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# Bridging strength, monotonicity, and word order choices in Catalan

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### Abstract

Three experimental studies are presented testing the choice of a clitic left (LD) or clitic right (RD) dislocation in Catalan, depending on the bridging relation between the dislocate and its antecedent. We make the hypothesis that the stronger the anaphoric link between the dislocate and its antecedent, the more appropriate a RD is, while the opposite is true for LD. The results of the first two acceptability judgment experiments partially support our hypothesis: RD scores clearly decrease proportionally to the strength of the anaphoric bridge. However, it is scores of canonical sentences, rather than of LD, that display the opposite direction as those of RD. For LD, the picture is more complex and reflects its pragmatic function as a topic shifter or marker of contrast. The third experiment tests the monotonicity hypothesis, according to which a LD is chosen when the anaphoric relation with the antecedent is either downward monotonic or non-monotonic, while RD prefers an upward monotonic anaphoric relation. The results partially support such hypothesis; however, they also further support the importance of taking the pragmatic function of LD into account to explain its choice in discourse by speakers.

**Abbreviations:** ACC (accusative pronoun), FUT (future), LOC (locative pro-

noun), PART (partitive pronoun), PL (plural), PST (past), REFL (reflexive), SG (singular).

#### KEYWORDS

Bridging, anaphora, clitic left dislocation, clitic right dislocation, Catalan

### Introduction

The interpretation of utterances is sensitive to the way we phrase them in a particular context. For example, whereas the sentence in (1a) can be an appropriate answer to (1), (1b) cannot, which we mark by means of #, as is standard practice:

- (1) Sally: What did Mary bring to the party?
- a. Heather: Mary brought the cookies.
  - b. Heather: #The cookies were brought by Mary.

The form of (1a) matches the way we place informative elements in the sentence: *the cookies* appear at the end of the sentence, where elements carrying new information surface, and *Mary* is in the initial position, where elements encoding old information tend to appear. In contrast, even though Heather’s answer in (1b) includes the relevant information, there is a mismatch between the position of the elements and their information status: *the cookies* is new information, but it is placed in initial position –where old information is expected– and *Mary* is old information, but it is placed in final position –where new information is expected.

In the literature, the fit between the position of the different constituents of a sentence and their informative value has been studied at length from many perspectives under the label of functional sentence perspective (Danes, 2015; Firbas, 1992), information packaging (Chafe, 1976; Vallduví, 1992) or information structure (Lambrecht, 1996; Ward & Birner, 2008, 2001)

In this article we study a syntactic construction offering a transparent encoding of information status: dislocation. Dislocation places the constituent carrying old information in a peripheral position of the sentence, either to the left (2) or the right (3), while representing it within the sentence by means of a pronoun (the dislocate is

separated from the clause by means of a comma):

- (2) Speaker A: Tell him about Bingo. Tell him about your iguana.  
Speaker B: My iguana Bingo, he almost bit my finger off. (South Philadelphia Corpus, cited in Manetta (2007, 1032))
- (3) I just saw the newly discovered Van Gogh painting at the Art Institute; apparently he painted it when he was only 11 years old. He was a genius, that Van Gogh. (Birner & Ward, 1998, 149)

As highlighted by several authors (Forcadell, 2016; Mayol, 2007; Vallduví, 1992), dislocation in English is not particularly common, for this language may resort to prosodic means to encode the different informative value of elements. This fact makes less transparent in the syntactic encoding of information structure, with unwanted consequences at the experimental testing. Henceforth, we will study dislocations in Catalan, which offers a transparent encoding of old information: the constituents carrying old information must be dislocated outside the core of the sentence, allowing the element carrying new information to receive the main stress in its final sentence position (the verb *puc sofrir* ‘can stand’ in (4) and the verb *odia* ‘hates’ in (5)):

- (4) a. M’agrada molt aquest barri.  
‘I like this neighborhood very much.’  
b. Però els veïns, no els puc sofrir.  
but the neighbors not them can suffer  
‘But the neighbors, I can’t stand.’
- (5) a. Per què li vas portar un pastís a la Maria?  
‘Why did you bring a cake to Mary?’  
b. Els odia, els pastissos.  
the hates the cakes  
‘She HATES cakes.’

Note that the pronoun in Catalan dislocations is a prosodically weak form (*els* ‘them’) adjoined to the verb.

Yet, even though left and right-dislocation typically mark constituents carrying old

information, they are not identical from an informative point of view. It is by now well known in the literature that left dislocation is used to introduce a sentence topic (Brunetti, 2009a, 2009b; Prince, 1998; Vallduví, 1992; Villalba, 2000), in many cases making a contrast with the previous one (Arregi, 2014; Brunetti, 2006, 2009a):

- (6) El llibre ja l’he llegit, però la revista encara no la he acabada.  
 finished  
 ‘The book, I have read already, but the magazine, I haven’t finished yet.’

As the English translation shows, the most typical English construction for such contrastive cases is topicalization.

In contrast, right-dislocates encode background information, namely old information which is not active, but is reactivated for discourse purposes (7) (Villalba & Mayol, 2013), as in the following example:

- (7) XEIXA garbellant *blat*. [...] XEIXA: Tant se me’n dóna  
 XEIXA sifting wheat so myself to-me-of.it matter.3SG  
 que queda net com brut, **aquest blat**.  
 that gets clean as dirty this wheat  
 “XEIXA is discovered sifting wheat. XEIXA. What does it matter whether the wheat’s clean or whether it ain’t clean?” [Guimerà: p. 163]

Here, the wheat had never been explicitly mentioned but was present in the utterance context, hence is part of the background. In this context, right dislocation makes this information accessible again for further reference.

Hence, while left or right-dislocation have different functions, there is consensus that dislocates cannot encode information which is new to the speaker and must, thus, be anaphorically related to an accessible antecedent in the context. For example, the left-dislocate *els veïns* ‘the neighbors’ in (4) is anaphoric to *aquest barri* ‘this neighborhood’ and the right-dislocate *els pastissos* ‘the cakes’ in (5) is anaphoric to *un pastís* ‘a cake’.

The exact nature of this anaphoric relation between dislocates and their antecedents has proven hard to agree on, since it is based on linguistic and extralinguistic knowl-

edge, and can thus be analyzed from different scientific perspectives. In the next section, we consider the most important proposals in the linguistic tradition.

### *Anaphoric relations of dislocates*

#### *Partial ordered sets (posets)*

An influential proposal on the type of anaphoric relation between the dislocate and its antecedent is that dislocates must be related to their antecedents by means of a partially ordered set ('poset') relation (Vallduví, 1992) –this hypothesis was originally designed to define the relation between topicalized phrases and their antecedents in English (Ward & Prince, 1991). Typical cases of poset relations (see Partee, Ter Meulen, & Wall, 1987, 277–280, for their mathematical properties) are the 'part-of' and the 'subset' relations, which are expected to be fine for left dislocates:

- (8) a. Aquesta casa és preciosa, però les finestres, les han fet petites.  
this house is precious, but the windows them have made small  
'This house is lovely, but the windows were built small.'
- b. Menjo molta fruita, però el mango, no el suportó.  
eat much fruit but the mango not him stand  
'I eat a lot of fruit, but mangoes, I cannot stand.'

