

Preregistration & Open Science

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LINGUIST 245B

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A typical psycholinguistics study

Hypothesis

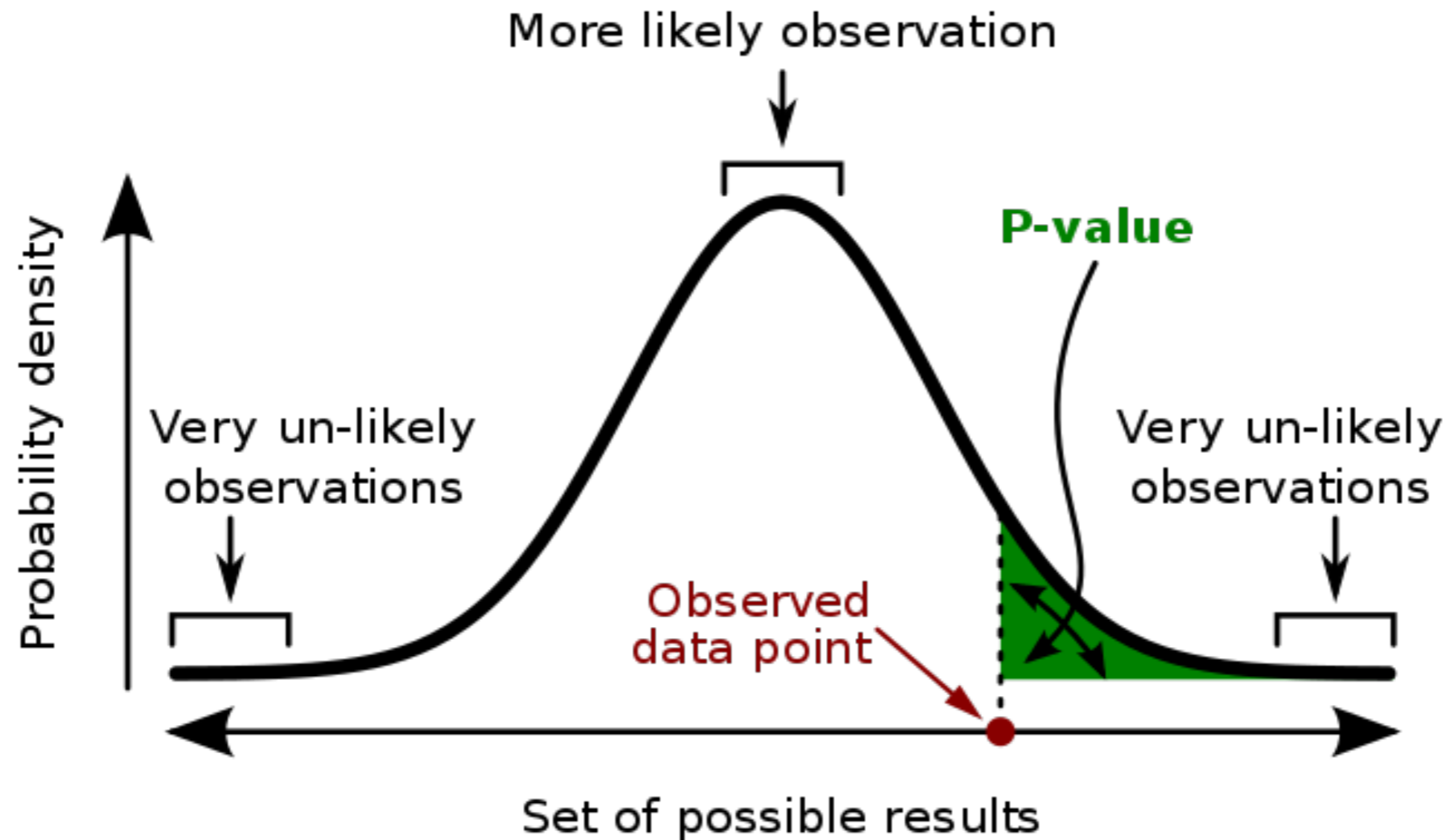
Reading of sentences with reduced relative clauses is slower than reading of sentences with overt complementizer

H_0 : Average reading times of both sentence types are equal

The horse raced past the barn fell into a ditch

The horse that was raced past the barn fell into a ditch

p -values



A **p-value** (shaded green area) is the probability of an observed (or more extreme) result assuming that the null hypothesis is true.

Sketchy things you can do to get a significant p -val

1. Number of subjects per condition
 - a. Run 10 subjects per condition
 - b. Perform a t-test
 - c. If $p < .05$: Publish paper!

Otherwise: Go to step a.

Sketchy things you can do to get a significant p -val

2. Have multiple dependent variables
 - a. Run tests to predict each of the variables
 - b. Pick the dependent variable that gives you a significant p -value

The horse raced past the barn fell into a ditch
The horse that was raced past the barn fell into a ditch

Sketchy things you can do to get a significant p -val

3. Run models with many different independent variables
 - a. Have a set of many independent variables
 - b. Run models with various combinations and interactions until your manipulation is significant

Sketchy things you can do to get a significant p -val

4. Have conditions that you don't report on
 - a. Run $n > 2$ conditions
 - b. Pick 2 conditions which differ significantly and don't tell anybody about the other conditions

DON'T DO ANY OF THESE THINGS!!!

