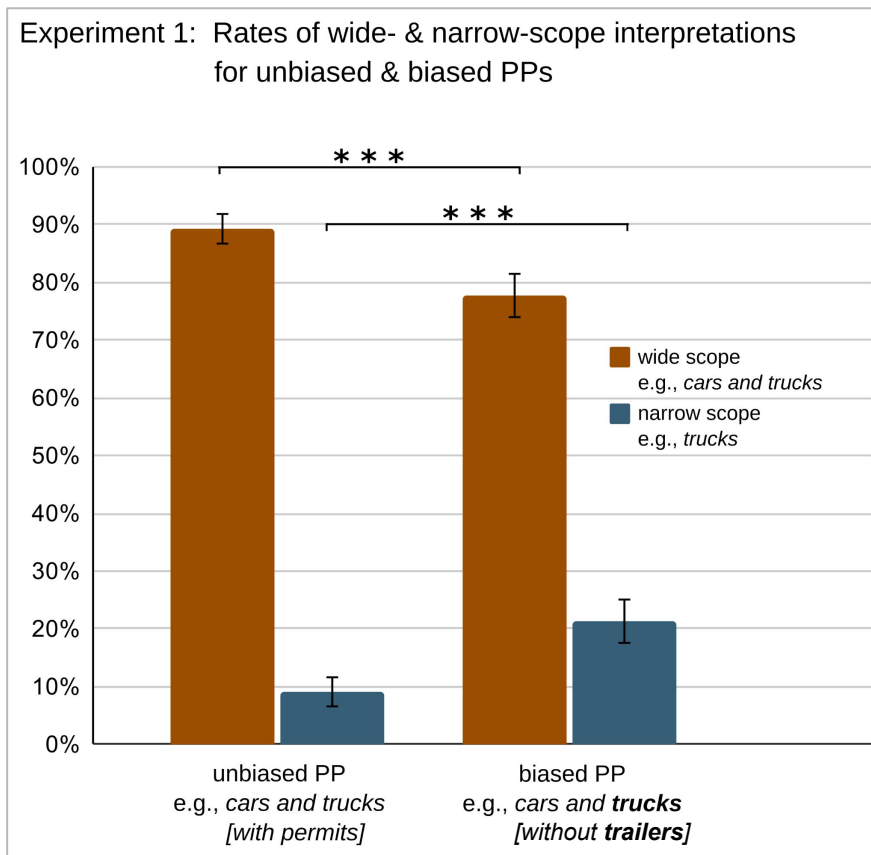


## Experiment 1

Hypothesis 1: Wide scope is preferred.

Hypothesis 2: Semantic bias can weaken a wide-scope preference

- Wide-scope preference in **unbiased** sentences: **89.4%**
- Wide-scope preference in **biased** sentences: **77.8%**



## Experiment 1

**Hypothesis 1: Wide scope is preferred.**

**Hypothesis 2: Semantic bias can weaken a wide-scope preference**

Hypothesis 3: Syntax will override semantic bias

## Experiment 1

✓ Hypothesis 1: Wide scope is preferred.

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Hypothesis 3: Syntax will override semantic bias

## Experiment 2

Hypothesis 1: Wide scope is preferred.

Hypothesis 2: Semantic bias can weaken a wide-scope preference

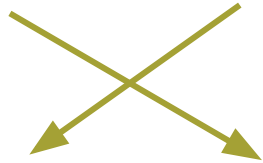
**Hypothesis 3: Syntax will override semantic bias**

## Experiment 2

(2) Cars and **trucks** [without **trailers**] are allowed.

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(2) Cars and **trucks** [without **trailers**] are allowed.



(4) **Trucks** and cars [without **trailers**] are allowed.



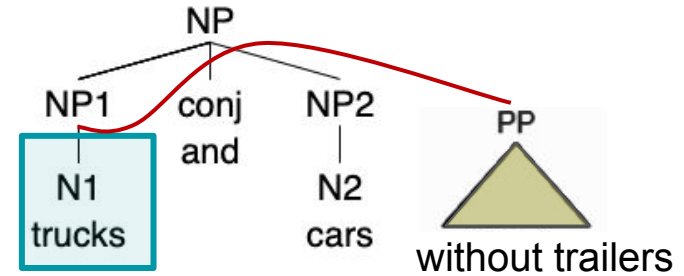
## Experiment 2

(4) **Trucks** and cars [without **trailers**] are allowed.



**biased, but ILLEGAL**

## Experiment 2



(4) **Trucks** and cars [without **trailers**] are allowed.



biased, but **ILLEGAL**

## Experiment 2

(4) **Trucks** and cars [without **trailers**] are allowed.

## Experiment 2

- (3) Trucks and cars [with **permits**] are allowed.
- (4) **Trucks** and cars [without **trailers**] are allowed.

## Experiment 2

unbiased

(3) Trucks and cars [with permits] are allowed.

(4) Trucks and cars [without trailers] are allowed.

biased, but **ILLEGAL**

## Experiment 2

(4) **Trucks** and cars [without **trailers**] are allowed.



## Experiment 2

(3) Trucks and cars [with permits] are allowed.



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## Experiment 2

**Hypothesis 1: Wide scope is preferred.**

Hypothesis 2: Semantic bias can weaken a wide-scope preference

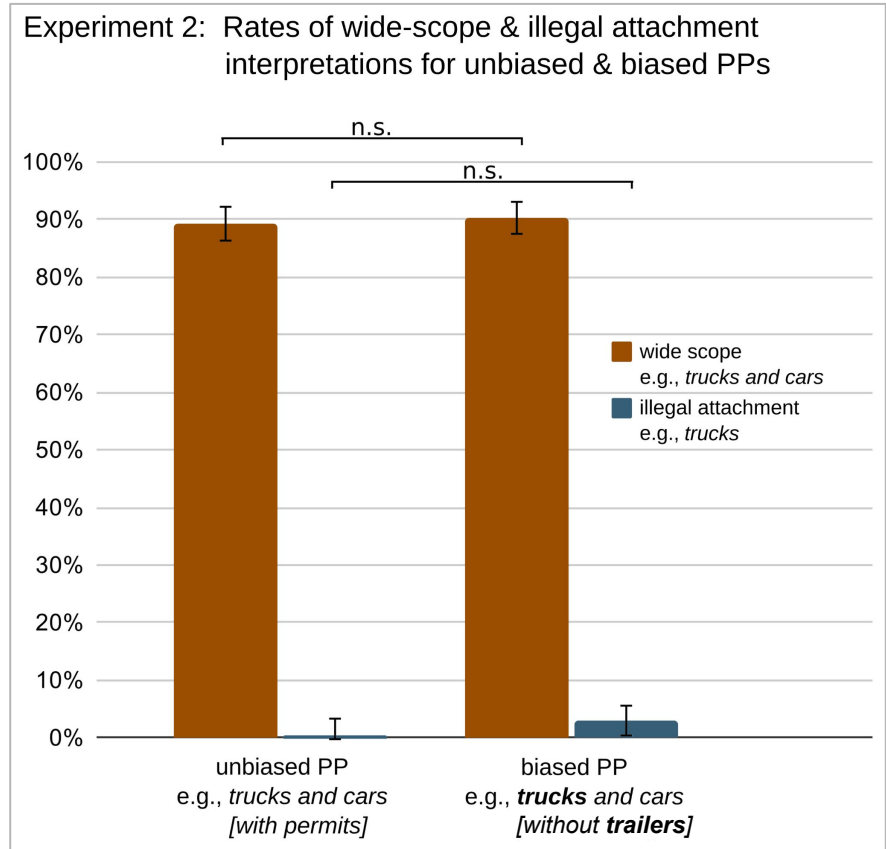
**Hypothesis 3: Syntax will override semantic bias**



## Experiment 2

Hypothesis 1: Wide scope is preferred.