However, the poset account has to face a problematic case: inferable relations (see also Hendriks (1996); Hendriks and Dekker (1995)). Observe the following dialogue, from Villalba (2000, ch.2), where dislocate is indirectly connected to a previous referent:

- (9) a. M'agrada molt aquesta casa. 'I like this house very much.'
- b. A l'arquitecte, en canvi, no el va satisfer el resultat.  
to the architect, in change, not it did satisfy the result  
'The architect, however, wasn't satisfied with the result.'

The relation between a house and its architect cannot be formalized as a poset, yet the dislocation is totally acceptable.

When we consider right dislocation, the poset analysis is unsatisfactory, for only a small group of poset relations are used. As Birner and Ward (1998, 149) point out,

the identity relation is prototypical for RD, as in the example in (5), repeated here:

- (10) a. Per què li vas portar *un pastís* a la Maria?  
‘Why did you bring a cake to Mary?’  
b. Els odia, els pastissos.  
the hates the cakes  
‘She HATES cakes.’

Identity cases fall under the poset analysis, but not all poset relations work. Take for instance, the whole-part relation between house and windows, which was fine with left dislocation:

- (11) \*Aquesta casa és preciosa, però les han fet petites, les finestres.  
this house is precious, but them have made small the windows  
‘This house is lovely, but the windows were built small.’

Moreover, as pointed out in Ziv (1994, fn.27), non-poset relations set apart left and right dislocations:

- (12) Vaig agafar l’autobús aquest matí.  
‘I went on a bus this morning.’  
a. Al conductor, l’havien apallissat.  
‘The driver, he had been beaten hard.’  
b. #L’havien apallissat, al conductor.  
‘He had been beaten hard, the driver.’

Notwithstanding, they do so imperfectly. Counterexamples can be found of non-poset cases with right-dislocation, even in English:

- (13) a. No sé com pots llegir *Washington Square*. Jo no el suportó, a Henry James.  
‘I don’t know you can read *Washington Square*. I can’t stand him, Henry James.’  
b. I saw *Modern Times* again yesterday. He’s amazing, (this) Charlie Chaplin. (Grosz & Ziv, 1998, ex. 20)

To conclude, posets don't describe the relation between dislocates and their discourse antecedents correctly. On the one hand, it falls short for explaining the availability of left dislocates with non-poset relations (i.e. house-architect), and, on the other hand, it doesn't explain the restriction of right dislocates to the subclass of poset relations involving identity.

### *Monotonicity*

To overcome the limitations of the poset analysis, Bott (2007) argues for an approach to the anaphoricity relation between dislocation and its discourse antecedent based on monotonicity, which regulates inference patterns between sets or parts and wholes. For example, we have an upward monotonic relation when we move from a subset (citrics) to its superset (fruits) or from a part (window) to its whole (house). When we reverse the relation, we have a downward monotonic relation. In the case of relations not involving subsets and supersets nor parts and wholes (e.g. houses and architects), we have non-monotonic relations.

Following previous work by Alexopoulou and Kolliakou (2002), Hendriks and Dekker (1995) and Hendriks (1996), Bott remarks that non-monotonic anaphors are always associated to left dislocates, but he crucially claims that when monotonic anaphors are involved, downward monotonic ones associate with left dislocates (14), whereas upward-monotonic ones, with right dislocates (15) (examples adapted from (Bott, 2007)):

(14) Q: Which relationship did Bach have to string instruments?

A': La viola, segur que li va agradar.  
the viola, sure that to-him did please  
'The viola, he surely liked.'

A" #Segur que li va agradar, la viola.  
'He surely LIKED, the viola.'

(15) Q: Which relationship did Bach have to the viola?

A': Segur que li van agradar, els instruments de corda.  
sure that to-him did please, the instruments of string  
'He surely LIKED string instruments.'



A”#Els instruments de corda, segur que li van agradar.

‘String instruments, he surely liked.’

In (14), we are dealing with an upward monotonic relation: we move from the dislocate violas to the antecedent string instruments. Hence, only left dislocates are felicitous. In (15), we are dealing with the reverse situation, namely a downward monotonic relation: we move from the dislocate string instruments to the antecedent violas. In this case, only right dislocates are felicitous, according to Bott.

As for the case of non-monotonic anaphoric relations (e.g. the house-architect case), Bott tries to reduce them to a subspecies of part-whole relations, hence to cases of downward-anaphora. Obviously, if this were the case, the prediction would be that these case would only be possible for left dislocates. While this is mostly true, it cannot offer an explanation for clear cases of non-monotonic right dislocation like (13-b): *I saw Modern Times again yesterday. He’s amazing, (this) Charlie Chaplin.*

### *Bridging*

The previous proposals based on posets or monotonicity point to the fact right dislocations are mostly restricted to identity relations with a discourse antecedent, whereas left dislocations have a wider choice. This intuition pervades the relevant literature (Birner & Ward, 1998; Brunetti, 2009a; Grosz & Ziv, 1998; Vallduví, 1992; Villalba, 2000; Villalba & Mayol, 2013; Ziv, 1994), but we still don’t have a complete picture of such relations and how they affect the position of dislocates, nor an experimental support for the hypotheses. We make the stand that this can be achieved if we consider the anaphoric relationship between the dislocate and its antecedent through the lenses of the better studied concept of bridging.

Bridging is conceived by Clark (1975) as a type of inference, which is necessary to accommodate particular given-new structures (for developments, see Asher & Lascarides, 1998; Geurts, 2011; Irmer, 2011; Matsui, 1998, 2000; Umbach, 2003). In example (16-b) below, contrary to (16-a), the listener must bridge the gap from what she knows (“X was missing”) to the intended antecedent for the given information “X left”. The inference she makes derives from known information available in discourse

(x was missing), but also from world knowledge, just as happens with conversational implicatures (Grice, 1975).

- (16) a. John saw someone leaving the party early. It was Mary who left.  
b. In the group there was one person missing. It was Mary who left.

Clark discusses several types of bridging relationships, which we summarize as follows:

- a) **direct reference**: the anaphora makes direct reference to something just mentioned. It involves three subclasses:
- i) Identity: “I met *a man* yesterday. *The man* told me a story.”
  - ii) Epithets: “I met *a man* yesterday. *The bastard* stole all my money”
  - iii) Set membership: “I met *two doctors* yesterday. *The tall one* told me a story.”
- b) **indirect reference by association**: there is no explicitly mentioned antecedent, but it is a part of something that has been mentioned.
- i) Necessary parts: “I looked into *the room*. *The ceiling* was very high.”
  - ii) Inducible parts: “I walked into *the room*. *The chandeliers* sparkled brightly.”
- c) **indirect reference by characterization**: the antecedent plays an implicit role in an event or circumstance explicitly mentioned.
- i) Necessary roles: “John *was murdered* yesterday. *The murderer* got away.”
  - ii) Optional roles: “John *died* yesterday. *The murderer* got away.”
- d) **Reasons, Causes, Consequences or Concurrences**: all relations where the antecedent is an event. For instance, in the utterance “*John fell*, what he wanted to do was *scare Mary*”, the fact that John wanted to scare Mary is the reason for John’s falling.

