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Exploring variation in English and Italian relative clause attachment: The role of coordination

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Abstract. This study investigates the effect of coordination on the resolution of relative clause attachment ambiguity in English and Italian. We also examined the interplay of RC length and DP positions on attachment preferences in coordinate structures, conducting a partial replication of previous results on English (Hemforth et al. 2015). In two offline force-choice tasks, English speakers favored local attachment, while Italian speakers showed a strong preference for non-local attachment across all conditions. This pattern aligns with established variation across the two languages, but interestingly deviates from earlier reports showing the effects of RC-Head type, RC length, and DP position on attachment decisions. Our findings thus suggest that further attention needs to be paid to the complex interaction of different, potentially understudied, structural factors when investigating disambiguation mechanisms across languages.

Keywords. coordination; relative clause attachment; parallelism; English; Italian

1. Introduction. Exploring factors guiding syntactic parsing mechanisms cross-linguistically remains a central theme in psycholinguistic research. In this sense, ambiguity resolution has served as a good testing ground for theories of parsing, and the strategies involved in the resolution of ambiguity in relative clause (RC) attachment specifically have provoked substantial discussion. Consider the sentence in (1), where a complex DP (*the manager of the woman*) is followed by a RC (*who was on the balcony*).

(1) I met the manager of the woman who was on the balcony.

a. The manager was on the balcony.

b. The woman was on the balcony.

This structure has two available interpretations, depending on which of the two distinct DPs – the manager (DP1) or the woman (DP2) – the relative clause modifies. As standard in the literature on RC attachment, we will refer to these two different interpretations as high-attachment (HA; when the RC modifies DP1 as in 1a) and low-attachment (LA; when the RC modifies DP2 in 1b). A series of foundational experiments in English found a predominant LA preference when interpreting globally ambiguous sentences of this type. Based on these empirical results, a variety of theoretical proposals were put forward to sketch the type of principles biasing the human parser towards a LA preference. Locality, in particular, has been argued to influence ambiguity resolution in these contexts, as well as structure building more broadly during sentence processing (Kimball 1973; Frazier & Fodor 1978; Frazier 1979; De Vincenzi 1991; Gibson 1991; Phillips 2003, 1996). Late Closure, for instance, has been proposed as a formulation of locality that hypothesized that new lexical items are preferentially integrated into the currently active

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phrase or clause, thus leading the parser to prefer building a LA structure over a HA one (Frazier 1979).

However, cross-linguistic research beyond English quickly showed that languages vary significantly in their attachment preferences – with some languages patterning like English in favoring LA, while others (e.g., Spanish, Italian) favoring HA (Cuetos & Mitchell 1988; Carreiras & Clifton Jr 1993; De Vincenzi & Job 1993; Abdelghany & Fodor 1999; Ehrlich 1999; Papadopoulou & Clahsen 2003; Brysbaert 1996; Lovric 2003; Fedorova et al. 2007; Hemforth & Scheepers 2000b; Swets et al. 2007; Aguilar & Grillo 2021; Pozniak et al. 2019; Branco-Moreno 2014) – leading to decades of research investigating the generalizability of locality principles governing syntactic processing (for reviews and discussions see, among others, Frazier & Clifton 1996; Frazier & Fodor 1978; Baccino et al. 2000; Desmet et al. 2002; Grillo & Costa 2014; Aguilar et al. 2021).

Crucially, in addition to variability *across* languages, researchers have found significant variability in attachment preferences even *within* the same language. One factor that has been known to influence this type of preference is the nature of the task employed in a study, suggesting that the methodology employed significantly influences the detection of differences in RC attachment (De Vincenzi & Job 1993; Fodor & Ferreira 1998). Moreover, while there are well-known asymmetries in RC attachment between studies using offline (questionnaires, force-choice tasks, acceptability judgments) and online (self-paced reading, eyetracking) techiniques, the specific results are inconclusive – with some studies reporting consistent behavior across tasks (among others, Carreiras & Clifton Jr 1993), while others reporting differential behavior (Maia et al. 2007; Aguilar et al. 2021).