Simulated false-positive rates

Researcher degrees of freedom	Significance level		
	$p < .1$	$p < .05$	$p < .01$
Situation A: two dependent variables ($r = .50$)	17.8%	9.5%	2.2%

Simulated false-positive rates

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Situation B: addition of 10 more observations per cell	14.5%	7.7%	1.6%

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Situation C: controlling for gender or interaction of gender with treatment	21.6%	11.7%	2.7%

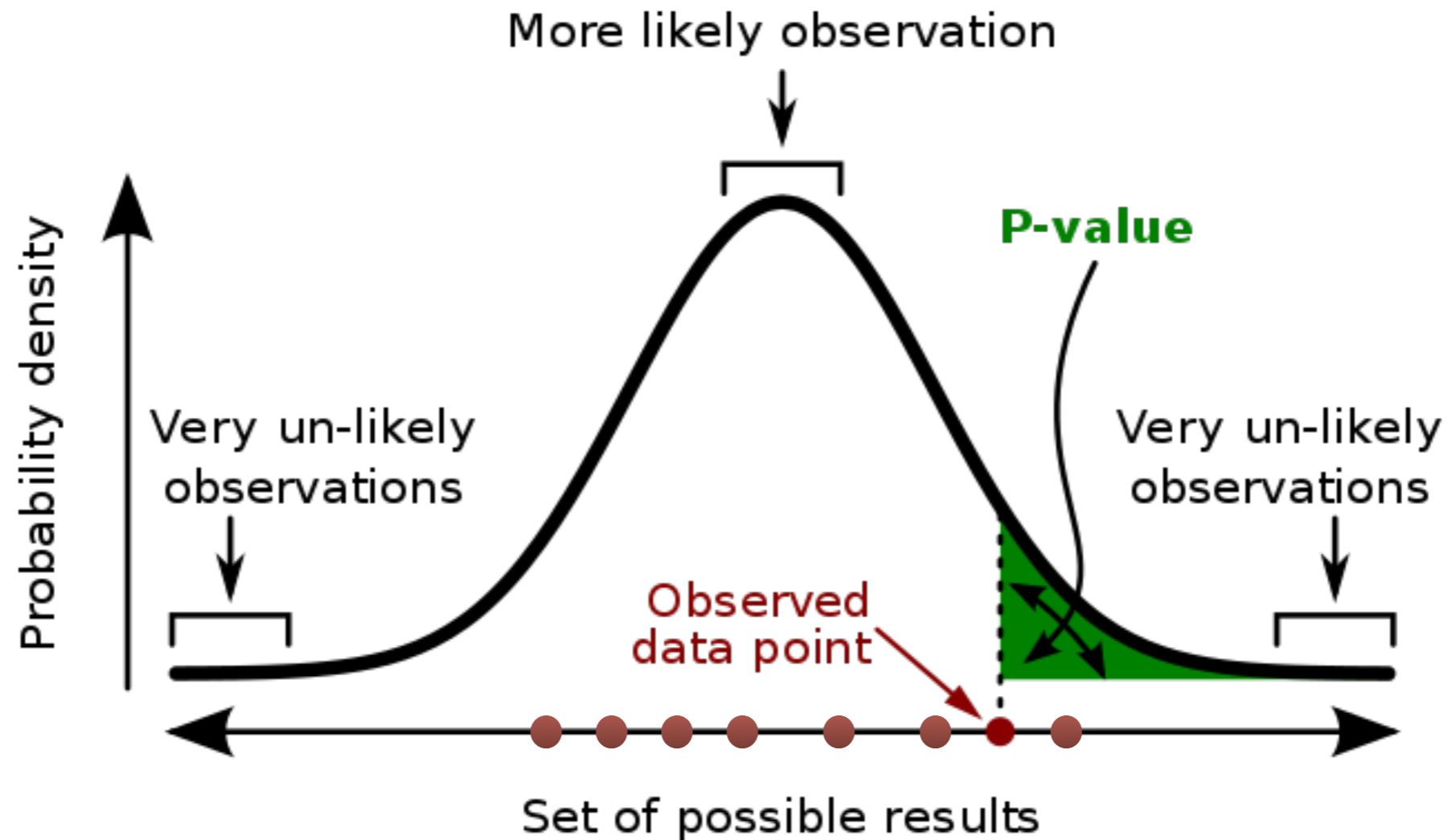
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Situation D: dropping (or not dropping) one of three conditions	23.2%	12.6%	2.8%

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Situation D: dropping (or not dropping) one of three conditions	23.2%	12.6%	2.8%
Combine Situations A and B	26.0%	14.4%	3.3%
Combine Situations A, B, and C	50.9%	30.9%	8.4%
Combine Situations A, B, C, and D	81.5%	60.7%	21.5%

p-values



A **p-value** (shaded green area) is the probability of an observed (or more extreme) result assuming that the null hypothesis is true.

Pre-registration

- To keep p -value meaningful, fix the following things **before collecting data**
 1. number of subjects you'll run
 2. exclusion criteria:
Which data points are you going to exclude from your analysis
 3. dependent variable
 4. independent variables
 5. experimental conditions

Preregistration

- Preregistering provides you (and reviewers and readers of your paper) with proof that you actually fixed all these things
- Only requires filling out a short questionnaire which is permanently stored on a pre-registration platform



A preregistration workflow

1. Come up with and implement experiment
2. Run pilot study with 2-4 subjects
3. Write analysis scripts and test them with pilot data
4. Preregister study and upload analysis scripts to OSF
5. Run actual study
6. Analyze data with pre-registered analysis script
7. (optional) Do **exploratory** post-hoc analyses

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