A novel argument for the universality of parsing principles

Nino Grillo*, João Costa

Centro de Linguística da Universidade Nova de Lisboa
Faculdade de Ciências Sociais e Humanas
Av. de Berna 26-C 1069-61, Lisboa, Portugal.

Abstract

Previous work on Relative Clause attachment has overlooked a crucial grammatical distinction across both the languages and structures tested: the selective availability of Pseudo Relatives. We reconsider the literature in light of this observation and argue that, all else being equal, local attachment is found with genuine Relative Clauses and that non-local attachment emerges when their surface identical imposters, Pseudo Relatives, are available. Hence, apparent cross-linguistic variation in parsing preferences is reducible to grammatical factors. The results from two novel experiments in Italian are presented in support of these conclusions.

Keywords: Locality, Attachment Preferences, Universality of Parsing Principles, Relative Clauses, Pseudo Relatives.

1. Introduction

In this paper we identify a confounding factor in the literature on Relative Clause (RC) attachment preferences originating with the findings of Cuetos & Mitchell (1988): the asymmetric availability of Pseudo Relative Small Clauses (PRs)[1].

Analyzing previous attachment preference results both crosslinguistically and crosstructurally, we observe the following: everything else being equal (controlling prosody and referentiality etc.) languages / structures that generate a Low Attachment preference contain genuine Relative Clauses (RCs), while those demonstrating a High Attachment preference have a string identical, but structurally and interpretatively distinct, representation from the RC, the PR. PRs and RCs, despite being string identical, are very distinct at the structural and interpretive level (1).

(1) a. Vi al [$_{DP}$ [$_{NP1}$ hijo del medico] [$_{CP}$ que corría]]. RC, HA
b. Vi al [$_{DP}$ hijo [del [medico [$_{CP}$ que corría]]]]. RC, LA
Saw.I the son of.the doctor that run.impf.
'I saw the son of the doctor that was running.'

*Corresponding author. Present address: University College London, Division of Psychology and Language Sciences, Chandler House, 2 Wakefield Street London WC1N 1PF. Tel.: +44 (0) 207 679 4017, Fax: +44 (0) 20 7679 4238.
Email address: nino.grillo@gmail.com (Nino Grillo)

[1]List of abbreviations: PR: Pseudo Relative; RC: Relative Clause; SC: Small Clause; HA: High Attachment; LA: Low Attachment; CE: Center Embedding; RB: Right Branching; DP: Determiner Phrase; NP: Noun Phrase; CP: Complementizer Phrase; VP: Verb Phrase; PP: Prepositional Phrase; Acc-*ing*: Accusative + progressive constructions.

c. Vi al [$_{SC}$ [$_{DP}$ hijo$_1$ del medico$_2$] [$_{CP}$ que EC$_{1/*2}$ corría]]. PR, obligatory HA
Saw.I the son of.the doctor that run.impf.
'I saw the son of the doctor running.'

RCs are NP-modifiers and denote properties of entities, PRs are either complement or adjuncts of VPs and denote events / situations. In the context of complex NPs, the most local NP is not grammatically available for attachment in the case of a PR interpretation, High Attachment is mandatory. Critically, PRs are not crosslinguistically available: they exist in Spanish (French, Italian, Dutch among others) but not in English (Romanian, Basque, Chinese, among others). Thus, in Spanish there are certain contexts (clarified below) where an RC is open to at least one additional interpretation/structural parse that is unavailable in English. Furthermore, within a language (e.g., Spanish), PRs are not available in all syntactic and semantic environments, as they are selected by a relatively small set of predicates and subject to a number of syntactic and semantic constraints.

We propose an account, the *PR-first Hypothesis*, based on the structural and interpretive distinction between PRs and RCs, to explain (some of the) variability in the attachment preference literature. We then present a test of this Hypothesis across two studies in Italian through the manipulation of PR availability. The results of both experiments strongly support the predictions of the PR-first Hypothesis: a Low Attachment preference is observed in all conditions in which RC is the only available reading, while a significantly greater preference for High Attachment is observed when PRs are a grammatical option.