Hypothesis 3: Syntax will override semantic bias

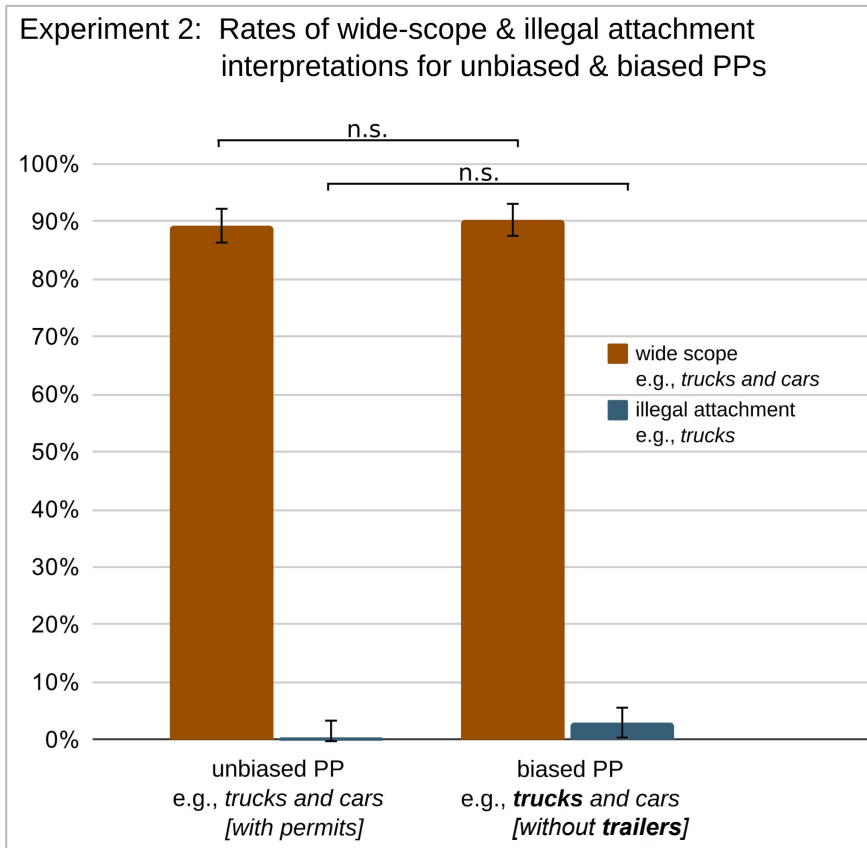


## Experiment 2

**Hypothesis 1: Wide scope is preferred.**

**Hypothesis 3: Syntax will override semantic bias**

- Wide-scope preference in **unbiased** sentences: **89.3%**
- Wide-scope preference in **biased** sentences: **90.3%**



## Experiments 1 & 2

- ✓ Hypothesis 1: Wide scope is preferred.
- ✓ Hypothesis 2: Semantic bias can weaken a wide-scope preference
- ✓ Hypothesis 3: Syntax will override semantic bias

Are there cases where a **narrow-scope** reading is justified?

Are there cases where a **narrow-scope** reading is justified?

**yes.** If there's a really good reason.

Are there cases where a **narrow-scope** reading is justified?

**yes.** If there's a really good reason for semantics to win:

Cars and **trucks [with 18 wheels]**...

# What do these results mean for **Lockhart v. US (2016)**?

“prior state convictions for crimes relating to  
[aggravated sexual abuse], [sexual abuse], or [abusive sexual conduct]  
***involving a minor or ward.***”

**wide  
scope!**



# Ambiguity Experiments





# Overview: Three Experiments



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**II. Quantifier experiments**

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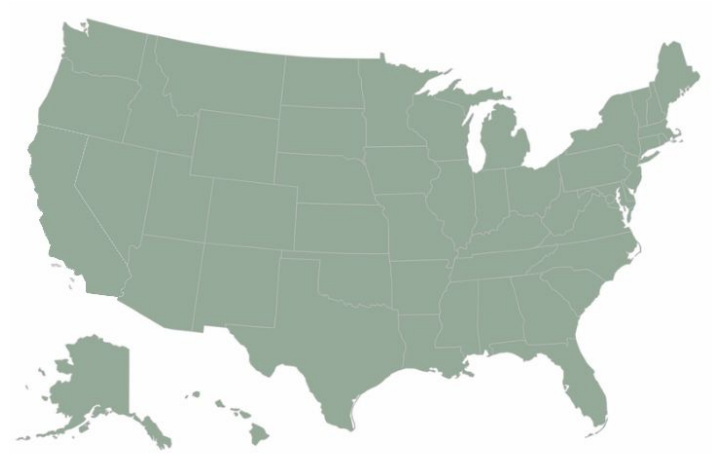
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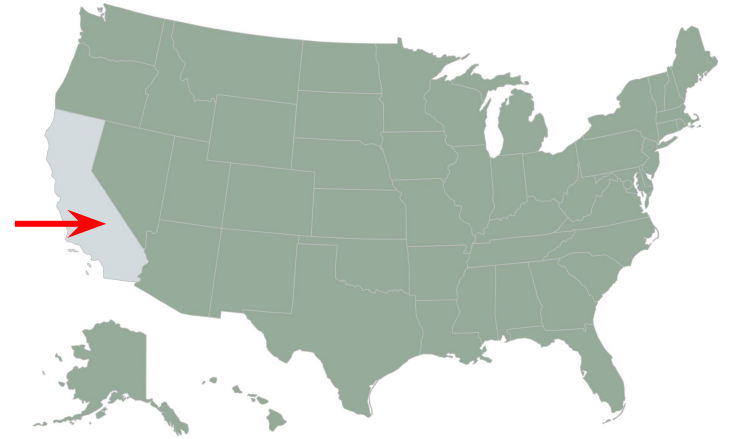
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# Quantifier Experiments

Court use only:  
# 3  
Time: 3:58 PM  
Date: 8/30/11

**I**  
**FILED**  
SUPERIOR COURT OF CALIFORNIA  
COUNTY OF ORANGE  
CENTRAL JUSTICE CENTER  
AUG 31 2011  
PALAN CARLSON, Clerk of the Court  
BY G. CABINOC DEPUTY

SUPERIOR COURT OF CALIFORNIA  
COUNTY OF ORANGE, CENTRAL JUSTICE CENTER

PEOPLE OF THE STATE OF CALIFORNIA, )  
Plaintiff, ) Case No. 10CF0786  
vs. ) JUROR REQUEST  
VICTOR JAMES WELLEN, )  
Defendant(s), ) DO NOT DESTROY THIS DOCUMENT  
(Permanent record of the Court)

We, the Jury in the above-entitled action, request the following:

IN REGARDS TO COUNT 3 (KIDNAPPING) PLEASE DEFINE  
#2) THE DEFENDANT MOVED THE CHILD A SUBSTANTIAL DISTANCE.  
PLEASE DEFINE SUBSTANTIAL DISTANCE  
DOES ALL 4 <sup>STEPS</sup> ~~ELEMENTS~~ DEFINING KIDNAPPING BE COMMITTED  
TO CONVICIT?

① Substantial distance is defined on page 35  
of your packet.

② Yes, all four elements listed on page 34  
must be proven beyond a reasonable doubt.

A. Joshua

Juror No. ~~139~~ 139 Seat No. 11 Department C30  
This 30 day of August, 2011

ORIGINAL DOCUMENT FILED SEPARATELY  
AND SEALED PURSUANT TO CCP 237(a)(2)

402



# Quantifier Experiments

Court use only:  
# 3  
Time: 3:58 PM  
Date: 8/30/11

I

FILED  
SUPERIOR COURT OF CALIFORNIA  
COUNTY OF ORANGE  
CENTRAL JUSTICE CENTER  
AUG 31 2011

SUPERIOR COURT OF CALIFORNIA  
COUNTY OF ORANGE, CENTRAL JUSTICE CENTER  
ALAN CARLSON, Clerk of the Court

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A. J. J. J.

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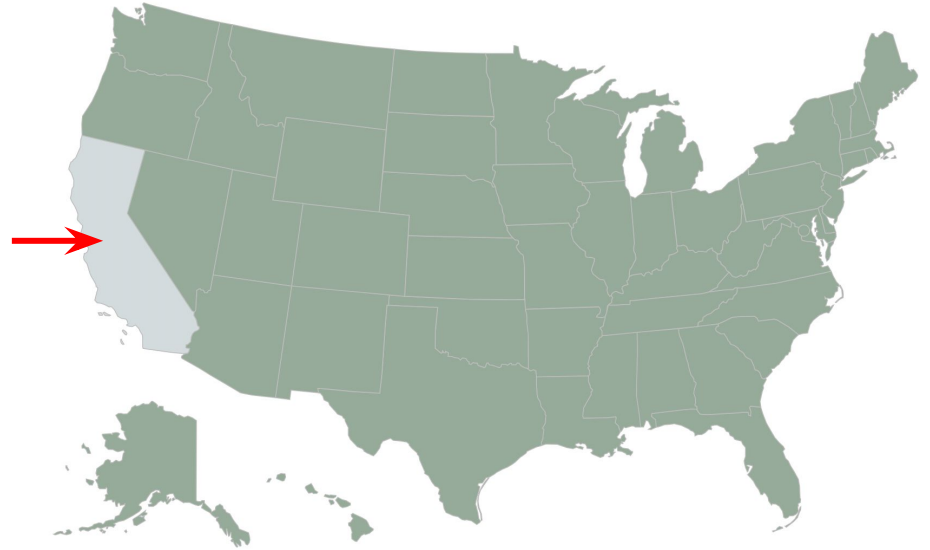
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# Quantifier Experiments



Mark Yanis





## Overview: Three Experiments

For you to find a defendant guilty of a crime,  
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## Overview: Three Experiments

For you to find a defendant guilty of a crime, you must believe that

the defendant is guilty of **[each element of]** the crime beyond a reasonable doubt

the defendant is guilty of ~~**[each element of]**~~ the crime beyond a reasonable doubt



## Kidnapping: A Pilot Study



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**Hypothesis:** Removing “each element” increases the rate of guilty verdicts



## Kidnapping: A Pilot Study

The defendant is charged with **“kidnapping in order to molest a child”**.