Details of the task aside, studies have shown how a variety of factors influence the interpretation of RC attachment to complex antecedents both across and within languages – e.g. prosody, referentiality of the DPs, lexical semantics, and more (Swets et al. 2007; Grillo & Costa 2014; Hemforth et al. 2015). A specific example of interest for us is the impact of RC length on which attachment is favored, and the consistency of this effect across different languages. Research indicates that speakers show a more pronounced preference for attaching to the first DP in a sentence when the RC is "long" (e.g., Fernández 2003; Hemforth et al. 2015). This phenomenon is thought to have a prosodic basis (Bradley et al. 2003; Fernández et al. 2003), even though increasing the length of an RC not only adds prosodic weight but also changes the informational content of the sentence (Thornton et al. 2000).

Focusing on RC length manipulations, Hemforth et al. (2015) investigated the effect of modulating structural characteristics of RCs in order to explore the interplay of language-specific properties and general parsing principles. In an extensive cross-linguistic study comparing German, Spanish, English, and French, they compared participants' preference for LA vs. HA intepretations when presented with ambiguous sentences containing "short" vs. "long" RCs (2a/c vs. 2b/d).

(2) a. The son of the colonel who died had written five books on tropical diseases.

b. The son of the colonel who tragically died of stroke had written five books on tropical diseases.

c. The doctor met the son of the colonel who died.

d. The doctor met the son of the colonel who tragically died of stroke.

This comparison was meant to test the predictions of Fodor's (2002) Implicit Prodosody hypothesis, which put forward the idea that readers impose a particular prosodic structure on the sentences they read, and that the parser would prefer a balanced prosodic structure over an unbalanced one. Additionally, Hemforth et al. (2015) note that a majority of studies on RC preferences had focused on RC modifying DPs in object position, and thus wonder about the potential differences between subject vs. object modification (2a/b vs. 2c/d). They found an effect of length across all four languages, reporting more HA with longer RCs than with shorter ones, independently of the previously reported individual HA/LA tendencies of each language. They also found an overall preference to disambiguate towards HA for object position RCs, and interesting this latter effect was larger for German and Spanish than for English and French – a fact that the authors attribute to differences in the properties of the "subject" positions of these languages (e.g. topic vs. non-topic subjects). This study opened an abundance of questions about the particular mechanisms behind such effects, and on how language-specific grammatical properties could be masking more general, language-independent parsing principles (e.g. locality) in leading to HA/LA decisions.

With these issues in mind, this paper is interested in the fact that the majority of previous RC ambiguities studies have focused on RC modifying complex DPs containing a prepositional phrase (DP1 of DP2), and on investigating the potential effects of alternative constructions in biasing attachment preferences. In this sense, it has already been argued that the type of the RC head (i.e. properties of the complex DP and the relation between the internal DPs) influences the preferred attachment of the relative clause – leading to an apparent "hierarchy" of preferences such that material and quantity DPs (e.g. *table of wood*, *glass of wine*) show the strongest HA preference, DPs with a contentful PP (e.g. *girl with the hat*) show the strongest HA preference, while relational possessive (e.g. *son of the woman,car of the company*) DPs land in between those two (Gilboy et al. 1995; Frazier & Clifton 1996; Hemforth et al. 2015). Still considering the internal structure of the complex DP, Gibson et al. (1996a) showed different attachment behavior in Spanish and English, when considering three potential RC attachment sites over two. In particular, they showed that in contrast to the HA preference usually found in Spanish for RC attachments to one of two preceding DP sites, with three preceding DPs there was a solid LA preference (see also Gibson et al. 1999).