The conclusion we will draw is that locality is a universal principle governing the human language parser and the apparent exceptions can be reduced to the variation in PR- availability across languages and structures. This does not mean to say that locality does not interact with other principles when it comes to RC attachment. As, e.g. Gilboy et al. (1995) show convincingly, *Referentiality* plays a major role in deciding RC attachment; the same is true of prosody. Importantly these interactions between principles of locality and referentiality/prosody (among others) generate the same outcome in all languages studied. What we set out to explain here is the residual asymmetry in attachment across both languages and structures that is left unexplained. We claim that when PR-availability is considered, much of this variation can receive a principled explanation that does not require postulating language specific parsing mechanisms.

The structure of the paper is the following: section 1.1 introduces the relevant literature on variation in RC attachment across languages, structures and individual processing capacity. The ambiguity between Pseudo Relative Small Clauses (PR) and RCs is introduced in section 2. After having presented some core properties distinguishing PRs from genuine RCs (section 2.1), we will propose that the parser is more likely to resolve this ambiguity in favor of Pseudo Relatives over Relative Clauses, as the former are simpler on both structural and interpretive grounds 3.1. Sections 3.2 and 3.3 discuss the application of this distinction to previously observed attachment preference asymmetries across languages and structures respectively. Section 4 presents the results of two novel experiments on attachment preferences in Italian in which we manipulated PR availability. Section 5 sums up the findings and concludes with a research agenda to further investigate the role of PRs in attachment.

1.1. Asymmetries in Attachment Preferences

Principles of locality have been shown to regulate both structure building and filler-gap processes in language processing (*Right Association* Kimball 1973; *Late Closure* Frazier 1978; *Min-*

imal Attachment Frazier 1978; Frazier & Fodor 1978; *Minimal Chain Principle* De Vincenzi 1991; *Recency* Gibson 1991; *Merge Right* Phillips 1996, among others).[2]

(2) details a typical case of ambiguity in which such principles have been shown to apply:

(2) John said that Bill arrived yesterday

a. John [$_{VP}$ said [$_{CP}$ that [$_{IP}$ Bill [$_{VP}$ arrived yesterday]]]]

b. John [$_{VP}$ said [$_{CP}$ that [$_{IP}$ Bill [$_{VP}$ arrived]]] yesterday]

Principles of Locality, correctly predict (2-a), i.e. with the temporal modifier *yesterday* attaching to the most local potential host, to be the preferred interpretation.

Yet, this picture is not exempt from problems: Cuetos & Mitchell (1988) tested both English and Spanish speakers for their attachment preferences when RCs were embedded within complex NPs (3). They found that while English speakers had a preference for Low Attachment (LA), i.e. appear to obey locality principles akin to Late Closure (3-a), Spanish speakers preferred High Attachment (HA), apparently disobeying locality (3-b).

(3) a. Someone shot the maid$_1$ of the actress$_2$ that$_2$ was$_2$ standing on the balcony

b. Alguien disparó contra la criada$_1$ de la actriz$_2$ que$_1$ estaba$_1$ en el balcón

These findings are at odds with the otherwise uniform Local Attachment preferences found for other structures within that same language (Phillips & Gibson, 1997) This has led researchers to question the universality of locality principles in processing and, as a consequence, of the very existence of universal principles of parsing, grounded on syntactic structures or otherwise. This, in turn, posed important theoretical problems for language acquisition.[3]

The second issue is in many respects far more critical than the first: How to account for cross-linguistic variation in parsing preferences. While variation across structure can have a principled explanation, cross-linguistic variation in parsing preferences is much harder to capture under a principled account. For these reasons, the last two decades generated a large body of work aimed at explaining these problematic findings for parsing. These studies confirmed that speakers of additional languages differ in their RC attachment preference in complex DP environments(NP1 P NP2 RC). Like English (Cuetos & Mitchell, 1988; Mitchell & Cuetos, 1991; Gilboy et al., 1995; Fernández, 1999, 2003; Frazier & Clifton, 1996, among others), a Low Attachment (LA) preference is found in e.g. Romanian (Ehrlich et al., 1999), Basque (Gutierrez-Ziardegi et al., 2004), and Chinese (Shen, 2006), while a preference for High Attachment (HA), as in Spanish, was reported in e.g. Dutch (Brysbaert & Mitchell, 1996; Mitchell & Brysbaert, 1998; Mitchell et al., 2000), French (Mitchell et al., 1990; Frenck-Mestre & Pynte, 2000b; Zagar et al., 1997), Italian (De Vincenzi & Job, 1993, 1995), Russian (Sekerina, 1997, 2004; Fedorova & Yanovich, 2004, 2006b,a; Dragoy, 2007) and Greek (Papadopoulou & Clahsen, 2003), among others.