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The defendant is charged with **“kidnapping in order to molest a child”**.

The evidence shows that the defendant approached a 10-year old boy standing next to the slide at a local playground and offered to take him to his apartment to play video games.



### Kidnapping: A Pilot Study

The defendant is charged with **“kidnapping in order to molest a child”**.

The evidence shows that the defendant approached a 10-year old boy standing next to the slide at a local playground and offered to take him to his apartment to play video games.

The child agreed but before they could go anywhere, a police officer walked over and arrested the defendant.



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The child agreed but before they could go anywhere, a police officer walked over and arrested the defendant.

During the trial the jury saw a video of the incident.





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The evidence shows that the defendant approached a 10-year old boy standing next to the slide at a local playground and offered to take him to his apartment to play video games.

The child agreed but before they could go anywhere, a police officer walked over and arrested the defendant.

During the trial the jury saw a video of the incident.

They heard the defendant’s friend testify that the defendant had been planning to entice the boy to his apartment to molest him.



## The “Each Element” group

For the crime of “kidnapping in order to molest a child,” the prosecution must prove *each of* the following three elements beyond a reasonable doubt:

- [1] The defendant persuaded a child younger than 14 years old to go somewhere
- [2] The defendant did so in order to molest the child
- [3] As a result of the defendant’s conduct, the child moved a substantial distance

If the evidence does not prove the defendant guilty *of each of these elements* beyond a reasonable doubt you must find him not guilty.

## The “Control” group

For the crime of “kidnapping in order to molest a child,” the prosecution must prove ~~each of the~~ following three elements beyond a reasonable doubt:

- [1] The defendant persuaded a child younger than 14 years old to go somewhere
- [2] The defendant did so in order to molest the child
- [3] As a result of the defendant’s conduct, the child moved a substantial distance

If the evidence does not prove the defendant guilty ~~of each of these elements~~ beyond a reasonable doubt you must find him not guilty.

### Kidnapping: A Pilot Study

The defendant is charged with **“kidnapping in order to molest a child”**.

The evidence shows that the defendant approached a 10-year old boy standing next to the slide at a local playground and offered to take him to his apartment to play video games.

The child agreed but **before they could go anywhere**, a police officer walked over and arrested the defendant.

During the trial the jury saw a video of the incident.

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## Overview: Three Experiments

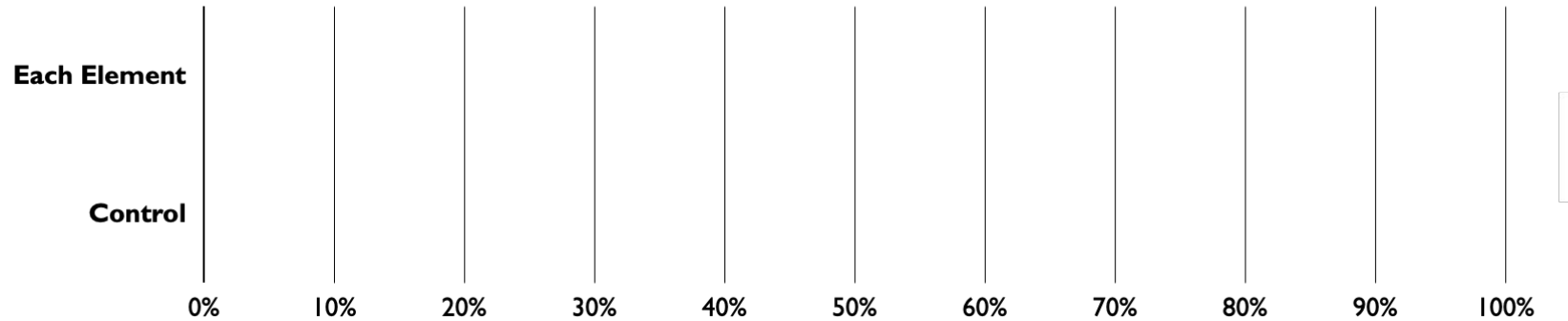
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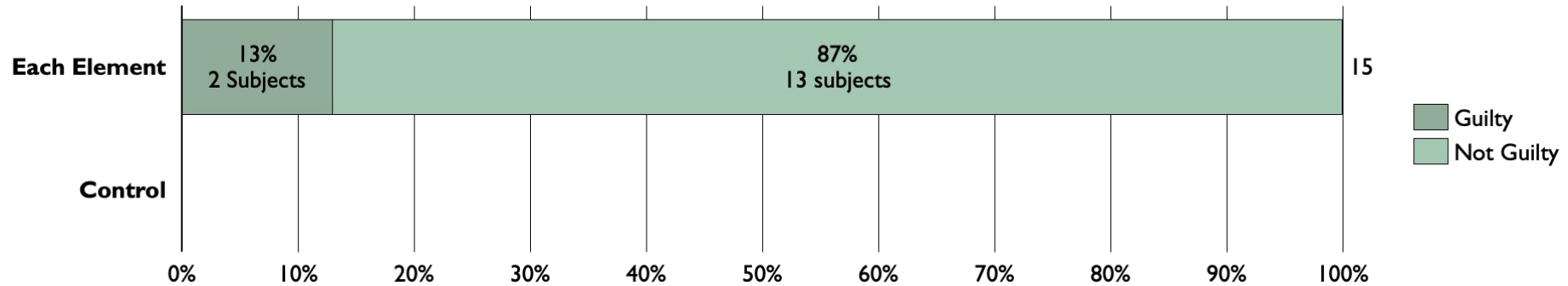
the defendant is guilty of ~~**[each element of]**~~ the crime beyond a reasonable doubt



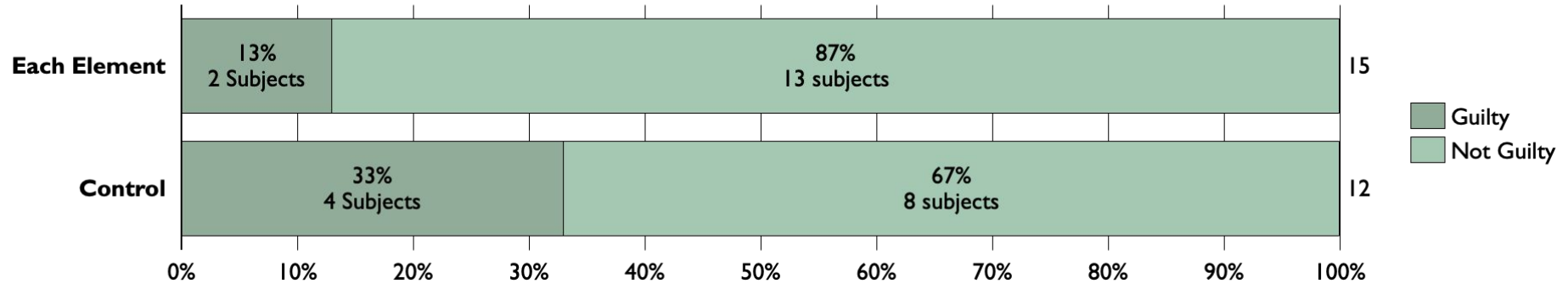
## Guilty / Not Guilty Verdicts for **Each Element** and **Control** Instructions



