



# Cars and trucks [on weekends]? : Interpreting PPs in legal language



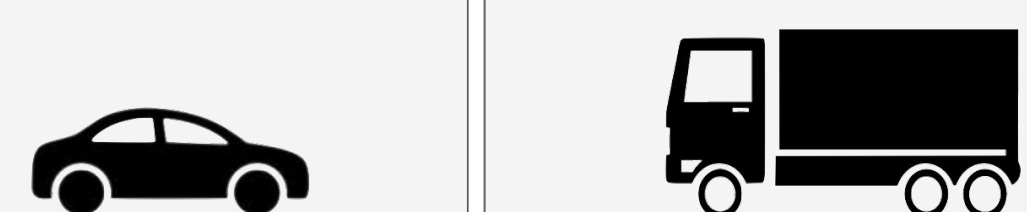
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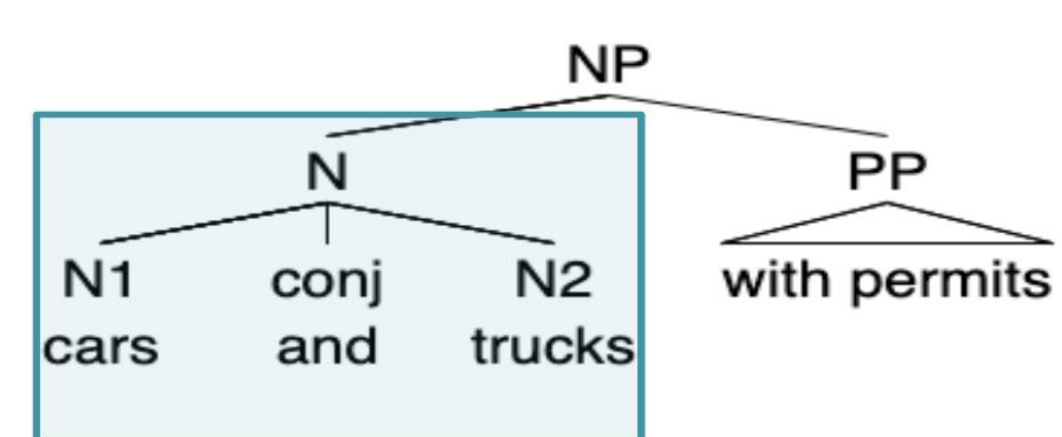
## Background

A parking lot law states:

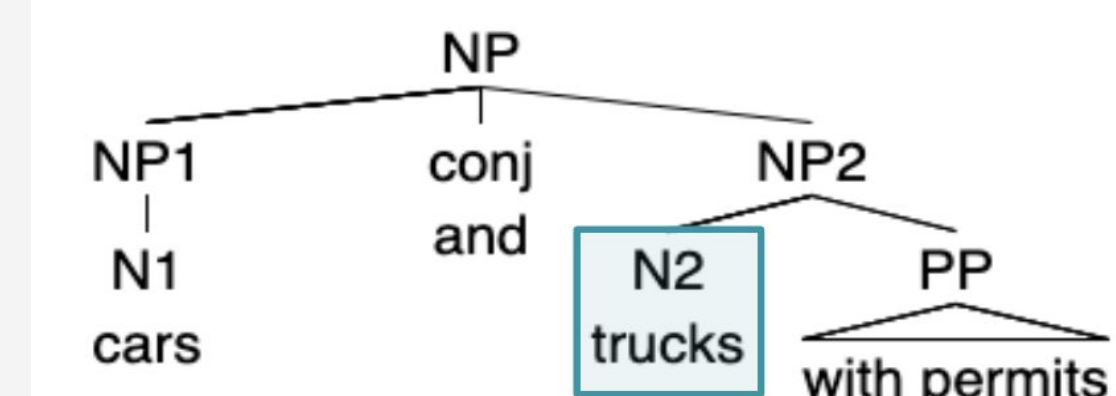
Residents may park cars and trucks with permits.



Is THIS the meaning? I hope not. I have no permit.



But wait. Maybe THIS is the meaning.



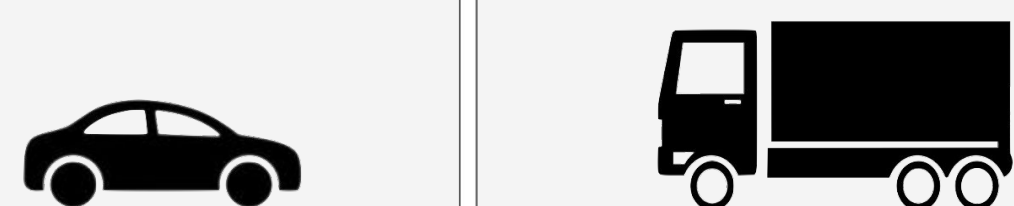
And then I CAN park here.