Note that, whereas a) and b) involve standard cases of nominal anaphora, in types c) and d), the antecedent is not an entity, but an event. Since event anaphora are subject to particular constraints (see Asher, 2000 for discussion), in the current work we will concentrate on nominal anaphora and, thus, on the direct reference and indirect reference by association types.

While other classifications of bridging types have been proposed in successive lit-

erature (see for instance Gardent, Manuélian, & Kow, 2003; Kleiber, 2001; Schwarz-Friesel, 2007), all classifications entail a scale of referential strength: direct reference cases (e.g. identity) build stronger bridges than indirect cases (e.g. necessary roles), and necessary parts/roles build stronger bridges than optional or probable ones. We will build on this fact to create experiments explicitly testing the sensitivity of left and right dislocation to referential strength.

### **Testing bridging and dislocation**

Three acceptability judgment experiments are presented in the subsections below. Our general goal was to determine what bridging types are better suited for the different pragmatic functions of clitic left and right dislocations in Catalan. With the first two experiments, we tested the bridging strength hypothesis, namely the idea that the strength of the anaphoric link between the antecedent and the dislocate has an impact on the preference for LD or RD. Given the pragmatic properties of LD and RD described in Section ??, some relations between these dislocation types and different bridging types clearly emerge. We have seen that RD's typical pragmatic function is to recover some referent that is not active anymore in the discourse. We have also seen that RD is used to provide some additional properties to a previously mentioned referent, as in the case of epithets. Given these functions, RD will be generally associated with identical antecedents. As for LD, we have seen that it mainly has a topic shifting or a contrastive function, encoding an explicit or implicit referent. If LD has a topic shifting function, trivially its referent will not be the same as the topic referent of the immediately preceding discourse (since otherwise, there would be no topic shift). If LD is contrastive, we will also expect it to be different from previously mentioned referents, which will generally be the contrasting alternatives. In conclusion, RD's main pragmatic functions require identity, while LD's pragmatic functions are compatible with weaker anaphoric relations.

Bott's monotonicity hypothesis (see Section (13)), if correct, supports a view where RD is associated with stronger anaphoric relations and LD with weaker ones. According to that hypothesis, RD is preferred with an upward monotonic relation –namely

a relation which goes from a more specific antecedent to a more general dislocate. Such a relation is clearly stronger than a downward monotonic one, which is preferred by LD and goes from a more general antecedent to a more specific dislocate. Indeed, talking for instance about string instruments necessarily implies talking about violas (a particular string instrument) as well; however, talking about violas does not necessarily imply talking about string instruments in general, since some property of the viola may not apply to other string instruments.

Given these premises, we suggest that the two dislocate expressions, both representing a topic and both requiring an antecedent, will be optimal with different bridging types depending on the anaphoric strength of such types: RDs will be less appropriate as far as the anaphoric relation becomes weaker, while LDs will be preferred with weaker anaphoric relations. Such hypothesis is tested in the first two experiments. The third experiment will instead explicitly test Bott’s monotonicity hypothesis.

### *Experiment 1*

The research question behind the first experiment is what preferences Catalan speakers have with respect to LD and RD in contexts involving the following five bridging relations: epithet, hypernym, set membership (direct reference), and necessary part and optional part (indirect reference by association). An example of item per each bridging type is given below. Note that all variants are given without acceptability judgments; as the experiments will show, they are not all equally acceptable.

(17) ‘Yesterday, on the street, I saw Andreu, our former accountant.’ [Epithet]

- a. El vaig evitar, aquell desgraciat.  
him I.did avoid that wretch  
‘I avoided that wretch.’
- b. Aquell desgraciat, el vaig evitar.

(18) ‘Mary cooked chickpeas.’ [Hyponym]

- a. No els suportó, els llegums.  
not them I.stand the legumes  
‘I cannot stand legumes.’
- b. Els llegums, no els suportó.

- (19) ‘Last summer, I visited the cities of Tuscany.’ [Set membership]
- a. La vaig recórrer de punta a punta, Florència.  
it I.did go.through from end to end Florence  
‘I wandered all through Florence.’
  - b. Florència, la vaig recórrer de punta a punta.
- (20) ‘My parents gifted me with a new laptop.’ [Necessary part]
- a. La té tàctil, la pantalla.  
it has tactile the display  
‘It has a touch display.’
  - b. La pantalla, la té tàctil.
- (21) ‘I recommend this hotel.’ [Optional part]
- a. L’ havien reformada, la piscina .  
it they.had renovated the swimming-pool  
‘The swimming-pool had been renovated’
  - b. La piscina, l’havien reformada.

Following Clark, we motivate this order as follows. First, the antecedent is semantically ‘closer’ with direct reference than indirect reference. In other words, the implicature triggered by direct reference is simpler than the one triggered by indirect reference, which results in faster processing, as originally reported in Haviland and Clark (1974). As for the order of the three bridging types involving direct reference, it is motivated by the following considerations. When the bridging relation involves an epithet, like in (14), the referent denoted by the antecedent and the one denoted by the dislocate are the same: what changes is just the linguistic expression used to refer to it. In a case of hypernymy – cf. (15) – the second utterance still predicates about chickpeas, but it does so indirectly by talking about legumes in general, namely about the kind of which chick peas are a token. Finally, within a set-membership bridging relation like (16), the second utterance does not predicate about the antecedent at all (*Tuscan cities*) but only about one specific Tuscan city (*Florence*). The predication does not necessarily hold for the other cities. As for the order of necessary part before optional part within indirect reference, the assumption is simply that talking about a necessary part is closer to talking about the whole than when one does it of some part that is

not needed to identify the whole.

Note that the bridging relations we take into account are not exhaustive of the bridging possibilities described by Clark and subsequent work. As a matter of fact, constraints in the experimental set up and in the statistical analysis led us to choose only one part of the scale of bridging strength. In particular, as mentioned, we excluded all bridging types that involve a non-referential antecedent.

The specific hypothesis we make for this experiment is the following:

- (22) The bridging strength hypothesis: Dislocation structures are sensitive to the anaphoric strength according to a bridging scale in the following way:
- (i) the more “anaphorically strong” the relationship between the referent of a RD and its antecedent, the better; and
  - (ii) the more “anaphorically weak” the relationship between the referent of a LD and its antecedent, the better.

Hence, our hypothesis predicts that RD’s ratings will be optimal with epithets and that they will decrease as the anaphoric link becomes weaker, up to the optional part bridging type, which will render the worst ratings for RD. In contrast, for LD, the hypothesis is reversed: we expect LD to be preferred when the bridging link is less strong. In other words, the ratings of RD and LD are expected to peak at opposite ends off the scale of bridging possibilities.

### *Method*

**Participants** 67 native Catalan speakers took part in Experiment 1; they were university students at the Universitat Autònoma de Barcelona and at the Universitat Pompeu Fabra, in Barcelona. All participants answered a questionnaire which is a version of the Bilingual Linguistic Profile (Gertken, Amengual, & Birdsong, 2014), adapted to Catalonia’s situation, and 20 candidates were discarded because classified as Spanish language dominant speakers. The participants we eventually considered were 47 (38 female and 9 male), aged 17-51 (mean age: 22.1).