## Guilty / Not Guilty Verdicts for **Each Element** and **Control** Instructions

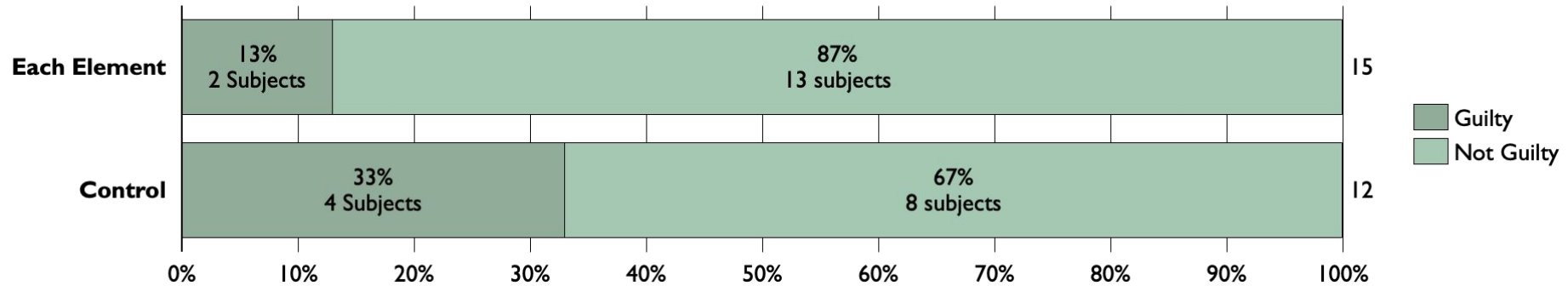


## Guilty / Not Guilty Verdicts for **Each Element** and **Control** Instructions



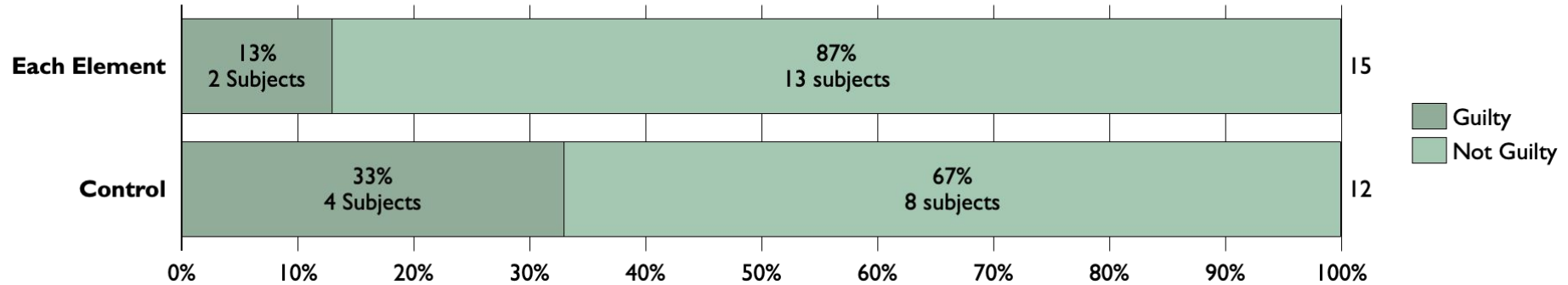


## Guilty / Not Guilty Verdicts for **Each Element** and **Control** Instructions



**Hypothesis:** Removing “each element” increases the rate of guilty verdicts

## Guilty / Not Guilty Verdicts for **Each Element** and **Control** Instructions



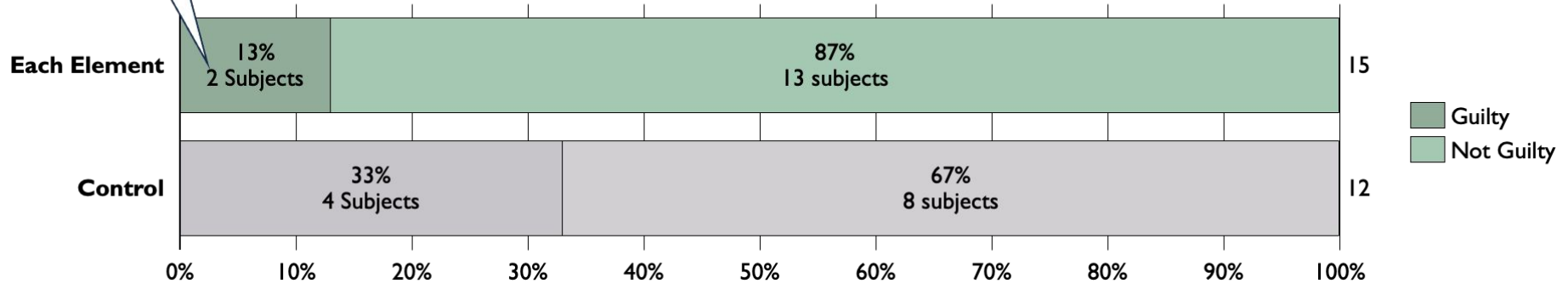
**Why were there any guilty verdicts at all?**

### How many elements were proven?

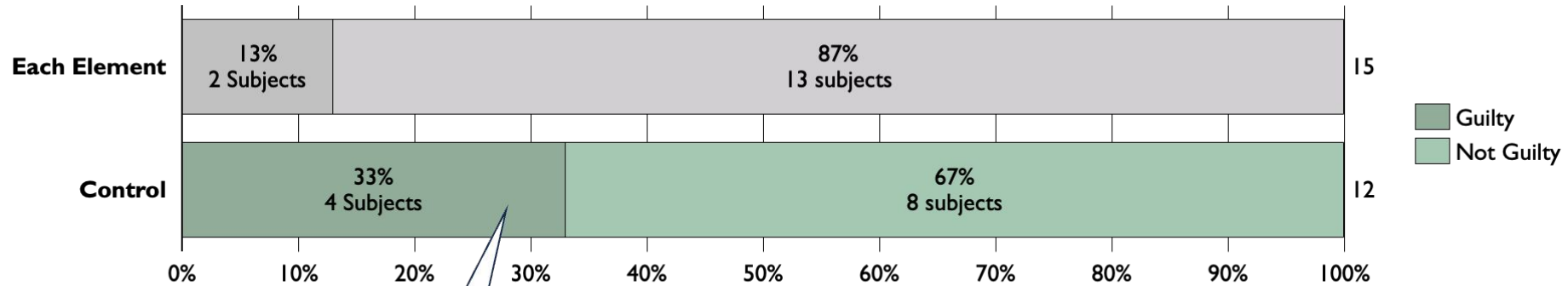
All 3 Elements



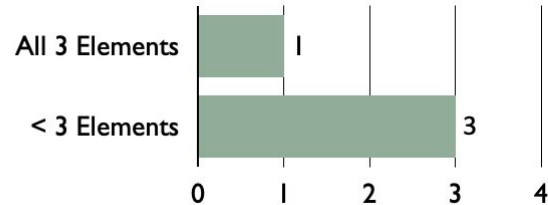
< 3 Elements



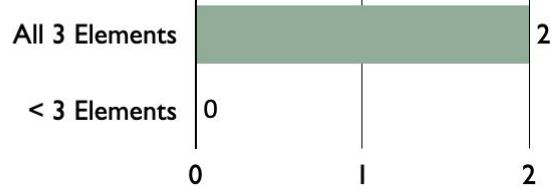
# Quantifier Experiments



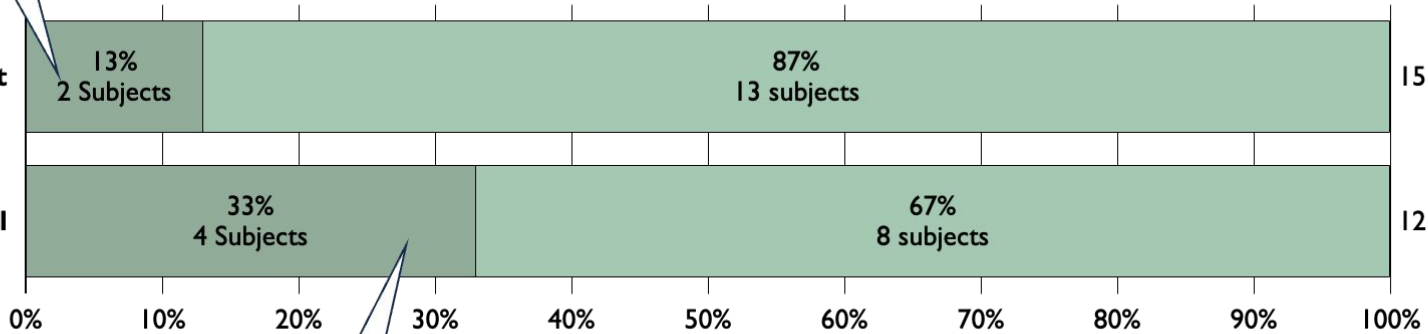
## How many elements were proven?



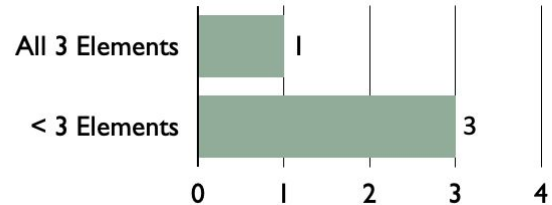
### How many elements were proven?