Ambiguous laws are common, and judges often disagree on how to interpret them. They try to use the “ordinary” meaning that most people would agree on, but how can they know what that is? Here’s where psycholinguistics can help.

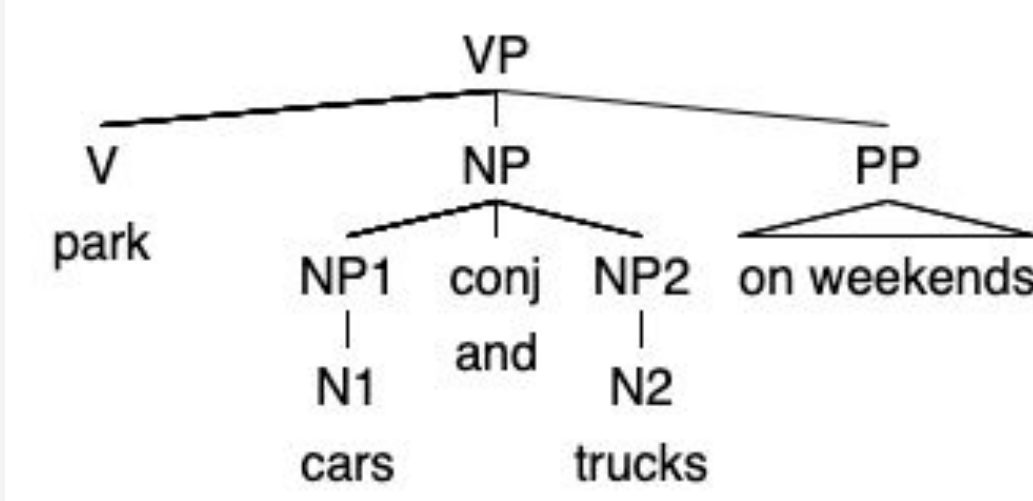
In two experiments (Randall & Solan, 2023) we found that participants significantly preferred the wide-scope interpretation for PPs like [PP with permits]. Both cars and trucks need permits.

Now, what about **this** sign? Is it ambiguous too? Tobia et. al. (2022) said yes. We say no: the only reading is wide scope. [PP on weekends] must apply to both cars and trucks.

Residents may park cars and trucks on weekends.



Why are the scopes of [PP with permits] and [PP on weekends] different? The PP [PP with permits] modifies either the conjoined nouns “cars and trucks” or just “trucks.” But the PP “on weekends” modifies the verb “park”; cars and trucks can’t be “on weekends.” It’s the action of parking that can happen on weekends.



In an online study, we tested how native speakers parse sentences with these two kinds of PP modifiers.

## Our Hypotheses

- Hypothesis I:** For VP modifiers, the preferred PP reading is wide-scope (high attachment) over narrow-scope (low attachment).
- Hypothesis II:** For NP modifiers, the preferred PP reading is wide-scope (high attachment) over narrow-scope (low attachment).
- Hypothesis III:** Response times will be longer for NP-modifier (ambiguous) than VP-modifier (unambiguous) sentences, because of their scope ambiguity.
- Hypothesis IV:** For NP modifiers, the number of conjuncts (2 or 3) should not affect the wide-scope preference.

## Methodology

### Participants

- 57 subjects
- were recruited via Lucid (an online survey-distribution service) with demographics matching those of the US jury-eligible population (US citizens over 18)

### Materials & Procedure

Each participant saw 12 test sentences: 6 with VP modifiers and 6 with NP modifiers, in a random order. Half of each type (NP modifier and VP modifier) had 3 conjuncts; half had 2 conjuncts. Following each sentence was a multiple-choice question like the one to the right (showing an NP-modifier sentence with 3-conjuncts). For each question, the answers were randomly ordered.

12 distractor questions were randomly interspersed with the test questions. Any participant who failed to answer any distractor question correctly or omitted any test question was excluded from the analysis. Each participant’s answers and response times for all questions were recorded.

In parking area A, people may park cars, mopeds, and trucks with permit stickers.

In parking area A, which vehicles must have permit stickers?

- Cars
- Mopeds
- Trucks
- Cars, mopeds, and trucks
- None of the above

## Results

All four hypotheses were confirmed.