To complicate things further, variation in attachment preference within the *same* language has also been reported. Brazilian Portuguese was initially classified as an LA language by

[2] While it is a matter of debate whether these, and other, principles of syntactic parsing apply in isolation from, and prior to, other factors involved in deciding the meaning of a sentence, e.g. context, plausibility, lexical idiosyncrasy (see e.g. Altmann et al. 1998 on the effects of contexts in late closure), there is substantial consensus that principles of locality play a major role in human language parsing.

[3] As Fodor (1998a, p. 285) puts it: *The whole explanatory project [...based on the hypothesis that the processing mechanism is fully innate and applies differently to different languages only to the extent that their grammars differ ...] is in peril because of the discovery that Late Closure is not universal.*

(Miyamoto, 1999), but Maia & Maia (2001); Ribeiro (1998, 2005) have shown a consistent preference for HA among its speakers. A similar situation arises with German. While some studies have found HA preference in this language Hemforth et al. (1996, 1998, 2000), LA preference was found by others(Murray et al., 2000; Augurzky, 2005). How much of this variation is accountable by dialectal variation and/or induced by differences in experimental design and material (see Fernández 2003 and below for discussion of this matter) is an open question.

Table 1 and 2 (adapted from Augurzky (2005)) summarize these results by LA and HA languages respectively. }

LA Languages	
Arabic	Abdelghany & Fodor (1999); Quinn et al. (2000)
Basque	Gutierrez-Ziardegi et al. (2004)
*Bulgarian	Sekerina et al. (2003)
Chinese	Shen (2006)
English	Cuetos & Mitchell (1988); Mitchell & Cuetos (1991), Gilboy et al. (1995); Fernández (2003), Frazier & Clifton (1996)
*German	Augurzky (2005); Murray et al. (2000)
Norwegian	Ehrlich et al. (1999)
*Portuguese	Miyamoto (1999)
Romanian	Ehrlich et al. (1999)
Swedish	Ehrlich et al. (1999)

Table 1: Summary of studies reporting LA for the languages indicated. Note: "*" precedes contrasting results.

A hint to the solution of this puzzle is provided by the finding that in certain well-defined syntactic structures the cross-linguistic asymmetry in attachment disappears. The first such observation is due to De Vincenzi & Job (1993, 1995), who showed that RC HA preference in Italian disappears in the contexts of thematic prepositions (4):

(4) TYPE OF P (De Vincenzi & Job, 1993, 1995)

a. Qualcuno ha sparato alla governante$_1$ con l'attrice$_2$ che stava seduta$_2$ in balcone.
Someone shot the maid with the actress that was sitting on the balcony.

Similar findings, were reported for other languages, including Spanish (Cuetos et al., 1996), English (Frazier & Clifton, 1996; Traxler et al., 1998), French (Frenck-Mestre & Pynte, 2000b; Zagar et al., 1997) and Greek (Papadopoulou & Clahsen, 2003).

Similarly, Hemforth et al. (unpublished), show that Spanish speakers, just like English speakers, demonstrate LA preference with complex NPs in subject position (6):

(5) SUBJECTS Hemforth et al. (unpublished)

a. La criada$_1$ de la actriz$_2$ que$_2$ estaba$_2$ en el balcón es rubia.
'The maid of the actress who was on the balcony is blonde.'

Fernández (2003) discusses the case of Spanish RCs introduced by the relative pronoun "*el cual*" (who) vs. the more common complementizer "*que*" (that). While, as seen above, HA is generally observed with the latter, a sharp preference for LA appears to be induced by the former:

HA Languages	
Afrikaans	Mitchell et al. (2000)
*Bulgarian	Sekerina et al. (2003)
Serbo-Croatian	Lovrić (2003)
Dutch	Brysbaert & Mitchell (1996); Mitchell & Brysbaert (1998), Mitchell et al. (2000); Desmet et al. (2002b)
French	Mitchell et al. (1990); Frenck-Mestre & Pynte (2000b), Zagar et al. (1997); Colonna et al. (2000), Colonna & Pynte (2001a)
Galician	Fraga et al. (2005)
*German	Hemforth et al. (1996, 1998), Hemforth et al. (2000)
Greek	Papadopoulou & Clahsen (2003)
Italian	De Vincenzi & Job (1993, 1995)
*Portuguese	Ribeiro (1998, 2005), Maia & Maia (2001), Maia et al. (2006), Miyamoto (2005)
Russian	Sekerina (1997, 2004)
Spanish	Cuetos & Mitchell (1988); Carreiras & Clifton (1993), Carreiras & Clifton (1999); Cuetos et al. (1996), Gibson et al. (1999); Igoa et al. (1998), Gilboy et al. (1995); Mitchell et al. (1990)

Table 2: Summary of studies reporting HA for the languages indicated.