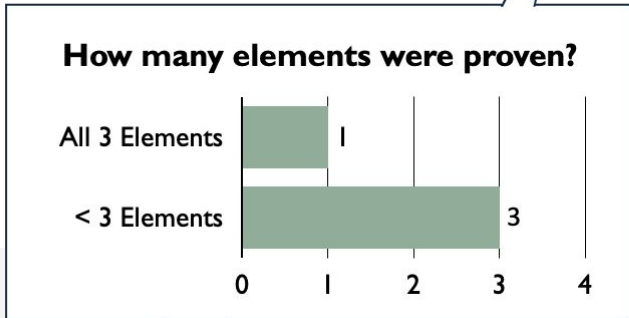
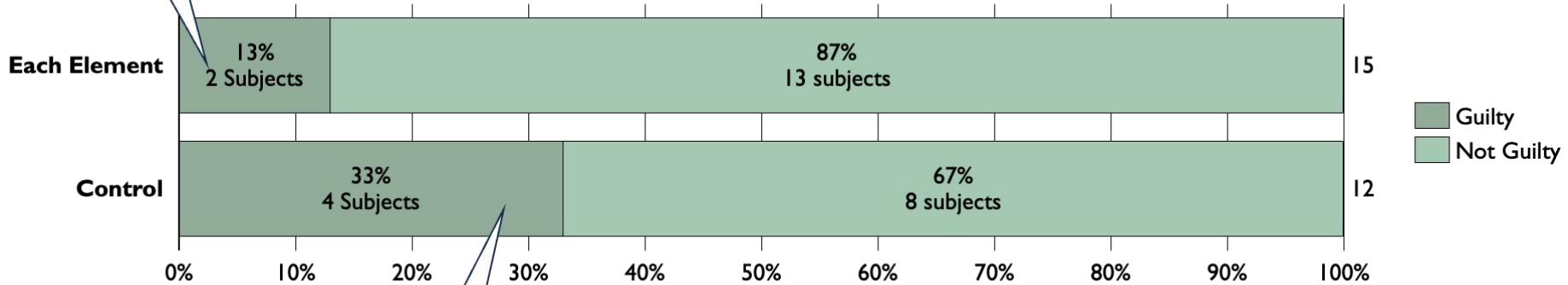
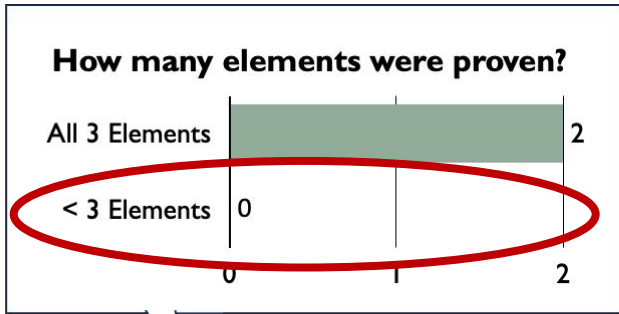


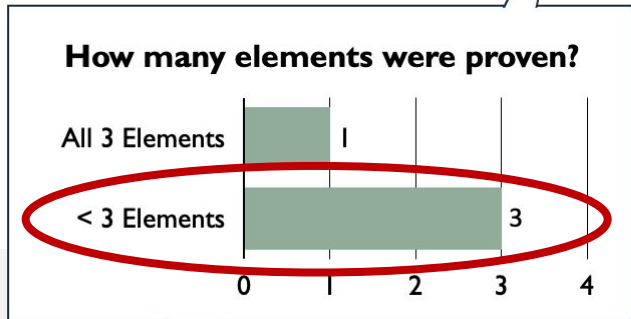
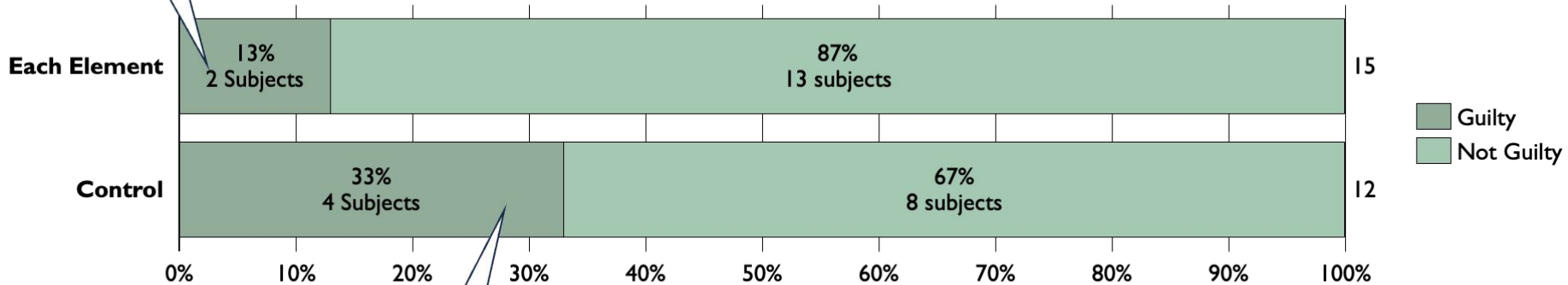
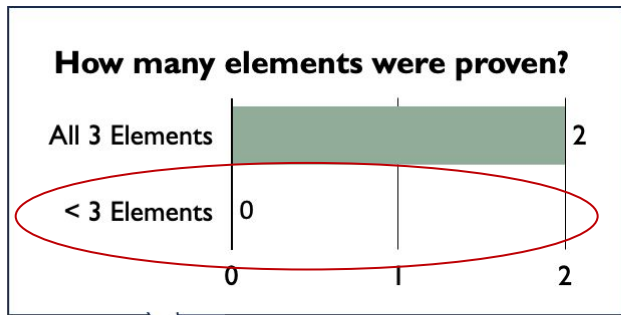
Each Element



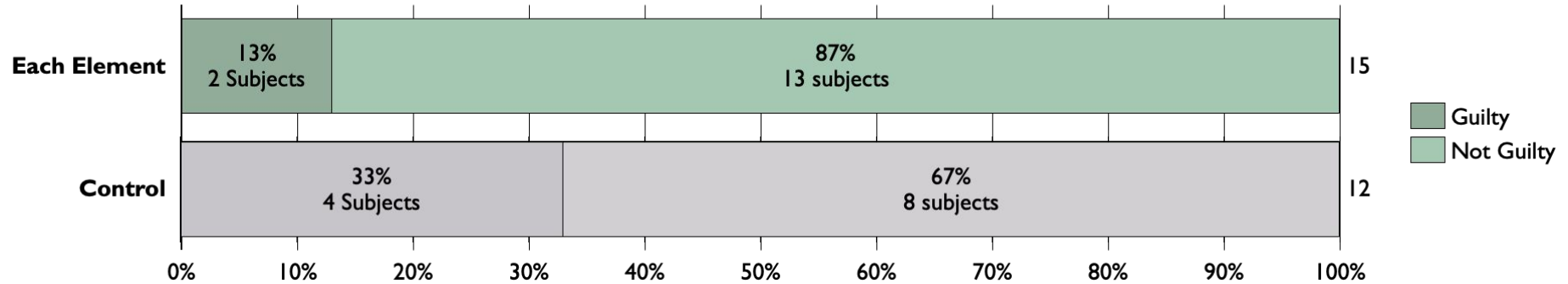
### How many elements were proven?