Building on this past results showcasing the complexity of the interaction between structural factors and ambiguity resolution, in this study we focus on the variation of RC attachment preferences across and within languages through the lens of a syntactically less examined structure: DP coordination. Structural differences aside, the traditionally employed "DP1 of DP2" construction suggests an asymmetric semantic relationship between the two DPs, whereas coordinated DPs (e.g., "DP1 and DP2 [RC]") within a conjunction can be construed as being interpretatively equivalent. Structural and semantic parallelism is known to affect processing load and parsing preferences, as reported both in sentence comprehension (Altmann et al. 1993; Branigan et al. 1995; Frazier et al. 1984; Henstra 1996) and in production (Bock 1986).

Related to attachment ambiguity specifically, Altmann et al. (1993) tested English participants in an offline Cloze task, and reported that participants tended to complete sentences like example (3) with a plural auxiliary (*were*) 90% of the time – consistently with the RC modifying the complex DP consisting of two conjuncts together, instead of the second simple DP by itself. Additionally, when comparing eye-tracking data for globally disambiguated sentences (4), sentences with plural auxiliary forms showed an advantage over those with singular auxiliary forms,

once again indicating a preference towards a parallel structure.

(3) Robert saw a man and a woman who ___ walking down the street.

(4) a. He watched a boy and a girl who were waiting in the hall.
b. He watched a boy and a girl who was waiting in the hall.

In a follow-up study investigating parallelism effects, Henstra (1996) also explored sentences similar to (4). However, in contrast to the Cloze task and the eye-movement results of Altmann et al. (1993), Henstra found no significant reading time differences between the singular and plural auxiliary in sentences like (4). In a related study, Gibson & Schütze (1999) explored syntactic ambiguity resolution with sentences involving conjoined noun phrases (as in 5), comparing self-paced reading and corpus frequencies. The reading times for the attachment to the first noun phrase were faster than for the attachment to the second noun phrase but, to the extent that any differences were observed in the corpus frequencies, attachments to the second noun phrase were more frequent.

(5) The talk show host told a joke about a man with an umbrella and one...
a. ... about a woman with a dog but hardly anybody laughed.
b. ... with a dog but hardly anybody laughed.

Importantly, while these latter results showed the relevance of coordinate structures in manipulating disambiguation strategies, they do not directly speak to the interaction between RC attachment and DP coordination (see also Gibson et al. 1996b; Hemforth & Scheepers 2000a).

To our knowledge, research on RC attachment ambiguity specifically with coordinate structures is limited, and none of them investigated the interaction between coordination and other structural properties of the RC (e.g., length and position). Additionally, findings from existing studies on RCs and coordination present conflicting results, underscoring the need for further investigation in that. Furthermore, existing studies predominantly focus on English, leaving a gap in our understanding of the effect of DP type on the cross-linguistic strategies for RC attachment resolution. Therefore, this paper sets out to address the following questions:

1. does coordination affect RC attachment preferences?
2. does it interact with previously reported effects of RC length and DP position?
3. do these factors interact in different ways depending on language-specific properties?

In order to do so, we conduct a partial replication of Hemforth et al. (2015), with an offline questionnaire adopting a modified version of their English stimuli with sentences containing complex DPs with coordination instead of prepositional phrases. To investigate differential effects of structural factors across languages with (reportedly) different attachment preferences (but see De Vincenzi & Job 1993; Grillo & Costa 2014; Aguilar et al. 2021), we also conduct an identically constructed study in Italian.

2. Experiment 1: English.[1]

2.1. PARTICIPANTS. We recruited 51 participants (average age: 39yo) through the online platform Prolific, with English as their self-reported first language. For the purpose of this study, Prolific filters were set so that all participants were currently residing in the US. Participants were compensated monetarily through Prolific.

2.2. MATERIALS. For a close comparison with previous work on the effects of RC length on "DP of DP [RC]" constructions, stimuli for the English task were directly lifted from Hemforth et al. (2015), by switching "*of*" with "*and*" within the complex DP of each globally ambiguous sentence. Thus, the target sentences contained a coordination, [DP1 and DP2], followed by an RC which could ambiguously modify either the whole coordination or the second DP within it – as in (6).

