1. **MOUSE-TRACKING and PLURALS**

**A. Discussion about the properties of images and the low amount of distributive readings**

***Could the preference for cumulative readings (and the dispreferrence for distributive readings) be driven by the sentence-image relation?*** In order words, certain images could make much easier to derive one reading than the other (but importantly, other images might have the opposite pattern). Since in our experiment we are using the same images for both conditions, this type of bias could lead to (1) one reading at ceiling (as we do have), (2) low accessing rate for the other reading, and (3) an extra difficulty observed in RT and mouse trajectories for the dispreferred interpretation.

Which are the elements to support this idea?

1. **Scope results** suggesting that the images combined with particular quantifiers are driving most of the effect in response times and accessing (Note: it’s not the case that only the images are driving the effect, otherwise in French we should have had the same results).
2. **Amount of distributive readings in different experiments:** Although it’s true that the task is different in the priming and MT experiments, in the former the rate of distributive interpretations is higher than 50% (even when there is no priming). Besides the task itself, we didn’t change many things: the images and the insertion of the adverb “exactly”. Notice that the biggest change in images is a consequence of the inclusion of other predicates besides “be connected to”.
3. **Predicate influence but no influence of numerals:** In fact, the results suggest that the rate of distributive responses rises when “be connected to” predicates to ~50%. Conversely, there is seems to be no effect of the number of shapes in the image. The maxRatio results per predicate also suggest that the difference between cumulative and distributive conditions is reduced in this predicate [See below].
4. **First priming experiment:** Our pattern of results in this MT experiment is very similar to the one that we had in the first pilot done for the priming experiment (distributive answers ~25%). In this case, the problem was the quantity of shapes and the disposition (i.e., a change in that gave us a 50-50 preference).

However:

1. **Differences with pilots in French.** We piloted a similar version of the experiments (same images) in French and results were as expected (50-50). Why in French is different? (See: the experiment was longer and only 10 participants).
2. Task might differentiate the results (it’s not the same to be force to access the reading than to choose between that image and some other unknown possibility).

**B. How to explain the high amount of deviation in both experimental conditions?**

A baseline deviation towards the alternative might be associated to the existence of ambiguity itself, independently of the final reading (and the cost associated to each of them). Higher deviation is associated to distributive readings because the weight of cumulative readings is stronger, i.e. people access to a cumulative reading before accessing to a distributive reading.

In relation with this:

**TOMLISON, BAILEY AND BOTT – Possible all of that and then some.**

While in our results the high derivation associated to both conditions contributes to make mean trajectories very similar, their mean trajectories for “logical” and “pragmatic” (SI) conditions reflect very clearly two different patterns of derivation. How do we explain this difference?

In their experiments, T&B&B use one type of critical sentence (*Some elephants are mammals*), where logical interpretations = TRUE and pragmatic interpretations = FALSE. They have basically 4 control items (All-True, All-False, Some-True and Some-False). Notice that in Some-False trials (*Some elephants are insects*) both alternative readings are FALSE and in Some-True (*Some mammals are elephants*) both readings are TRUE. Neither of these conditions presents a big deviation towards the alternative.

When they compare for critical items True (41%) and False (59%) responses, they found that there is a difference of deviation.  [Note: This effect is still there when they restrict the analysis to "pragmatic participants", who said false most of the time]

So, why our results are so noisy?

This is independent of the type of derivation, whether it’s in two-steps (somehow serial) or in parallel and cumulative readings are derived first because they are faster (cf. idea of Speed-Accuracy trade off).

**Some ideas to continue**

Step 1: **Discard predicate effects** (present in our experiment) 🡪 Inclusion of two different predicates (eg. “be connected to” and “be above to”), one of them gives 50-50 of distributive-cumulative readings, while the other one involves a prominence of cumulative readings (75-25). Observation: We don’t know whether what was driven the effect was the predicate itself of the picture. We need to be sure that we are using the same pictures.