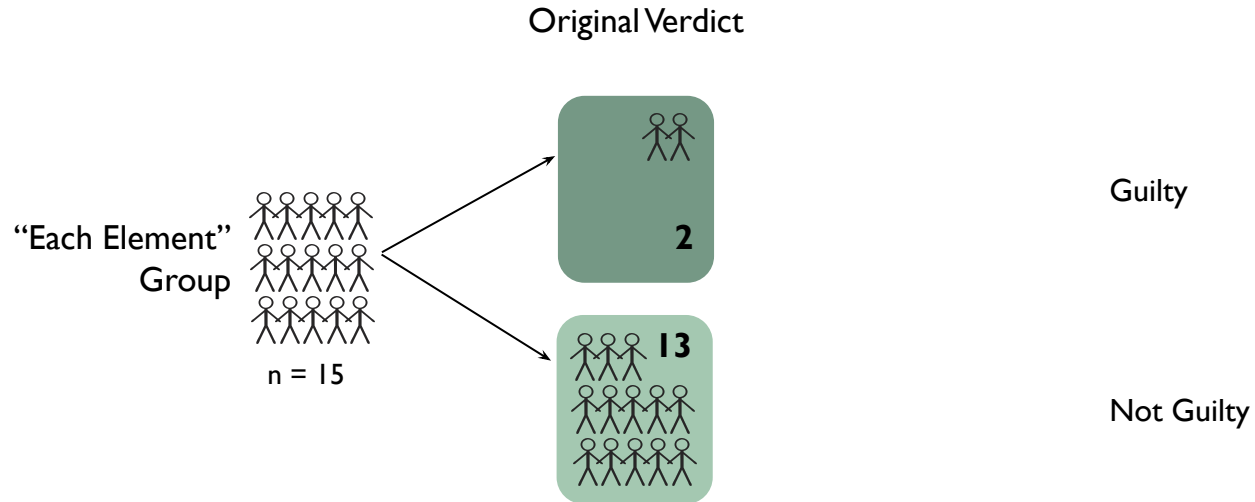


## Guilty / Not Guilty Verdicts for **Each Element** and **Control** Instructions

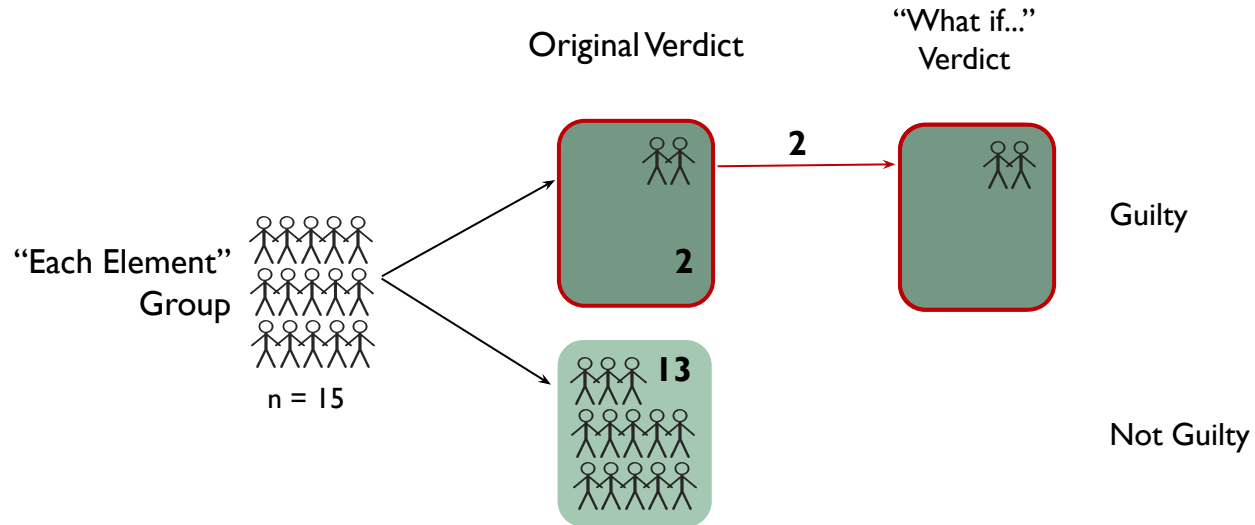




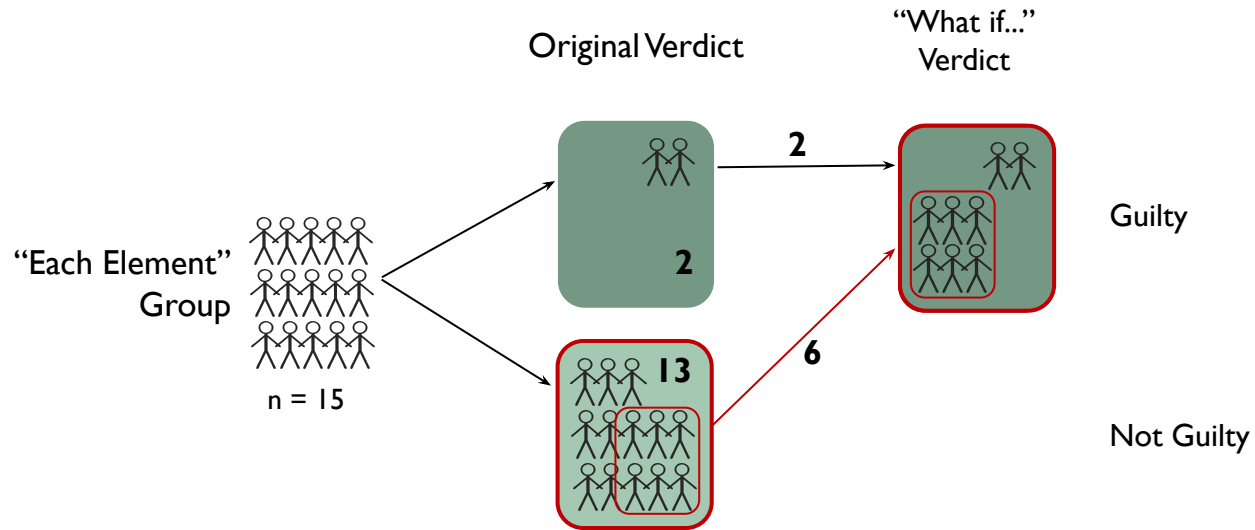
# Quantifier Experiments



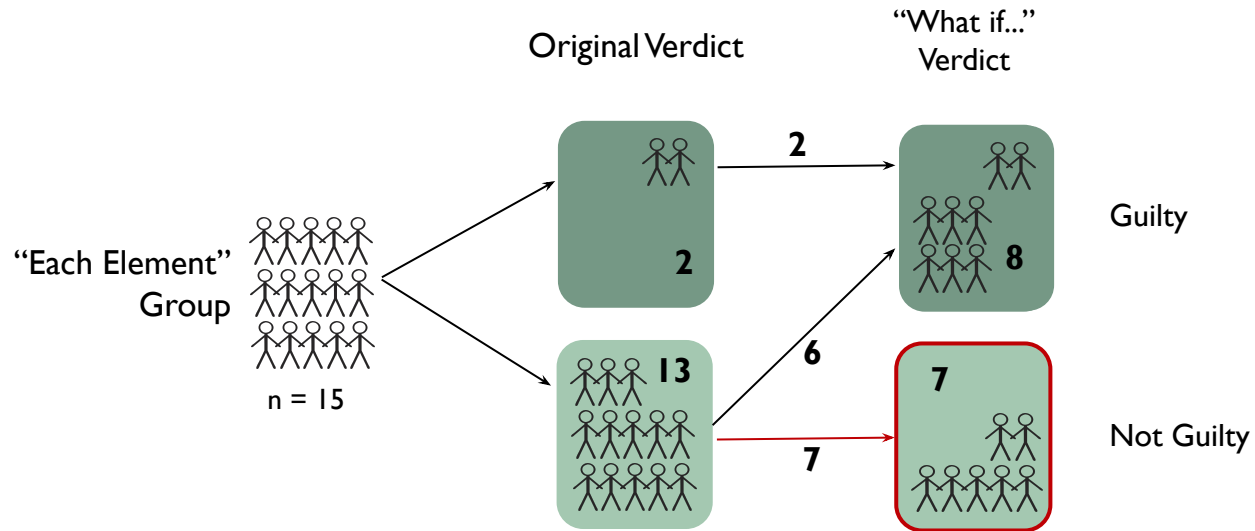
# Quantifier Experiments



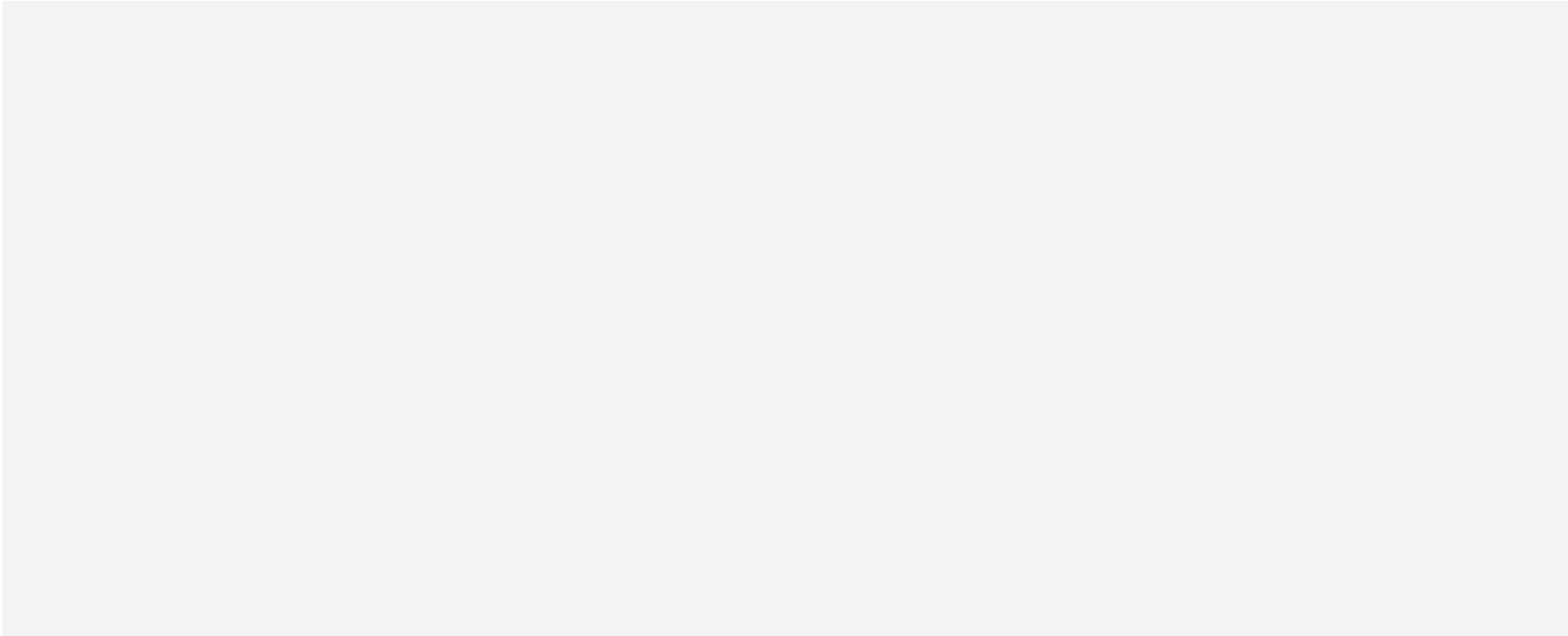
# Quantifier Experiments



# Quantifier Experiments



# Quantifier Experiments



## Conclusions

**Removing “each element” increases the rate of guilty verdicts**

### Conclusions

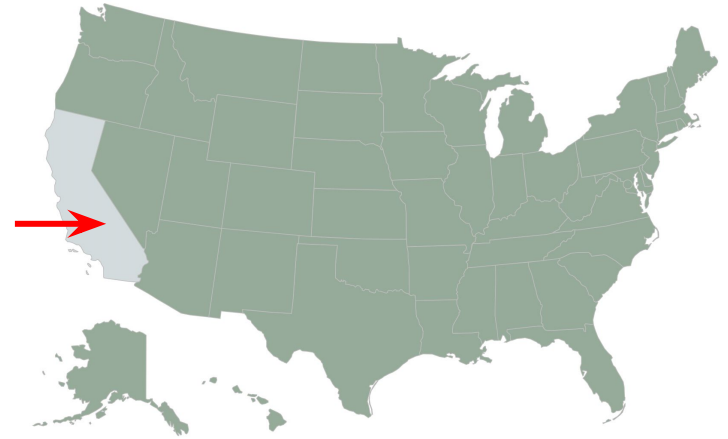
→ **Removing “each element” increases the rate of guilty verdicts**

#### **In other words:**

Hearing “each element” prevents holistic interpretations,  
so that **jurors do not reach guilty verdicts unjustly.**

For you to find a defendant guilty of a crime,  
you must believe that

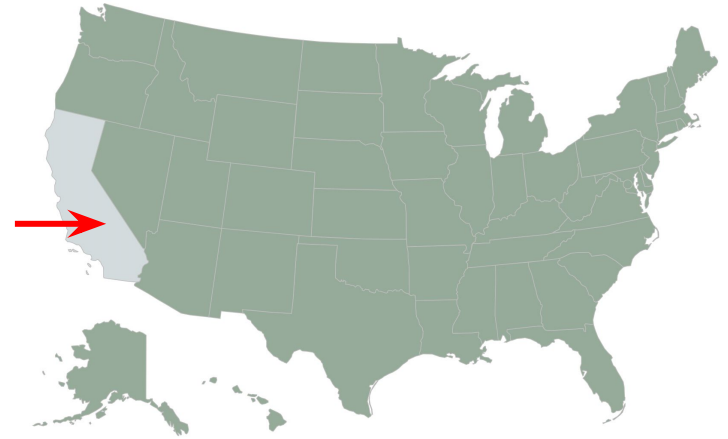
the defendant is “guilty of  
~~each element of~~ the crime  
beyond a reasonable doubt”





For you to find a defendant guilty of a crime,  
you must believe that

the defendant is “guilty of  
**[each element of]** the crime  
beyond a reasonable doubt”



### Follow-ups

Our Subject pool: highly educated friends, family, & co-workers

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→ **are their results representative?**

### Follow-ups

Our Subject pool: highly educated friends, family, & co-workers

→ **are their results representative?**

- 3 follow-up studies
- different scenarios
- larger subject pools

## Overview

I. Ambiguity experiments