(6) The captain and the colonel who died wrote five books on tropical disease.

Additionally, target sentences varied in the length of RCs (short *vs.* long) and the position of the modified noun phrase (subject *vs.* object). An example set of our stimuli is in Table 1.

	position	length	target sentence
a.	Subj	short	The captain and the colonel who died wrote five books on tropical disease.
b.	Subj	long	The captain and the colonel who tragically died of a stroke wrote five books on tropical disease.
c.	Obj	short	Frank met the captain and the colonel who died.
d.	Obj	long	Frank met the captain and the colonel who tragically died of a stroke.

Table 1. English stimuli by condition

Note that some studies have reported that RC attachment might be influenced by the use of *kinship* terms (e.g. *son, brother, mother, cousin,* etc.). For instance, Gilboy et al. (1995) report substantial differences in disambiguation preferences between Spanish and English only for such tems, and not for [DP of DP] complexes with other types of semantic relationships between the two nouns (e.g. occupational relations, see also Hemforth et al. 2015). The sentences in Hemforth et al. (2015) are slightly unbalanced in this sense, with 10 sets (out of their total 32) containing kinship terms. While it is unclear that a kinship asymmetry would hold in a coordinated context, since the purpose of our "and" manipulation is to semantically balance the complex DP as much as possible we further modified the original stimuli by substituting all instances of kinship terms with other types of nouns (e.g. professions).

In sum, our stimuli were comprised of 32 lexically diverse quartets, for a total of 128 target sentences which we distributed across 4 groups in a Latin square design. Each participant was presented with 92 sentences (32 target sentences and 60 filler sentences). The filler sentences were attention checks containing number, color, or location words.

[1] Materials, data, and code for all analyses in the following sections can be retrieved from OSF at this link: https://osf.io/phk8u

2.3. PROCEDURE. The experiment was an offline forced choice task, conducted on the web-based platform PCIbex (Zehr & Schwarz 2018). Participants were first asked to read a sentence and then to respond (as spontaneously as possible) to a forced-choice question about which of the possible DPs (the full complex DP or the second DP only; see 7) they considered the most appropriate for the interpretation of the RC. The procedure involved displaying the target sentence alone on a screen, followed by the question and answer options on a subsequent screen, with the original sentence no longer visible.

(7) a. Screen 1:
The captain and the colonel who died wrote five books on tropical disease.

b. Screen 2:
Who died?
(i) the captain and the colonel (ii) the colonel

The order of appearance of the DPs in the force-choice screen (conjunction first or single DP first) was counterbalanced so that participants would not develop answering strategies. After answering by clicking a button, participants could not revisit previous questions. The completion of the experiment took approximately 20 minutes.

2.4. ANALYSIS AND RESULTS. Before proceeding with the statistical analysis, we first evaluated the reliability of the responses by examining participants' answers to filler sentences. Specifically, we set a threshold of 80% accuracy on these filler sentences; responses from two participants who failed to meet this criterion were deemed unreliable and thus excluded from further analysis. This preliminary step served as a quality control measure to ascertain that participants were engaged and attentive throughout the task. Two participants were excluded based on this criteria. The results in the following sections are thus based on the responses from 49 participants. Furthermore, we removed the items from one set (set number 15), since due to an error in the stimulus file we found that the items for the object condition in this set were incomplete.

We fit a regression model with two fixed-effect factors: the RC length and the position of the DPs, considering their interaction. These factors were coded with treatment coding. Additionally, we included random intercepts for both participants and items, crossing them to account for variability. Initially, the model was designed to follow the maximal random effect structure as recommended by Barr et al. (2013). However, due to issues with non-convergence associated with the complexity of the model, we systematically reduced the complexity of the random effects structure until the model successfully converged. The final converged model was $glmer(answer \sim length * position + (1 + length|participant) + (1 + position|sentence)$.