Step 2: **Discard task effects.** It could be the case that, on top of predicate effects, we also have an extra difficulty driven by the task. Notice that both Tomlinson et al. and Dale and Duran don’t use pictures in the truth-judgment task, using common knowledge. This can be particularly difficult for the distributive-cumulative contrast. However, we can use a short story as context and then present sentences that could be more or less plausible in the particular context (See: the context could be presented by pictures *before* doing the task).

*Examples*

Two elephants have two trunks.

Two bats have two wings.

Context: Mary is organizing a party at her place. She invited Paul and Thomas with their girlfriends

Paul danced with one girl and Thomas danced with one girl.

Target Distributive reading: Two boys danced with a girl.

Target Cumulative reading: Two boys danced with two girls.

Chris danced with two girls and

Cumulative targets:

1. Two boys invited four girls.
2. Three girls drank

* Distributive target: Three girls dance with a boy.

Brasoveanu and Dotlacil 🡪 “Pragmatically forced distributive interpretation”

* Three employees drank a tea.

Notice that this type of configuration (without images) could also be used

Step 3: **Generalizing to locally and non-ambiguous sentences**. In all our experiments we used ambiguous sentences and rely in forcing one reading to see what happens with the other one. We could also do a follow-up of Frazier el al. (1999) and Brasoveanu and Dotlacil (2015) experiments using temporally ambiguous sentences.

What they have shown? Using contrasts such as “Two boys have **each/together** three balloons **each/together**”, these studies have shown that phrasal collectivity is preferred over phrasal distributivity and the decision is taken after reading the object (higher reading times in late distributive disambiguation).

However, none of these studies has focused on the incrementality issue: (1) when exactly the decision is being made?; (2) are the two options still competing even when one of the options is preferred?; (3) how the overt presence of the collective-distributive adverbs makes a difference in the processing?

In our original MT study, the main question was whether it is necessary to derive cumulative representations even when we are finally deriving distributive ones. Comparing sentences in (i-iii) would give us an idea of the answer to these questions, as well as measuring to which extent cumulative representations are derived in the processing of distributive readings (if it’s only when there is a global ambiguity or even in cases where the ambiguity is local).

1. Two boys have three balloons.
2. Two boys have three balloons each/between them.
3. Two boys have each/between them three balloons.

Importantly: This experiment would require a self-paced presentation for the sentence (to replicate Frazier et al results). Since this is very difficult to combine with a classical self-paced reading with MT and see the effects online, I propose: (a) presenting word-by-word at a fixed pace while the subject has to move the mouse; (b) use oral presentation and then track where the mouse were at each moment (this can be easily combined with eye tracking if we need a finer measure).

Step 4: **Dissociating parallel from two-steps accounts in derivation.** Speed-Accuracy trade-off.

Step 5 (maybe before): Explain noise patterns by

Aside question: Are there experiments where the task is to create the pictures (people arrange shapes according to a sentence)? Revise

María les dio un globo a sus hermanas

María les dio un globo a sus tres hermanas

Las abuelas les dieron un chocolate a sus tres nietos.

Los abuelos les dieron un chocolate a tres nietos.

Todos los chicos les dieron dos globos a tres chicas

Todos los chicos dieron dos globos a tres chicas

Los chicos les dieron un globo a tres chicas.

Los chicos dieron un globo a tres chicas.

Cada chico les dio un globo a tres chicas.

Los chicos le dieron un globo a menos de tres chicas.

Experimento para la comparación entre francés e inglés

Ver : orden entre quantificadores

Los abuelos los vieron a ellos

Los abuelos los saludaron a sus dos nietos.

Los abuelos los besaron a sus dos nietos.

Dos muchachos lo arrastraron al piano.

Dos muchachos los arrastraron a los dos pianos.

Dos muchachos las salvaron a las dos abuelas.

El pibe les dijo « te quiero » a dos chicas.

La maestra les hizo dos tortas a tres alumnas

La maestra hizo dos tortas para tres alumnas.

Los vimos a los dos hombres levantar un piano

Vimos a los dos hombres levantar un piano

Los ví a los dos hombres

Los tuve a los dos globos

los abracé a los dos hombres