**Design** Experiment 1 included 30 experimental items, 6 for each of the 5 tested bridging types (Epithet, Hypernym, Set membership, Necessary part and Optional part).

Each item had a context sentence containing the antecedent, followed by either a left or a right dislocation of a definite direct object DP. We are aware of the fact that the two-sentence setting of the experimental design only partially represents the phenomenon of bridging in naturalistic data, since the antecedent may obviously be not in the immediately preceding sentence and may even be found in the extra-linguistic context (see also Clark (1975) on this point). It is clear then that the present experiment does not test the effects of bridging with more distant antecedents, despite them being possible with both LD and RD.

For each item, each participant only saw one of the two constructions (either the RD or the LD). We also controlled for the grammatical function of the antecedent. It is known from the literature (Ariel, 2001; de la Fuente, Hemforth, Colonna, & Schimke, 2016; Kaiser & Trueswell, 2008) that the syntactic position of the antecedent makes the latter more or less accessible (more or less anaphorically distant) from the dislocate. In particular, it has been claimed that a preverbal subject, because of its tendency to be the topic of the sentence, is preferred in various languages as the antecedent of a pronoun in a subsequent utterance, for concerns of topic continuity (de la Fuente et al., 2016; Givón, 1983). We therefore decided to present participants with two types of context sentences: one where the antecedent of the dislocate is a postverbal object (cf. *el nou Mac* in (23-a)), and one where it is a preverbal subject (cf. *el nou Mac* in (20-a')).

- (23) a. Els pares m'han regalat el nou Mac.  
the parents to.me.have given the new Mac  
‘My parents gave me the new Mac (as a present).’
- a'. El nou Mac és molt eficient.  
the new Mac is very efficient.  
‘The new Mac is very efficient’
- b. La pots apagar amb la veu, la pantalla.  
it you.can turn.off with the voice, the screen  
‘You can turn off the screen with your voice’

The order of items was created according to the Latin Square design. Items were presented both in oral and in written form.

**Procedure** Participants had to give an acceptability judgment using a 10-point Likert scale<sup>1</sup>. Before doing that, they had to read the instructions and were tested for language dominance. Then, participants also had to rate three practice items. Only then, they could start the actual experimental task. The data was collected using the web interface Ibex Farm (<http://spellout.net/ibexfarm>, Drummond, 2016).

### *Results*

A statistical analysis based on a linear mixed-effect model, using R (R Core Team, 2018) and *lmerTest* (Bates, Maechler, Bolker, & Walker, 2015), was carried out on the data. The dependent numerical variable is the *z-score*, namely the standard deviation from the mean of the scores (recall, from 1 to 10) that were assigned by participants to each context/sentence matching. The independent variables (all categorical) are: Dislocation type, Bridging type, and Grammatical function (of the antecedent). Dislocation type has two conditions: Left dislocation and Right dislocation. Grammatical function has two conditions too: the antecedent is either a grammatical Subject or an Object. Bridging type has five conditions : Epithet, Hypernym, Set membership, Necessary part and Optional part. Since we hypothesized a gradual change of the ratings assigned to right and left dislocation from the strongest to the weakest bridging link between the dislocate and the antecedent, the fixed factor Bridging type was coded using Helmert contrasts (Vasishth & Broe, 2011 and Venables & Ripley, 2013, 149–209). A Helmert contrast coding compares the mean scores of each condition with the mean scores of the totality of the preceding conditions. The five bridging types were ordered in the model from the anaphorically strongest to the anaphorically weakest, so that each type was compared with the mean scores of all other types involving a stronger anaphoric link. Recall that the order of bridging types is the one given in Fig. 1. For instance, the mean score of Set-membership was compared with the mean scores of Epithet + Hypernym; the mean score of Necessary part was compared with the mean scores of Epithet + Hypernym + Set-membership, and so on. Participant and item were taken as random factors.

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<sup>1</sup>The choice of such a scale is motivated by the participants' (mostly university students) familiarity with a 10-point scale, which is used in Catalonia for evaluation at school and at the university.



Results showed an overall preference for left over right dislocation (estimate = .16,  $SE = .05$ ,  $t(1327) = 3.45$ ,  $p < .001$ ).

As can be seen in Fig. 2, left dislocation was preferred to right dislocation in 3 of the 5 bridging types.

[FIGURE 2]

As for the interaction between dislocation and grammatical function, no significant effect was obtained ( $p = .51$ ), so our results did not provide evidence for an effect of the grammatical function of the antecedent on dislocation preferences.

An interaction was found between bridging type and dislocation type. The presence of such an interaction significantly improves the model, as shown by the results of an anova comparison between a model with and a model without such interaction ( $\chi^2(4) = 50.13$ ,  $p < .001$ ). Results partially support our bridging strength hypothesis. First of all, with Right dislocation, mean scores given to (the sum of the means of) Epithet + Hypernym are higher than those given to Set-membership, while the opposite is true for Left dislocation (estimate = .24,  $SE = .04$ ,  $t(1326) = 5.9$ ,  $p < .001$ , see Fig. 3(a)).

Secondly, with right dislocation, the sum of the mean scores given to Epithet + Hypernym + Set-membership is higher than the mean of the scores given to Necessary part, though the reverse is not supported by our results: scores assigned to left dislocation with Necessary part are not significantly different from the sum of the others (estimate = .1,  $SE = .03$ ,  $t(1327) = 3.49$ ,  $p < .001$ , see Fig. 3(b)).

Finally, with right dislocation, mean scores given to Epithet + Hypernym + Set-membership + Necessary part are still higher than those given to Optional part, but unexpectedly, the same is true with left dislocation; nevertheless, the difference between Optional part and the other bridging types is significantly greater with right than with left dislocation (estimate = .05,  $SE = .02$ ,  $t(1326) = 2.04$ ,  $p = .041644$ , see Fig. 3(c)).

[FIGURE 3]

### *Discussion*

The bridging strength hypothesis is supported by Experiment 1, but only partially: scores with RD display a decreasing pattern from Epithet + Hypernym to Optional part (though no significant difference is found from Epithet to Hypernym between left and right dislocation). Nevertheless, with the former, scores do not keep increasing from Epithet to Optional part: they do rise from Hypernym to Set-membership, but then decrease from Set-membership to Optional part. As Fig. 2 shows, there seems to be a split between Epithet and Hypernym on one side and Set-membership, Necessary part and Optional part on the other: in the former group, scores are higher for RD, while in the latter, scores are higher for LD. How can this pattern be explained? We believe that an explanation must be searched in factors other than bridging strength. As discussed in section 2 above, a clear association is made in the literature between the presence of LD and the fact that the dislocate is picked up from (and sometimes opposed to) a set of alternatives, which is present in or inferable from the discourse context (Bott, 2007; Brunetti, 2009a; Mayol & Villalba, 2018; Vallduví, 1992). The interesting point for us is that depending on the bridging type, such an alternative set may be more or less easily reconstructed. Among our five bridging types, those that favor such an interpretation are precisely Set-membership, Necessary part and Optional part. With the former, the dislocate is a member of a set of alternatives by definition; with Necessary part and Optional part, the different parts of the whole represent the (contrasting) alternatives to the dislocate (though with Optional part, the alternatives may be less easy to infer). Our results interestingly show that it is precisely these bridging types that receive higher LD scores.