Results for English responses (Figure 1 and Table 2) show an average percentage of HA answers below 50% across all conditions. This pattern is in line with English participants exhibiting a preference for local over non-local attachment, and it is consistent with previous results on English when using [DP of DP constructions]. Notably, our findings diverge from those reported by Altmann et al. (1993), who observed a pronounced High Attachment preference in English within coordination structures, and also from Henstra (1996) who found neither a LA nor an HA advantage for sentences with coordination during self-paced reading.

Additionally, we found a consistent preference for LA in English across varied syntactic configurations. Contrary to the findings reported by Hemforth et al. (2015), our statistical analysis in

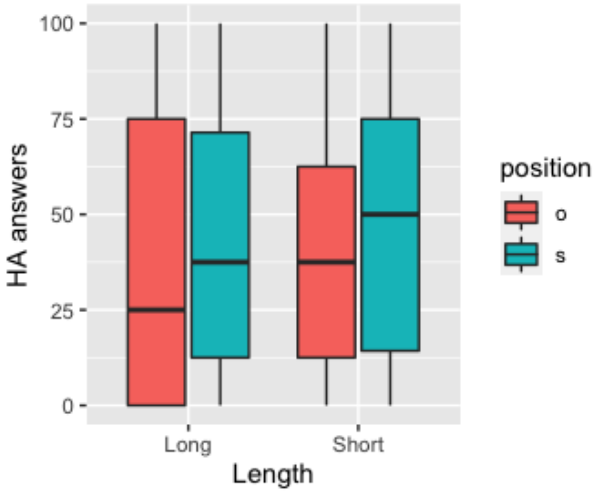

Figure 1. Rate of HA answers in English

	subject	object
short	48.52%	39.25%
long	42.81%	38.96%

Table 2. Average percentage of HA answers by length and position in English

Table 3 revealed no significant differences related to the length of the RC (p >0.8), the position of the modified DP (p >0.1), nor any interaction between these factors (p >0.7),

3. Experiment 2: Italian. We carried out an identically designed offline study in Italian, a head-initial language analogous to English, yet known for exhibiting a preference towards HA RC.

3.1. PARTICIPANTS. We recruited 51 participants (average age: 30yo) through the online platform Prolific, with Italian as their self-reported first language. For the purpose of this study, Prolific filters were set so that all participants were currently residing in the Italy at the time of the study. Participants were compensated monetarily through Prolific

3.2. MATERIALS. The original Hemforth et al. (2015) did not test Italian (although they did test two closely related romance Languages: Spanish and French). Thus, we designed all Italian materials as close translations of the English sentences adopted in Experiment 1, to facilitate a comparison across the two languages. As before, target sentences featured a complex DP with a coordination structure followed by a relative clause ambiguously modifying either the whole conjunct or the second DP by itself. Note that Italian verbs showcase morphosyntactic agreement in number with the subject. Additionally, when the subject of the clause is a coordinated DP agreement on the verb has to be marked as plural, independently of the grammatical number of each of the DPs in the coordination. Therefore, in order to guarantee global ambiguity, all DPs in the Italian sentences were made plural (see Table 4). As for the English case, we avoided kinship nouns. Finally, items again varied across two conditions: the length of the relative clauses (short *vs.* long) and the position of the DPs (subject *vs.* object). All Italian sentences were created based on the English sentences by one of the authors, whose first language is Italian, and also double checked by a second speaker – in order to ensure a) that each sentence structure and

	Estimate	Std. Error	z value	*p* value
(Intercept)	-0.83750	0.44595	-1.878	0.0604
short	0.07594	0.30837	0.246	0.8055
subject	0.52360	0.34112	1.535	0.1248
short x subject	0.14287	0.47456	0.301	0.7634

Table 3. Summary of Logistic Mixed Effect analysis of the forced choice task in English

meaning was as close as possible as the one of the corresponding English sentence, b) that each sentence sounded "natural" to an Italian speaker, and c) that the globally ambiguous nature of the construction was preserved across items. An example of the full two-by-two manipulation can be found in Table 4.