As shown in Figures 1 and 2,

**Hypothesis I** For VP modifiers, participants significantly preferred **wide-scope** 91.5% over **narrow scope** 4.7% (p < .001)

**Hypothesis II** For NP modifiers, participants significantly preferred **wide-scope** 76.3% over **narrow scope** 18.7% (p < .001)

**Hypothesis III** The average response was significantly longer for **NP-modifier sentences** 9.72 seconds than for **VP-modifier sentences** 8.62 seconds (p < .01)

supporting our claim that NP-modifier sentences are ambiguous, while VP-modifier sentences are not. Further support: the **wide-scope** preference for NP-modifier sentences was significantly lower than for VP-modifier sentences: **76.3% vs. 91.5%** (p < .001).

As shown in Figure 3,

**Hypothesis IV** **Wide-scope** readings were preferred for all sentences, with no significant difference between 2- and 3-conjunct versions: **77.8% vs 74.9%** (p > .05).

Figure 1: Rates of wide- & narrow-scope interpretations for VP- & NP-modifier PPs

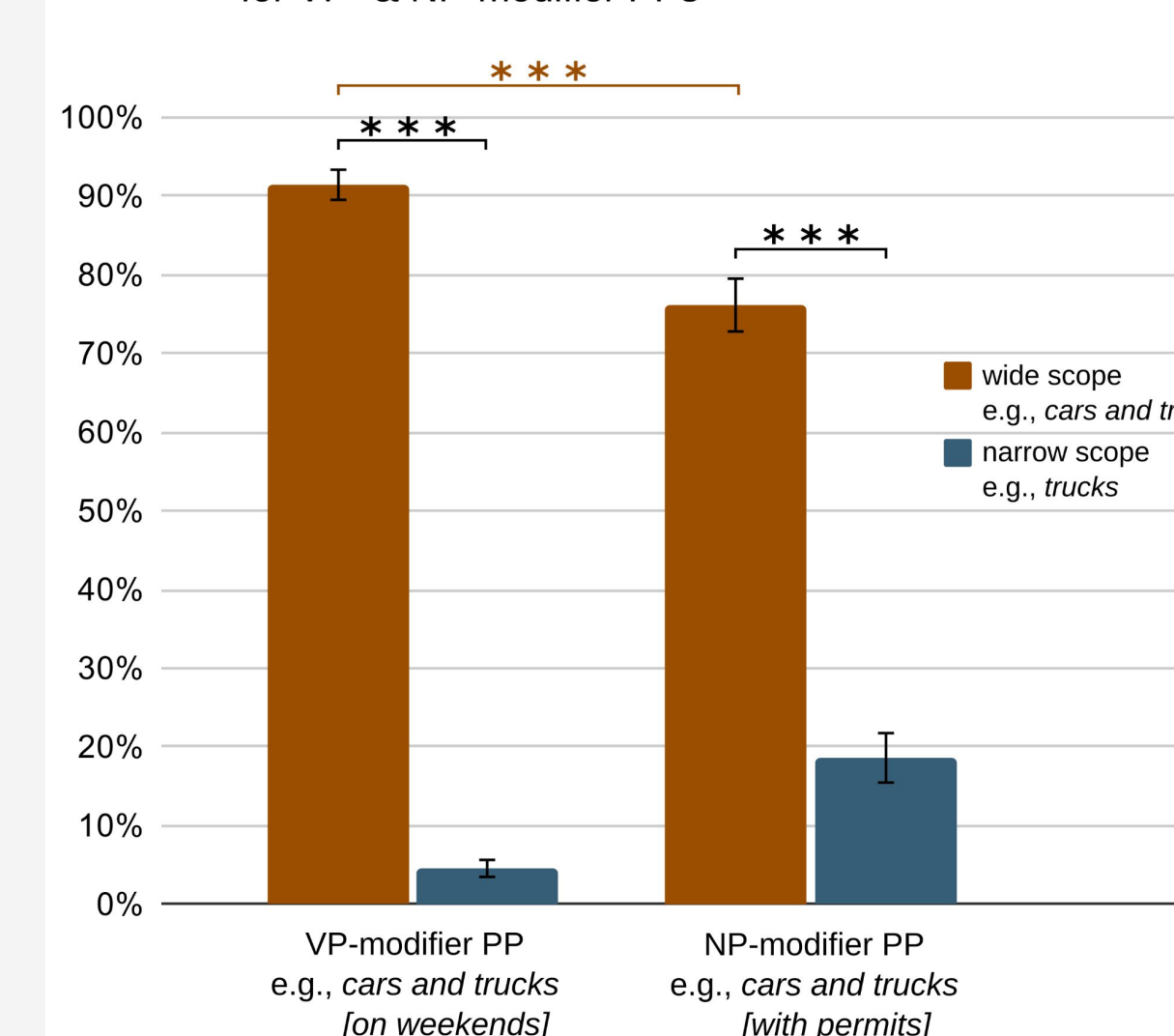


Figure 2: Decision times for NP- & VP-modifier PPs

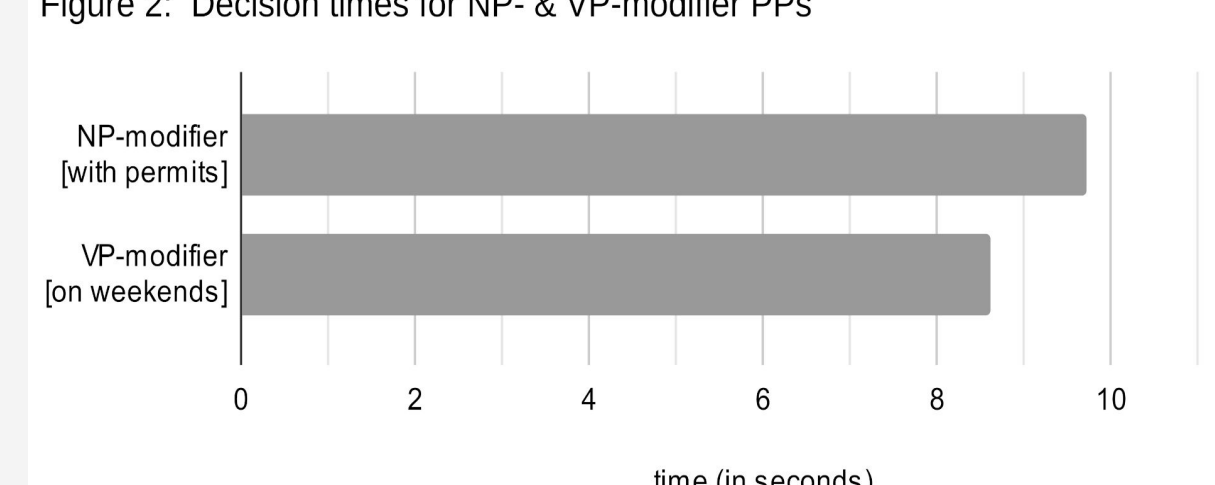
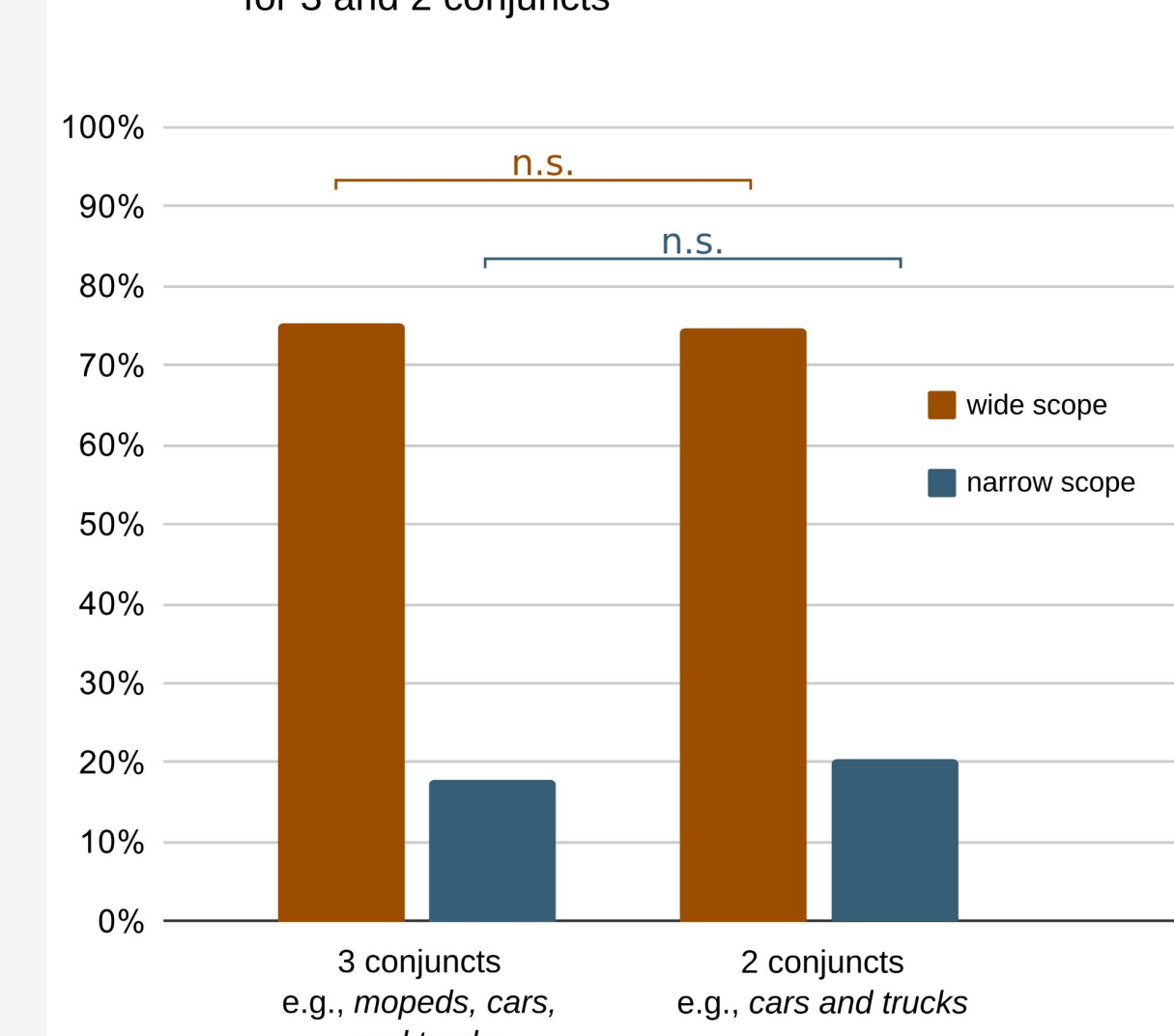