II. Quantifier experiments

**III. Future experiments: Dialect**

IV. Wrap-up

V. References

# Dialect Experiments



# Dialect Experiments



## Overview

- I. Ambiguity experiments
- II. Quantifier experiments
- III. Future experiments: Dialect
- IV. Wrap-up**
- V. References**



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**The End**

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**Thank you.**

## How do people interpret ambiguous PP modifiers?

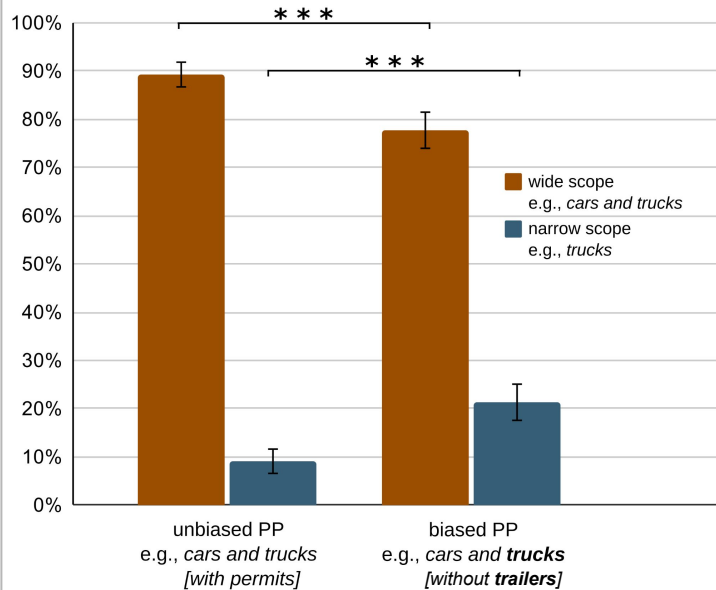
# Ambiguity Experiments

Hypothesis 1: Wide scope is preferred.

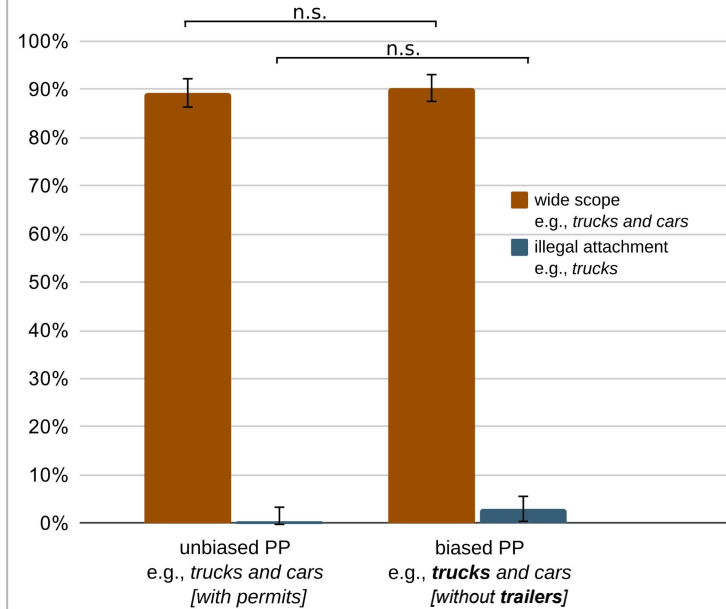
Hypothesis 2: Semantic bias can weaken preferences

Hypothesis 3: Syntax will override semantic bias

Experiment 1: Rates of wide- & narrow-scope interpretations for unbiased & biased PPs

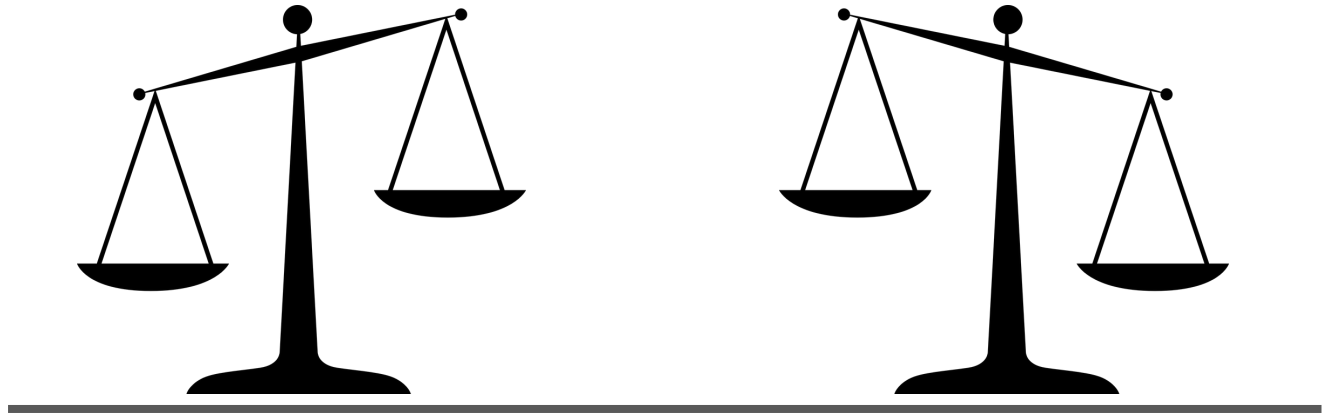


Experiment 2: Rates of wide-scope & illegal attachment interpretations for unbiased & biased PPs

















# Overview: Three Experiments



### Participants received the following 4 questions after reading the scenario:

[1] Your Verdict

[2] Explain how you reached your finding (optional):

[3] Check the box beside each element that you think the defendant proved beyond a reasonable doubt

[4] If the instructions had said [current version instruction]

Instead of: [opposite version instruction]

My verdict would have been:



## Open Questions

### Our Pilot Kidnapping Study

Subject pool: Our subjects were highly educated “friends & family.” are their results representative?