Again, stimuli comprised 32 lexically diverse quartets, for a total of 128 target sentences which we distributed across 4 groups in a Latin square design. Each participant was presented with 92 sentences (32 target sentences and 60 filler sentences).

	position	length	target sentence
a.	Subj	short	I capitani e i colonnelli che morirono avevano scritto cinque libri sulle malattie tropicali.
b.	Subj	long	I capitani e i colonnelli che morirono tragicamente di infarto avevano scritto cinque libri sulle malattie tropicali.
c.	Obj	short	Francesco aveva incontrato i capitani e i colonnelli che morirono.
d.	Obj	long	Francesco aveva incontrato i capitani e i colonnelli che morirono tragicamente di infarto.

Table 4. Italian stimuli by condition.

3.3. PROCEDURE. The procedure was identical to the one in Experiment 1. The experiment consisted of a forced choice task conducted on the PCIbex web platform. Each item was presented in two stages: a target sentence displayed on the first screen, and then the question with answer options on the next, without the sentence visible.

(8) a. Screen 1:
I capitani e i colonnelli che morirono avevano scritto cinque libri sulle malattie tropicali.

b. Screen 2:
Chi morí?
(i) I capitani e i colonnelli (ii) I colonnelli

The order of appearance of the DPs was counterbalanced so that the complex DP was ordered first in half of the trials, and second in the other half. Participants were not allowed to revisit previous sentences and questions. The experiment took about 20 minutes.

3.4. RESULTS. We applied the same protocol as in the English experiment to ensure the integrity of our data prior to conducting statistical analysis. An accuracy threshold of 80% was set for responses to filler sentences, serving as a critical benchmark for assessing participant engagement and comprehension. Participants who did not achieve this level of accuracy were deemed to have provided unreliable responses and thus excluded from further analysis. Remarkably, all participants demonstrated an accuracy rate exceeding 80%, with the lowest score recorded at 88%. This meant that no responses needed to be excluded, allowing us to consider data from all participants in our subsequent analyses.

We conducted the same statistical analysis as outlined earlier for Experiment 1. The analysis included fitting a model with two fixed-effect factors and their interaction. To accommodate participant and item variability, crossed-random intercepts were also included into the model. When constructing models, we started with the maximal random effect structure and progressively simplified the random effect structure until the model converged (Barr et al. 2013). The final converged model, for which we report numerical results below, was $g\ lmer(answer \sim length * position + (1 + length|participant) + (1 + position|sentence)$.

As shown in Figure 2 and detailed in Table 5 and Table 6, we observed a consistently high rate of HA responses, exceeding 80% across all conditions. The statistical analysis, summarized in Table 6, confirms this. The intercept, representing the baseline HA response rate, was significantly high (p <0.001), indicating a strong tendency towards HA responses across conditions. Once again, these results are consistent with the previously reported HA preference in Italian, independently of the use of coordination.

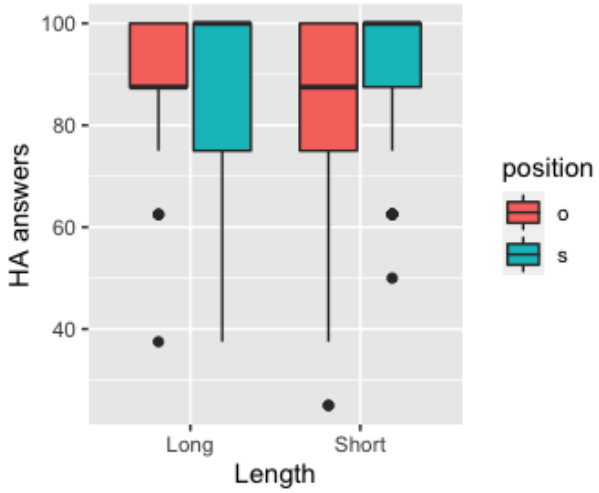

Figure 2. Rate of HA answers in Italian

	subject	object
short	90.20%	83.05%
long	87.68%	88.24%

Table 5. Average percentage of answers by Length and Position in Italian

	Estimate	Std. Error	z value	*p* value
(Intercept)	2.93631	0.40950	7.171	7.47e-13 ***
short	-0.17505	0.48304	-0.362	0.717
subject	-0.08962	0.46955	-0.191	0.849
short x subject	0.67330	0.60552	1.112	0.266

