PREVIEW : *"do RNNs show sensitivity to gap distance?"*

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Submission

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

No, no data have been collected for this study yet.

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

- Do RNNs show filler/gap licensing effects (e.g. a gap must be licensed by a wh-word and a wh-word requires a gap)

- Do RNNs exhibit higher surprisal at gaps that are further from their fillers?

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

Dependent Variables:

* (i) Surprsial of the word following the gap (e.g. "to" for the first two examples)

* (ii) Surprisal of the phrase following the gap (e.g. "to Mary" for the first two examples)

* (iii) Surprisal from the gap to the end of the sentence (e.g. "to ... weekend ?")

* 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?

2x2x2x4

* Wh-word is present

* Gap is present

* Gap is in direct / indirect object position

* Modifier is: not present / short / medium / long

1. I know that your friend gave a baguette to Mary last weekend .

2. I know that your friend gave __ to Mary last weekend .

3. I know what your friend gave a baguette to Mary last weekend

4. I know what your friend gave __ to Mary last weekend .

5. I know that your friend in the straw hat and dark blue pants gave a baguette to Mary last weekend .
6. I know that your friend in the straw hat and dark blue pants gave __ to Mary last weekend .
7. I know what your friend in the straw hat and dark blue pants gave a baguette to Mary last weekend
8. I know what your friend in the straw hat and dark blue pants gave __ to Mary last weekend .
(Example given with a long modifier and direct object position)

Defenition of Length:
Short: 3-5 words
Medium: 6-8 words
Long: 8-12 words

- In addition to treating length as a categorical variable we will also treat the number of intervening words as a continuous variable

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
Predictions:
* If the RNN is representing wh-gap dependencies, then we expect an interaction between the presence of a wh-word and a gap. The presence of a single gap or wh-word results in worse surprisal, but their combination results in lower surprisal in (i) - (iii).
* If the RNN is sensitive to length, then we expect an interaction between wh/gaps and length: the unlicensed gap conditions with longer modifiers will be penalized less than in the base case, ((6)-(5) < (2)-(1)) and, the effect of wh-licensors on gaps will be lower than in the base case ((8)-(7) > (4)-(3))

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
we will remove any items that contain out of vocabulary items

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 21 items and we think that will be enough

8) Anything else you would like to pre-register?
(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

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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