Figure 3: Rates of wide- & narrow-scope interpretations for 3 and 2 conjuncts



## Conclusions

Our results have shown that:

PP modifiers on **verbs**

- require a wide-scope reading
- are unambiguous for native speakers

In contrast, and confirming our previous results,

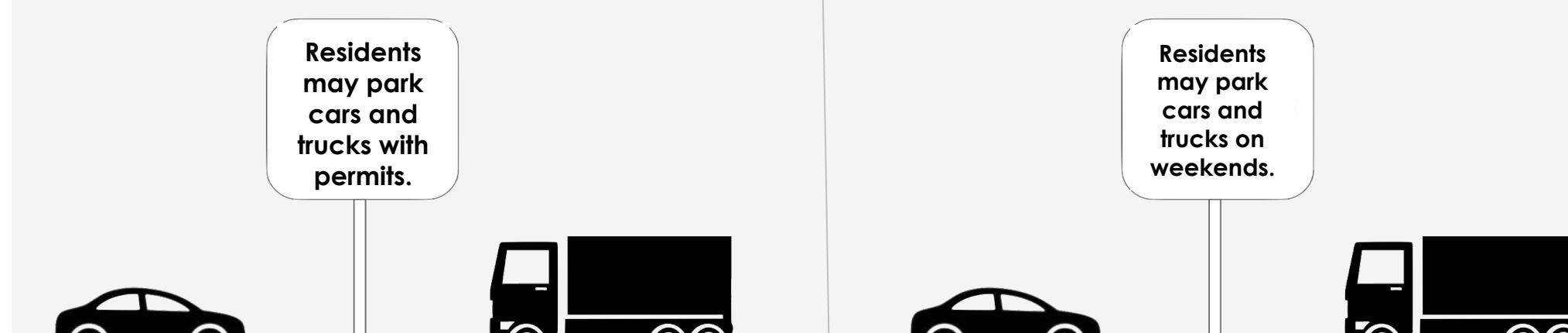
PP modifiers on conjoined **nouns**

- allow either a wide- or narrow-scope reading
- BUT are overwhelmingly given wide-scope
- regardless of the number of conjuncts (2 or 3)

Native speakers

- find it harder to process PP modifiers on conjoined nouns than on verbs, showing that
- they perceive a difference in where the PP attaches

## Take-aways



Some laws are ambiguous... and some are not.

And for ambiguous ones, it’s our parsers that dictate how we interpret them. We can see best what our parsers do by conducting empirical research.

So judges, if you want to know how people will interpret a law, **ask a psycholinguist.**

## Acknowledgements

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