Table 6. Summary of Logistic Mixed Effect analysis of the forced choice task in Italian

As for English, we found no effect of RC length, DP position, nor their interaction ($p > 0.7$, $p > 0.8$, and $p > 0.2$, respectively).

4. Discussion. Our study explored potential variation in relative clause attachment preferences when the RC can modify either a single DP or a coordinate structure, seeking to understand the role of semantic and structural parallelism in the resolution of ambiguity across languages. In particular, we aimed to address whether a) coordination affects RC attachment preferences, b) whether this possible effect depends on language specific properties of English vs. Italian, and c) whether this effect could interact with previously reported effects of RC length and position.

Regarding the first two questions, our results are consistent with numerous previous studies on [DP of DP] RC ambiguities in showing distinct attachment preferences between English and Italian. We found a strong HA preference in Italian and a predominant Low Attachment preference in English, indicating that coordination structures may not drastically alter parsing strategies in these languages. These results add to a small number of existing studies already providing conflicting evidence for the role of head type in the resolution of RC ambiguities. In particular, our study diverges from the pronounced High Attachment preference with coordination structures in English reported by Altmann et al. (1993), but also from Henstra (1996) who found neither a LA nor an HA advantage for sentences with coordination during self-paced reading.

Importantly, a direct comparisons of these studies is made difficult by the different methodologies employed during data collection. As mentioned before, previous work has discussed potential asymmetries in attachment preferences within a language depending on whether online or offline tasks are employed, possibly due to the multi-factorial nature of ambiguity resolution and to the differential sensitivity that online (eye-tracking, self-paced reading) vs. offline measures have to these factors. Even just considering offline tasks, note that our study employed a forced-choice tasks while others (e.g. Altmann et al. 1993; Henstra 1996) adopted an open completion task (Cloze). It is reasonable to think that these different approaches to eliciting offline preferences recruit cognitive resources in different ways, with potential effects on the overall attachment decision (Swets et al. 2007; Fernández 2003).

Regarding our final question, we failed to replicate Hemforth et al.'s (2015) results, which reported effects of DP position and RC length on English attachment preferences (as well as in French, Spanish, and German). In our data, both for English and Italian, modulating length and structural position had no significant impact on the overall disambiguation strategy picked by participants in the two languages. That is, we found a LA preference in English and a HA preference in Italian independently of the length/position modulation. One potential interpretation for this null result is that length and position interact strongly with coordination – e.g. such that coordination affects the strategies for prosodic structure building enough to mask biases due to RC length. However, differences across our studies and the original English study invite caution

with this interpretation, and deserve some consideration. For instance, while the Hemforth et al.'s (2015) sentences were normed for plausibility, it is possible that in switching the relation between the two DPs from an "of" to an "and" affected the plausibility of one attachment over the other across all items. This risk is more probable for Italian, since new stimuli were created based on the English version of the sentences. The translator and the second speaker checking the sentences were instructed to pay attention to potential plausibility biases, but of course this does not correspond to a norming study. Note however that if plausibility imbalances were caused by introducing the coordination, it would in fact be improbable for them to show up asymmetrically in the two languages – that is, we might expect plausibility to mask a HA preference in English or a LA preference in Italian, but not both since those biases would go in opposite directions. Task type might also be relevant (for stimulus presentation effects in Italian RCs see Fernández 2003). In particular, Hemforth et al. (2015) adopted an offline open questionnaire to probe participants' attachment preferences, while we used a forced-choice task. As mentioned before, these tasks probably recruit working memory and antecendent retrieval strategies in different ways, and it is conceivable that the cognitive effort involved in the two tasks different enough to mask the effect of other factors. Moreover, recall that in our study we substituted all kinship terms with other nouns. While the total number of sets modified in that way is relatively small, this change does introduce another element of variation which could be causing divergence from the original results.