Going back to the bridging strength hypothesis, in conclusion our results do not support the second part of it, namely that LD is preferred when the bridging strength is weaker. In other words, our results do not say anything about the syntactic preferences of a definite expression when the bridging strength with its antecedent is weak. By focusing on dislocations, however, in Experiment 1 we did not take into account cases where the definite expression occupies a non-dislocated, in situ position. It might be the case that weak anaphoric relations are prerogative of non-dislocated expressions, rather than of LD. In order to have the complete picture, we therefore decided to run a second

acceptability judgment experiment and test the effect of bridging strength on both dislocations and canonical sentences, namely sentences where the target expression occupies a non-dislocated, in situ position.

Before getting into that second experiment, we would like to briefly comment on the absence of a significant effect of grammatical function on dislocation preferences. This result may be due to the difference between a full DP and a pronoun, which prevents us from making a full comparison of our results with those provided by de la Fuente, Hemforth, and colleagues. However, the result might also simply be due to the type of stimuli presented to our informants. Consider again (20) above. Since the context-sentence is the only context preceding the dislocation, the reader/listener unconsciously interprets it as the starting point of the discourse. It is rather natural to imagine in (20a/a') that *el nou Mac* 'the new Mac' is going to be the new topic of subsequent discourse. Therefore, the retrieval of the antecedent for *la pantalla* 'the screen' does not seem to be a problem in either context. Note furthermore that *el nou Mac* is the only referent that can entertain a bridging relation with *la pantalla* 'the screen': in (20a), it is the only referent present, and in (20a'), the sentence contains another referent, *els pares* 'the parents', but such a referent clearly cannot entertain any bridging relation with the screen. Finally, it must be added that the context sentence of our stimuli was particularly short, so it might be the case that the syntactic position of the antecedent had a less strong effect than in the stimuli of the experiments presented in the literature.

### ***Experiment 2***

In this experiment we added canonical sentences to the comparison, and assumed that the canonical sentence is all-focused, so the target expression (the one corresponding to the dislocate in the non-canonical constructions) is part of the focus.<sup>2</sup> Note that the expression, which is always definite, requires an antecedent (in the same way as the dislocate in LD or RD) in order for the second utterance to be coherently linked to

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<sup>2</sup>It is possible that depending on the item, such expressions are more or less informative than the verb and/or the potential adjunct or complement present. We did not control for this difference among items. However, we included item as a random factor in the statistical analysis, so this potential variation is controlled by the model.

the first one. For instance, in example (16), where the dislocation contains *Florència*, namely one of the cities of Tuscany mentioned in the context sentence, a rhetorical relation can be identified between the two utterances (an Elaboration) : the speaker gives more particulars about the event described in her first utterance (Kehler, 2002). If, say, *París* 'Paris' replaced *Florència*, no clear relation between the two utterances would subsist.<sup>3</sup> Since the expression in situ is part of the focus, we expect its antecedent to be preferably anaphorically weak. What difference do we expect between a canonical sentence and a LD? Since the latter is a more marked construction, we expect it to be preferred in contexts where some particular pragmatic function is required, which a LD but not a canonical sentence may be able to express. Summing up, the bridging strength hypothesis of Experiment 1 is reformulated in Experiment 2 as follows:

- For LD and RD, we predict the same as in the previous experiments.
- We expect canonical sentences to be preferred when the bridging strength is weaker.

### *Method*

**Participants** 81 native Catalan speakers took part in Experiment 2 on Ibex Farm. They were mostly students at the Universitat Autònoma de Barcelona and at the Universitat Pompeu Fabra; they had not participated in the previous experiment. All participants answered a questionnaire on their linguistic profile (the same as that used in the previous experiment), and we discarded 11 candidates who were classified as Spanish language dominant speakers. The data were therefore collected from a total of 70 participants (57 women and 13 men) aged 18-67 (mean age: 23,4).

**Design** Experiment 2, exactly like Experiment 1, included 6 items per each of the 5 tested bridging types (Epithet, Hypernym, Set membership, Necessary part and Optional part). Each item came in three forms: either a context-sentence followed by a LD, or a context-sentence followed by a RD, or a context-sentence followed by a canonical sentence. 21 fillers were added.

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<sup>3</sup>In our experiment, the rhetorical relation between the two utterances is always either an Elaboration or a Comment. On rhetorical relations from a wider perspective, see Asher and Lascarides (2003); Mann and Thompson (1988).

The bridging types and the experimental set up of this experiment were the same as those in Experiment 1, except for the addition of canonical sentences (see ex. (24) below). Also, since the grammatical function of the antecedent played no role in Experiment 1, we restricted antecedents to postverbal objects only.

- (24) ‘Last summer, I visited the cities of Tuscany.’
- a. Vaig recórrer Florència de punta a punta.  
I.did go-through Florence from end to end  
‘I wandered all through Florence.’

**Procedure** The same procedure was followed as in Experiment 1: participants had to judge one sentence at a time (LD, RD or canonical) presented both in oral and in written form, using a 10-point Likert scale. For each item, each participant only saw one of the three constructions. The order of items was created according to the Latin Square design.

### *Results*

A statistical analysis based on a linear mixed-effect model was carried out. As in the previous experiment, the *z-score* was taken as the dependent numerical variable and Participant and Item as random factors. The independent categorical variable Bridging type was the same as in Experiment 1 and it was coded using Helmert contrasts as in Experiment 1. The other independent categorical variable, Construction type, had three conditions: LD, RD, and canonical sentence.

Results showed significant higher ratings for Canonical over RD (estimate = -.25,  $SE = .05$ ,  $t(1868.8) = -5.46$ ,  $p < .001$ ), and for LD over RD (estimate = .17,  $SE = .05$ ,  $t(1868.5) = 3.68$ ,  $p < .001$ ) across all bridging types. Mean ratings for each bridging type and construction combination are shown in Fig. 4.

[FIGURE 4]

An interaction between word order and bridging type is supported by Experiment 2 and by an anova comparison of a model with and a model without the interaction: results show that the model is significantly improved by the presence of such interaction ( $\chi^2(8) = 78.73$ ,  $p < .001$ ). First, from Epithet to Hypernym scores sharply increase

with Canonical, while they still increase but less sharply with RD (the difference is close to significance: estimate =  $-.14$ ,  $SE = .07$ ,  $t(1869.5) = -1.9$ ,  $p = .057059$ , see Fig. 4). Second, from Epithet + Hypernym to Set-membership there is a significant difference between RD and LD (estimate =  $.2$ ,  $SE = .04$ ,  $t(1869.7) = 4.69$ ,  $p < .001$ ) and between RD and Canonical (estimate =  $-.18$ ,  $SE = .04$ ,  $t(1870.6) = -4.31$ ,  $p < .001$ ): with RD, scores decrease, while they increase with LD and with Canonical (Fig. 5(a)). Third, from Epithet + Hypernym + Set-membership to Necessary part there is a significant difference between RD and Canonical (estimate =  $-.17$ ,  $SE = .03$ ,  $t(1868.3) = -5.78$ ,  $p < .001$ ) and between RD and LD (estimate =  $.09$ ,  $SE = .03$ ,  $t(1868.8) = 3.02$ ,  $p = .002562$ ): with RD, scores decrease while with canonical they increase and with LD, they stay constant (Fig. 5(b)). Finally, from Epithet + Hypernym + Set-membership + Necessary part to Optional part there is a significant difference between RD and Canonical: in both cases scores decrease, but the decrease is significantly less sharp with Canonical than with RD (estimate =  $-.057$ ,  $SE = .02$ ,  $t(1869.6) = -2.49$ ,  $p = .01304$ ); no significant difference is found between RD and LD ( $p = .602119$ ). See Fig. 5(c).

