PREVIEW : "*wh-licensing and gap position*"

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Submission

1) Have any data been collected for this study already?

It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-registration nevertheless.

2) What's the main question being asked or hypothesis being tested in this study?

- Do RNNs represent filler-gap licensing?

- Do RNNS show a pentalty for violating expectations about locations of gaps?

- Following Stowe (1986), Experiment 1.

3) Describe the key dependent variable(s) specifying how they will be measured.

Dependent Variables:

* (i) Total surprsial of embedded clause

* (ii) Surprisal of the word right after the target NP / gap (e.g. "will" in the examples below)

* (iii) Surprisal from the target NP / gap to the end of the sentence (e.g. "will ... Christmas" in the examples below)

* Surprisal will be taken using the Google 1-billion word benchmark trained LSTM and the Gulordava et. al. (2018) LSTM trained on 90-million tokens of wikipedia.

4) How many and which conditions will participants be assigned to?

Experiment: 2x2x2x3

* Wh-word is present

* Gap is present

* Locaiton of gap is in subject / direct object / PP or indirect object

* Presence of appositive at the start of the embedded clause

1. My brother knows that Ruth will bring us home to mom at Christmas

2. My brother knows who Ruth will bring us home to mom at Christmas

3. My brother knows that __ will bring us home to mom at Christmas

4. My brother knows who __ will bring us home to mom at Christmas

5. My brother knows that despite her poor health Ruth will bring us home to mom at Christmas

6. My brother knows who despite her poor health Ruth will bring us home to mom at Christmas

7. My brother knows that despite her poor health __ will bring us home to mom at Christmas

8. My brother knows who despite her poor health __ will bring us home to mom at Christmas

- These examples show the gap in subject position
- Appositive is added to reduce the local bigram effects of "that will" vs. "who will", which may impact surprisal of the target region.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
We will perform mixed-effects linear regression with all experimental conditions as predictors.
* If the RNN is learning basic filler/gap dependencies, we expect an interaction between wh-words and gaps, such that when just one of them is present the sentence is worse ((i)-(iii) are higher), but when both are present the sentence is better.
* If the RNN shows human-like behavior, then we expect the interaction to be the strongest for gaps in object position, followed by gaps in subject position, followed by gaps in PP position.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
We will discard items that turn out to have out-of-vocabulary words.

7) How many observations will be collected or what will determine sample size?
No need to justify decision, but be precise about <u>exactly</u> how the number will be determined.
We have written 24 items and we believe this will be enough.

8) Anything else you would like to pre-register?
(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
1) We have collected the total dataset, but not analyzed it yet.
2) This is a followup to pre-registration #11480, accounting for a local bigram confound.

The answers you are previewing would result in a **2-page** long .pdf file, we strongly recommend all AsPredicted pre-registrations to fit in a single page. That's just a recommendation. You may still submit it, but we encourage you to attempt editing it so that it does fit (**why?** (messages/why_limits.php)).
You can take a look at what that two-page .pdf document will look like **here (see_pdf.php)** to assess if there are easy ways to fit it all in 1 page.

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