An additional variable worth considering is the nature of Hemforth et al.'s (2015) length manipulation. Consider the examples of long vs. short RCs as used throughout the paper (as in 9), lifted directly from their study (and presented again here for ease of reference):

(9) a. **Short RC:** The son of the colonel [who died] had written five books on tropical diseases.

b. **Long RC:** The son of the colonel [who tragically died of stroke] had written five books on tropical diseases.

In this example, it looks like a "short" relative clause is made of simply the complementizer and the embedded verb[2], and contains two syllables. In contrast, a "long" RC has 9 syllables, and contains a modifier preceding the verb, which is then followed by a prepositional phrase.

Consider now a few other example sentences, also extracted from their original item set:

(10) a. **Short RC:** The agent of the author [who quit] had red hair and a mustache.

b. **Long RC:** The agent of the author [who quit abruptly and without warning] had red hair and a mustache.

(11) a. **Short RC:** The relative of the actor who drank hated the cameraman.

b. **Long RC:** The relative of the actor who too frequently drank hated the cameraman.

[2] From a syntactic perspective, we of course assume that the RC actually contains the full structure of an embedded clause, not "just" the complementizer and the verb. But for the sake of this discussion, we only refer to the pronounced word in the linear string yield.

If we compare the "long" RCs in (9), (10), and (11), we can observe significant variation in the number of words they contain, their syntactic categories, the total number of syllables (ranging from 6 to 9 in these examples, but going as low as 4 and as high as 12 in the full item set), and the underlying syntactic structure surrounding the verbal phrase – with pre-verbal or post-verbal modifiers, indirect objects, and even conjunctions. So much variation makes it difficult to interpret Hemforth et al.'s (2015) to their full extent (and ours as well), and suggests the need for future studies controlling for a consistent definition of short and long RCs across all items (e.g. only manipulating the number of syllables, and leaving all other structural and lexical factors consistent across items).

Furthermore, recent proposals have argued for an additional structural ambiguity (the availability of *pseudo-relative clauses*) confounding previous reports of HA preferences in languages like Italian and Spanish. One way to control for this ambiguity is via the manipulation of the verb in the matrix clause, restricting verb type to stative/non-perceptual verbs that only allow for "true" RCs (for recent reviews of this issue and some empirical results see Grillo & Costa 2014; Pozniak et al. 2019; Aguilar et al. 2021). For consistency with Hemforth et al. (2015), we did not control for matrix-verb type in our Italian stimuli, which thus still present this confound. In the future, it would be interesting to investigate the potential interactions between RC length, DP position, Head-DP type, and pseudo-relative clause availability – as well as the further impact of kinship terms, and the differential sensitivity of online vs. offline techniques to the contribution of each of these factors.

5. Conclusion. Adopting RCs modifying DPs in coordinate structures, we found preferences conforming to the usually reported variance between English and Italian – a LA preference in English and a HA preference in Italian – suggesting no direct impact of the type of complex DP the RC can potentially modify. Additionally, in contrast with previous results for English (Hemforth et al. 2015), we found no effect of structural and prominence factors (such as RC length and subject/object modification). Although many different explanations can be considered, these results suggest that the type of phrase modified by the RC could be playing a role when interacting with other factors, and that attention should be given to the type of complex DPs adopted in studies of RC attachment. While opening an abundance of new questions, our data once again underscore the complexity of the mechanisms influencing attachment preferences and their variation, and the need for further cross-linguistic investigations of under-explored structural factors in building theories of ambiguity resolution in human sentence processing.

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