[FIGURE 5]

### *Discussion*

The overall better scores with LD than RD support the findings of Experiment 1. The better scores of Canonical over the two dislocations is expected, since we expect canonical constructions to be non-marked and, thus, by default generally rated better than non-canonical ones, when possible. As far as the bridging strength hypothesis is concerned, results of Experiment 2 show that RD's and Canonical's ratings go to opposite directions: with RD – except for the unexpected result that Epithets do not receive better scores than Hypernyms —<sup>4</sup> we see a significant lowering of ratings from Hypernym to Optional part; with canonical sentences – set aside the low ratings of Optional part – scores display a continuous rise from Epithet to Necessary part. These results seem to support our hypothesis, namely that RD prefers stronger bridging

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<sup>4</sup>Recall that Epithet is the only true identity relation among our five bridging types, so the highest scores for RD are expected with it.

relations while canonical sentences prefer weaker ones. According to our hypothesis, however, LD should display the same pattern as canonical sentences, so its scores should also increase from Epithet to Optional part; yet, ratings with LD do not follow such a pattern. Rather, results of Experiment 2 support those seen in Experiment 1: there seems to be a split between Epithet and Hypernym on one side, and the other bridging types on the other, as illustrated by the graph in Fig. 4. The addition of canonical sentences in Experiment 2, however, helps us to better understand the participants' behavior. Let us look more closely at the differences between the three constructions.

A first difference that we observe between LD and canonical sentences is that with LD, there is no significant difference between Epithet and Hypernym, while with Canonical sentences, ratings are lower with Epithet than with Hypernym. The latter result is expected, since we expect a referent not to be part of the focus if it has been introduced in the immediately preceding utterance (unless it contrasts with some other referent). In the case of LD, the given referent is a topic, a pragmatic function that is suitable to a referent that has just been introduced in the discourse. Yet, we would expect Epithet ratings to be lower with LD than with RD, but in fact, they seem to be as good with LD as with RD, a result that we cannot explain at present.

The differences among word order types is particularly interesting with Hypernyms. Hypernym's ratings are higher with RD and canonical sentences than with LD. However, while Canonical's ratings with Hypernyms are as high as those with Set-membership and Necessary parts, with LD there is a significant increase from Hypernym to Set-membership. Summarizing, the differences between the three constructions concerning Hypernym are the following:

- with RD, Hypernym is rated higher than Set-membership;
- with LD, Hypernym is rated lower than Set-membership;
- with Canonical sentences, there is no difference between the two.

The differences just described suggest that Bott's (2007) monotonicity hypothesis may be correct. Henceforth, we decided to specifically test such a hypothesis by carrying out a third (and last) acceptability judgment experiment.

### *Experiment 3*

According to the monotonicity hypothesis, RD must be in an upward monotonic anaphoric relation with its antecedent, whereas LD must be in a downward monotonic or in a non-monotonic one. In Experiments 1 and 2, Set-membership items clearly represent cases of downward anaphor; Hypernyms, on the other hand, are clearly upward monotonic. It might be the case then that the results of Hypernyms and of Set-membership described above are a consequence of the monotonic properties of these bridging types. In Experiment 3, we specifically wanted to test this hypothesis.

#### *Method*

**Participants** 36 native Catalan speakers were selected for the experiment; they had not participated in the previous experiments. All participants answered the questionnaire mentioned in previous experiments, and we discarded 4 candidates who were classified as Spanish language dominant speakers. In conclusion, we considered the data of 32 participants (26 women and 6 men), who ranged between 18 and 29 years (mean age= 20.9).

**Design** In this experiment we tested four bridging types: two downward monotonic ones and two upward monotonic ones. The experiment included 24 experimental items, 12 for each of the 2 bridging conditions (downward vs upward monotonic), as well as 12 fillers.

**Procedure** The same procedure was followed as that described for Experiments 1 and 2: participants had to judge one sentence at a time (LD or RD) presented both in oral and in written form, using a 10-point Likert scale. Downward monotonic items included relations from hypernym to hyponym (see (23)) and from set to member (see (24)). Upward monotonic items included relations from hyponym to hypernym (see (25)) and from member to set (see (26)) (for space constraints, we just provide an example of the LD version).

(25) a. ‘After supper, I like liquors.’



- b. El whisky escocès, el prenc amb gel.  
the whisky Scotch it I.drink with ice  
'Scotch, I take on the rocks.'
- (26) a. 'Last summer, I visited all the cities of Tuscany.'  
b. Florència, la vaig recórrer de punta a punta.  
Florence it I.did go.through from end to end  
'I wandered all through Florence.'
- (27) a. 'I love Scotch.'  
b. Els licors, els bec després de sopar.  
the liquors them I.drink after of supper  
'Spirits, I take after supper.'
- (28) a. 'I wandered all through Florence.'  
b. Les ciutats de la Toscana, finalment les vaig visitar totes.  
the cities of the Tuscany finally them I.did visit all  
'Tuscan cities, I eventually visited them all.'

Each item was ordered according to the Latin Square design. For each item, participants only saw one of the two constructions (either RD, or LD).

### *Results*

As in previous experiments, a statistical analysis based on a linear mixed-effect model was carried out, where the *z-score* is the numerical dependent variable and Participant and Item are the random factors. The categorical variables Dislocation type and Monotonicity were chosen as independent factors. The conditions of Dislocation type are Left (LD) and Right (RD) dislocation, while the conditions of Monotonicity are Upward Monotonic and Downward Monotonic.

Results show that there is a significant interaction between Dislocation and Monotonicity (estimate = .66,  $SE = .16$ ,  $t(342.2) = 4.24$ ,  $p < .001$ ): specifically, as Fig. 6 illustrates, there is an effect of Dislocation in downward monotonic contexts: LD receives higher scores than RD (estimate = -.66,  $SE = .11$ ,  $t(343) = -5.97$ ,  $p < .001$ ). On the contrary, no difference is found between LD and RD in upward monotonic contexts ( $p = .9855$ ).

[FIGURE 6]

By comparing with anova a model with and a model without the Monotonicity factor, we see that monotonicity by itself does not have an effect on the model ( $\chi^2(1) = 1.79$ ,  $p = .1805$ ). As a matter of fact, a linear model with only Dislocation as independent variable shows that RD is rated worse than LD (estimate = .33,  $SE = .08$ ,  $t(341.4) = 4.08$ ,  $p < .001$ ), in line with previous experiments.