→ Our “**Kidnapping-2**” subjects match U.S. census demographics.

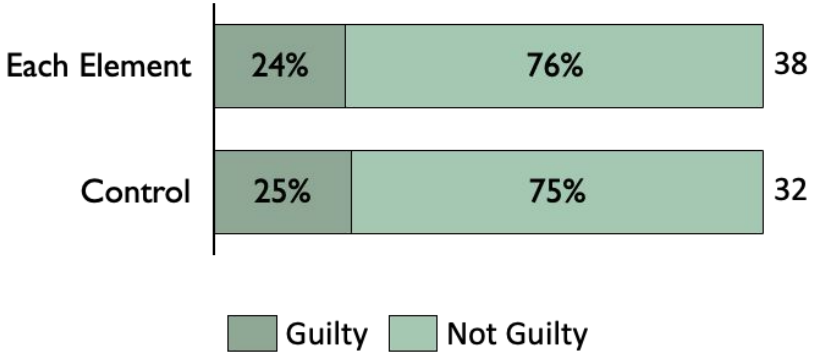
Content: Our scenario tests “each” using an emotionally charged 3-element crime.  
What if we use a crime that is not emotionally charged?  
Or a non-crime?

→ Our “**Vanilla**” scenario tests “each” in an unspecified 3-element crime.

→ Our “**Gymnastics**” scenario tests “each” in a 3-part gymnastics competition.

KIDNAPPING-2

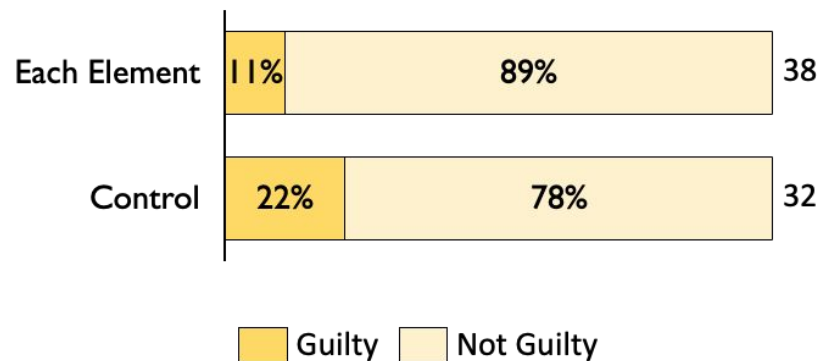
	<b>Each Element</b> N=38	<b>Control</b> N=32
<b>Guilty</b>	24%	25%
<b>Not Guilty</b>	76%	75%



Rajvi, Great so far. A couple of comments:

1. the graph on the right has the n's from the kidnapping study in the last slide. not 71 & 69.
2. The background in the two top cells should be grey as in kidnapping, not blue
3. I would prefer a layout with the left chart moved up and the right chart under it. Then I could have an animation showing the top one and adding the bottom one.
4. The numbers inside the bars are a little large. the 11% doesn't fit very well. When you move the bar chart down, can you make it wider so that the numbers fit inside their areas?
5. Can you make these charts editable by me? I click and they seem to be photos.

VANILLA	Each Element N = 71	Control N = 69
Guilty	11.27%	21.74%
Not Guilty	88.73%	78.26%



GYMNASTICS	<b>Control</b> N = 37	<b>Each Element</b> N = 36
<b>Yes</b>	22%	0%
<b>No</b>	78%	100%

## AAVE speaking suspect

- Police transcript of a conversation
- Rickford and King examined this transcript

<b>Actually said...</b>	<b>Transcript said...</b>
<i>He <b>come</b> tell (me) bout I'm gonna take the TV</i>	<i>??? I'm gonna take the TV</i>
<i>They <b>done</b> got it</i>	<i>They got it</i>
<i>They <b>done</b> tore that room up</i>	<i>They <b>just</b> tore that room up</i>
<i>I'm <b>fitna</b> be admitted</i>	<i>I'm <b>fit to</b> be admitted</i>

**Testifying while Black:  
An experimental study of court reporter accuracy  
in transcription of African American English**

Jones, T. et al. (2019).

*Language, Volume 95(2), 216-252.*

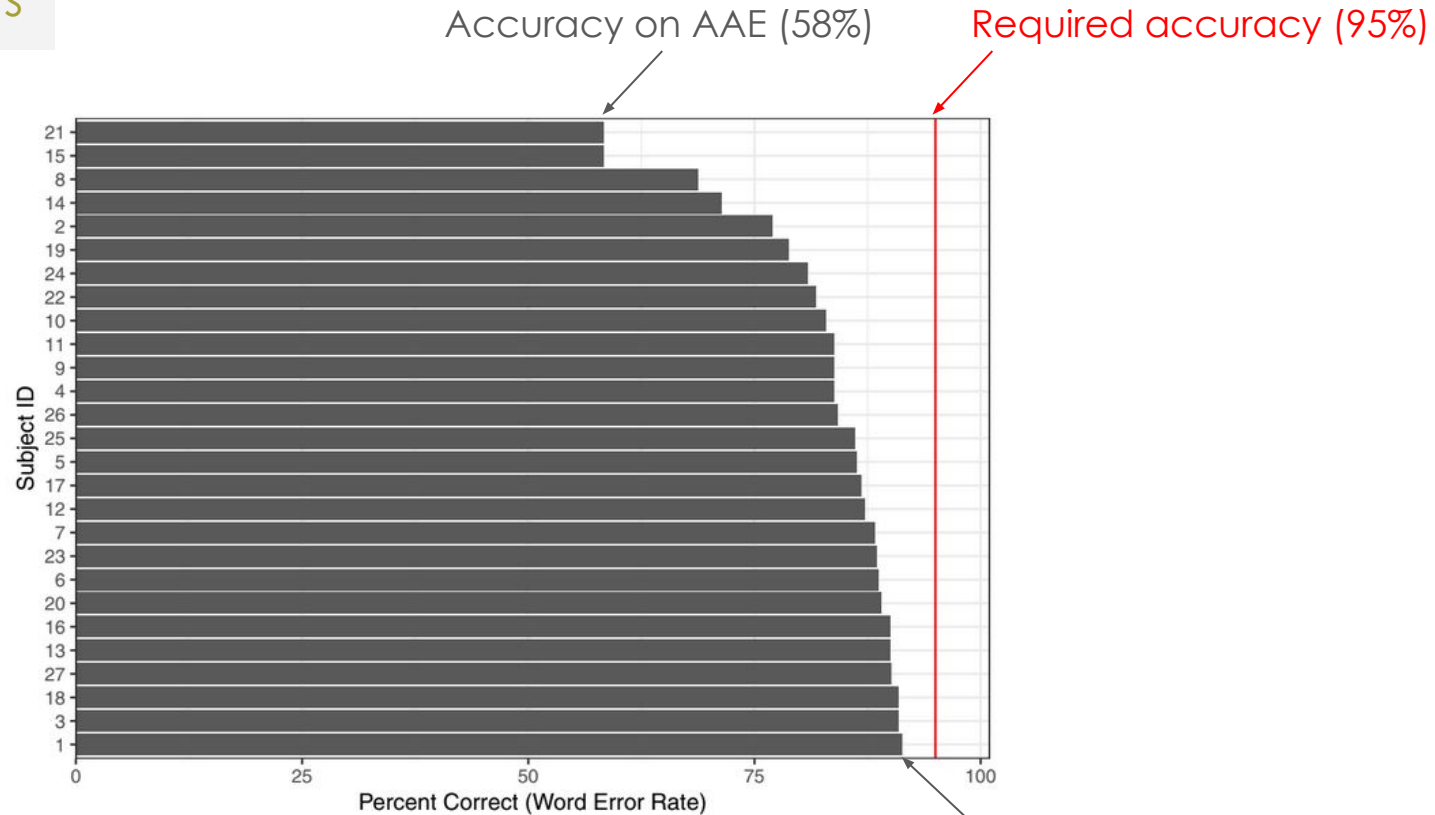


FIGURE 2. WER transcription accuracy by subject.

Even the best fall short (91%)

# Dialect Experiments