### *Discussion*

A first observation we can make is that RDs and LDs receive pretty high ratings (around 7 or more) in both monotonic environments: Bott's judgments in (15) and (14) are therefore too strong. The monotonicity hypothesis is (partially) supported by our results, but only as a tendency, not as a categorical rule. Results show as expected that RD is rated better with upward monotonic relations (member-set and hypernym-hyponym) and that LD is rated better with downward monotonic anaphoric relations (set-member and hyponym-hypernym). This tendency does not prevent, however, LD to be rated pretty high (in fact, as high as RD) in upward monotonic contexts, as Fig. 6 clearly shows. How to interpret such an asymmetry?

According to Vallduví (1992), Bott (2007), and Brunetti (2009a), among others, a LD in Catalan is a link, which involves selecting a topic among a set of alternatives in the context. In other words, for these analyses, the only possible anaphoric relation between an LD and its antecedent is, by definition, a downward monotonic one. If these analyses are correct, how can we explain the relatively high rating of LD in upward monotonic contexts? One possible explanation is to assume that a downward monotonic relation between the dislocate and its antecedent is always accommodated by the listener, even in non-downward monotonic contexts. This is basically the account that Bott (2007) (but see also Brunetti, 2006, 2009a) gives to cases where an LD expression is present in an answer to a question containing the same expression, like in the following Catalan example from Bott (2007, 113):

- (29) Q: 'Any news about Enric?'  
 A: L'Enric, no l'he vist.  
 the Enric not him-I.have seen  
 'Enric, I haven't seen.'

The presence of a LD is not expected in this context, because no alternative set is given to *l'Enric*. However, the repetition of *l'Enric* in the answer triggers a contrastive interpretation, according to which the speaker has seen someone else. The reason for such an interpretation is that listeners interpret the presence of the dislocate as an indication that its referent is in a downward monotonic relation with some set. In the absence of contextual clues, listeners infer the existence of such a set by accommodation. Cases like (25) or (26) can be analysed in a similar way. Listeners accommodate an interpretation such that the dislocate forms a set with other referents to be mentioned in subsequent discourse. For instance, the cities of Tuscany may be interpreted as a member of a set of sets of cities (cities of Tuscany, cities of Sicily, cities of Veneto, etc.), whose relevance becomes clear in subsequent discourse (for instance, if the cities of Tuscany is contrasted with the cities of other regions of Italy). If this analysis is correct, then the relatively high scores of LD in upward monotonic contexts are due to the fact that, even in cases of upward monotonicity, a downward monotonic antecedent is accommodated by listeners, along the lines originally described by Lewis (1979) for presupposition. However, since some kind of accommodation must be done in such contexts in order to get the desired interpretation, it is not surprising that scores will still be lower than those given to LD with explicit downward monotonic antecedents. Such an account is also valid, according to Bott, for non-monotonic anaphora, as we already mentioned in the introduction. No similar accommodation is possible, on the contrary, with RD, which would explain the lower scores of RD with downward monotonic antecedents. What is left unaccounted for by this analysis is the fact that RD is, if not preferred, at least totally acceptable in both a downward monotonic context (as shown by Experiment 3) and in a non-monotonic context (as in example (8) taken from the literature). We report an explanation for this particular behavior to future research.

As mentioned in the introduction, LD has also been described as introducing a new discourse topic, a new segment of discourse (a topic shift). Hence, another explanation to our results concerning LD may be that, even in an upward monotonic context, LD is licensed if the subsequent discourse is clearly about the new referent introduced by the dislocate. Since no context is given after the target sentence in our stimuli, such

an interpretation can be accommodated by the listener/reader.

## **General discussion and conclusions**

In this paper we have analyzed the relationship in Catalan between the position of an expression in the sentence (dislocated to the left, to the right or in situ) and the strength of the anaphoric link between the referent of such expression and its antecedent. We have tested the hypothesis that a RD occurs more naturally in cases of a strong bridging link between the referent and its antecedent, while a LD or a canonical position occur more naturally when the bridging link is weaker. Results of the first two acceptability judgment experiments partially support our hypothesis in that a decrease of ratings from the strongest to the weakest bridging type is visible with RD; interestingly, however, the opposite tendency is only visible with canonical sentences but not with LD. The latter construction does not seem to be affected by the bridging strength as much as RD is, which we interpret as a consequence of its prototypical pragmatic functions: topic shifting and contrast. Indeed, if we assume that LD always evokes alternatives (see Villalba, 2000, ch.2, Brunetti, 2009a and López (2009)), the high ratings of LD with set-membership and necessary parts are clearly explained, without having to call upon bridging strength.

LD's pragmatic functions are also compatible with Bott's analysis of LD as being a link, where 'link' means to establish a downward monotonic relationship with an antecedent. Our third experiment, which explicitly tested Bott's monotonicity hypothesis, supports this claim. However, unlike what Bott's analysis seems to suggest, results do not show a clear division of labor between RD and LD in upward and downward monotonic contexts respectively, for LD covers part of the space one would reserve for RD.

Overall, the resultant picture is more complex than previous analyses suggested, and shows that whereas anaphoric strength is a major factor in explaining the distribution of LD and RD in Catalan, other variables blur its effect, mainly the inherently contrastive nature of LD.

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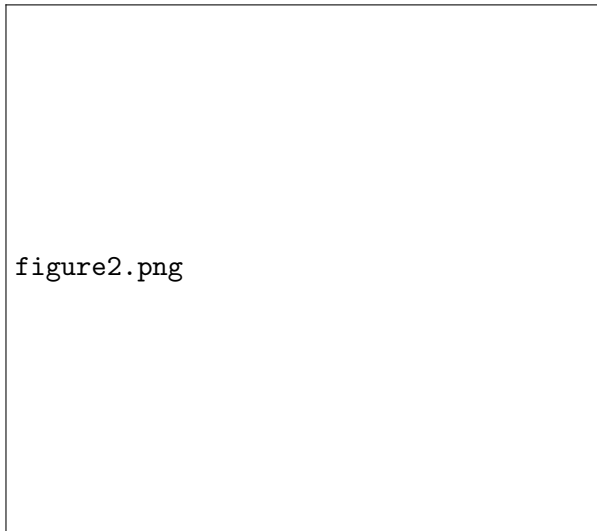
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## Figures





**Figure 1.**

### **Figure captions**

Figure 2. Experiment 1: ratings of LD and RD across bridging types.

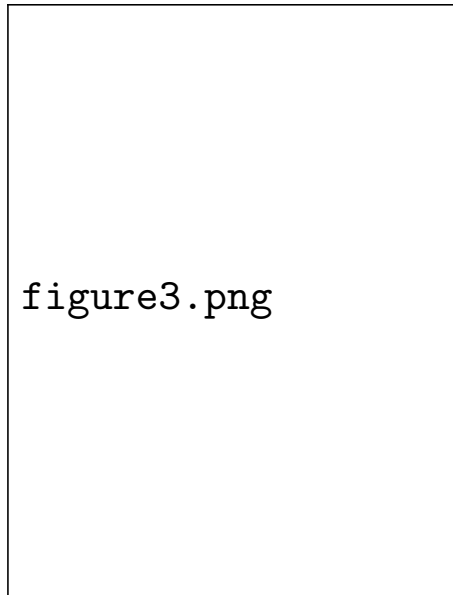
Figure 3. Experiment 1. Interaction effects among bridging types. (a) Ratings of epithet + hypernym vs other bridging types. (b) Ratings of epithet + hypernym + set-membership vs other bridging types. (c) Ratings of epithet + hypernym + set-membership + necessary part vs other bridging types.

Figure 4. Experiment 2: ratings for each bridging type and construction combination.

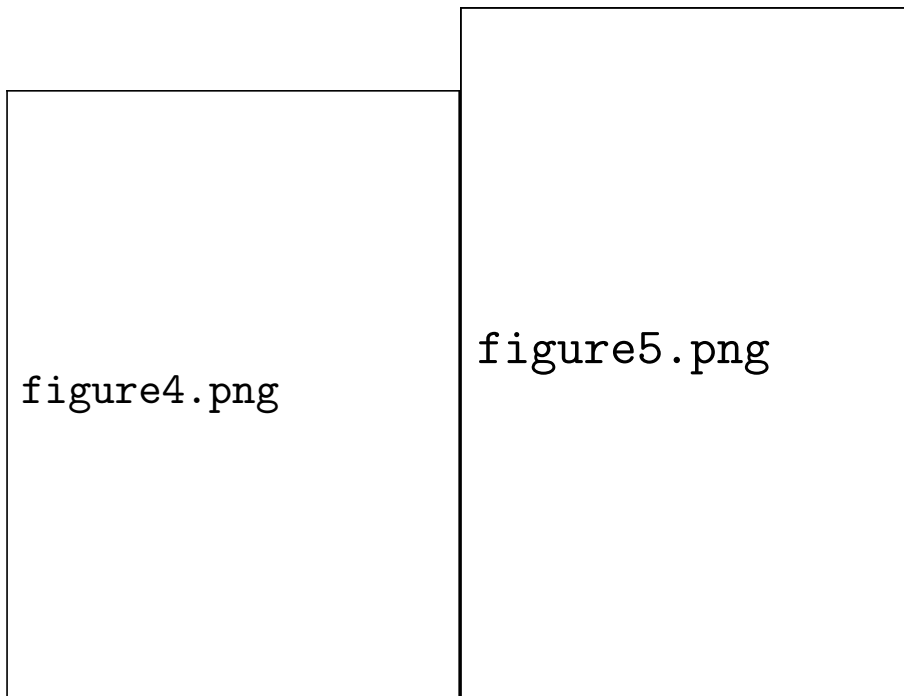
Figure 5. Experiment 2. Interaction effects among bridging types. (a) Ratings of epithet + hypernym vs other bridging types. (b) Ratings of epithet + hypernym + set-membership vs other bridging types. (c) Ratings of epithet + hypernym + set-membership + necessary part vs other bridging types.

Figure 6. Experiment 3: ratings for monotonicity across dislocation type.

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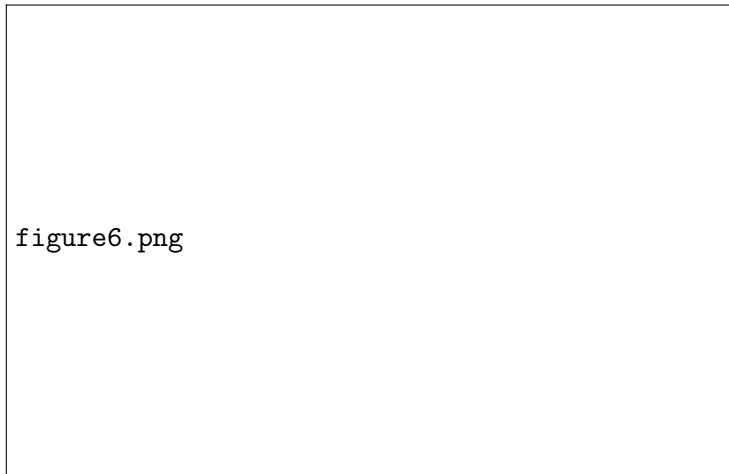
(a) Ratings of epithet + hypernym vs other bridging types.



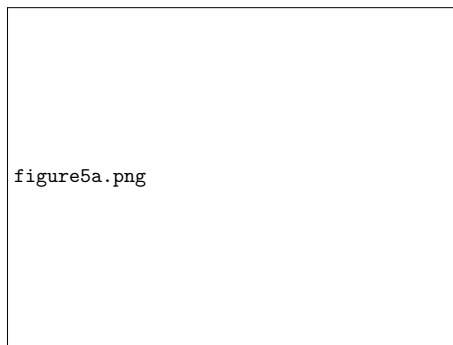
(b) Ratings of epithet + hypernym + set-membership vs other bridging types.

(c) Ratings of epithet + hypernym + set-membership + necessary part vs other bridging types.

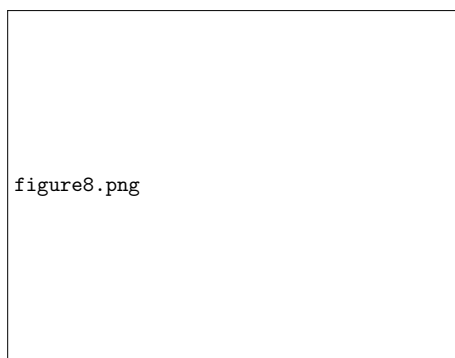
**Figure 2.**



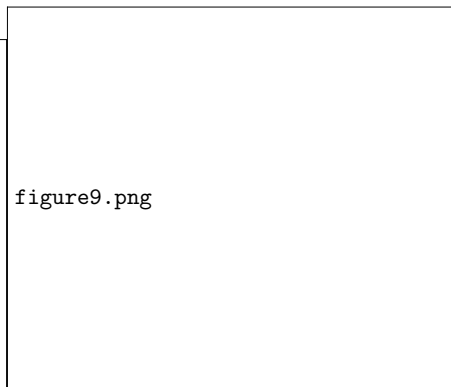
**Figure 3.**



(a) Ratings of epithet + hypernym vs other bridging types.

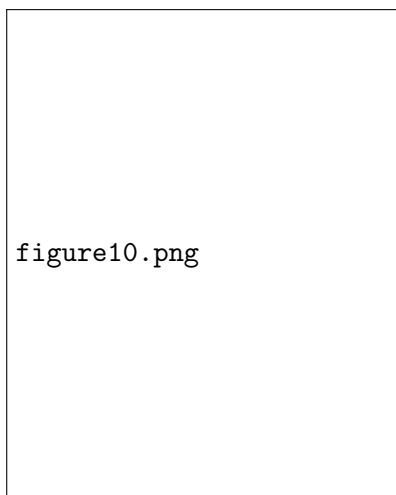


(b) Ratings of epithet + hypernym + set-membership vs other bridging types.



(c) Ratings of epithet + hypernym + set-membership + necessary part vs other bridging types.

**Figure 4.**



**Figure 5.**