(6) RELATIVE PRONOUNS (Fernández, 2003, p.31)
Vi al hijo$_1$ del medico$_2$ el cual$_2$ estaba en el balcón.
I saw the son of the doctor who$_{\text{rel-pro}}$ was on the balcony.

A third notable environment in which the asymmetry between English and Spanish disappears is in the presence of 3 possible attachment sites. Gibson et al. (1996) observed a U-shaped attachment preference in both languages in these contexts (7), with highest preference for the most local NP3, followed by the least local NP1 and lastly by intermediate NP2. Gibson et al. (1996) tested sentence fragments (isolated nominals), which might have been interpreted as subjects of a forthcoming matrix verb.

(7) NOMINALS Gibson et al. (1996)
a. La lámpara$_1$ cerca de la pintura$_2$ de la casa$_3$ que fué$_{3>1>2}$ dañada en la inundacíon.
b. The lamp$_1$ near the painting$_2$ of the house$_3$ that was$_{3>1>2}$ damaged by the flood.

Gibson et al. (1999) obtained similar results with full sentences containing the complex NPs in object position in Spanish. They conducted two experiments using the same materials modified to include either 2 or 3 NPs. In the two-NP condition the usual HA preference emerged, while in the three-NP condition they observed the U-shaped preference identified in Gibson et al. (1996). Similar findings were reported for Japanese and Brazilian Portuguese (Miyamoto et al., 1999; Miyamoto, 1999), while a different U-shaped pattern (NP1>NP3>NP2) was found by Wijnen (1998); Wijnen et al. (1999) for Dutch, and by Dragoy (2007) for Russian.

Gilboy et al. (1995) demonstrated that *Referentiality* and the type of associative relation between the two NPs (e.g. functional: *assistant of the inspector* vs. substance: *sweater of cotton*)

plays a central role in deciding attachment preferences in a similar way across both English and Spanish; see section 1.2 for discussion.

Prosodic Effects.. Following Fodor; Fodor; Fodor's (1998a; 1998b; 2002b) proposal that readers project a prosodic contour while reading, that can influence syntactic parsing, many researchers demonstrated that a length manipulation, of either the RC and / or the NPs, strongly affects attachment preferences. An effect of length was obtained consistently across languages: a stronger preference for HA is found with longer RCs than with short ones. These effects make perfect sense if the parser follows prosodic principles and tries to balance the length of different prosodic phrases in the clause. Reading a long RC is easier, if a prosodic boundary is placed at its onset. This boundary in turn influences the syntactic parsing, making LA less likely to arise. The resulting prosodic phrases provide a good balance, with the long complex NP balanced by a long RC. A short RC, on the other hand, can more easily continue the previous prosodic phrase, as the absence of a break pushes the parser to attach low (see Fernández, 2003; Augurzky, 2005, for discussion).

Differences between Offline and Online results. Online results, in HA languages like Italian (see De Vincenzi & Job, 1993, 1995), have shown that reaction times at the critical region in the RC are shorter when disambiguating information (ie, number) matches lower NP than when it matches the higher NP. These results, apparently conflicting with those offline, are generally interpreted as showing an initial LA preference followed by a later reanalysis for HA. Similar results have been obtained in other languages (see e.g. Fernández 2003 for Spanish, Baccino et al. 2000 for French and Italian; Frenck-Mestre & Pynte (2000a,b); Pynte et al. (2003) for French; Kamide & Mitchell (1997); Miyamoto (2005) in Japanese and Lourenço-Gomes et al. (2011) in Portuguese). However, as Andrea Santi p.c. pointed out, this is only one possible interpretation of the timing results. One, equally valid interpretation of (at least some of) the data is that longer RTs for High Disambiguation are due to *intervention* effects, triggered by the similarity of internal structure of the target High-NP and the intervening Low-NP. This explanation would treat the timing effects as a common case of *attraction* phenomena (Bock & Miller 1991; Franck et al. 2006, 2007, 2010, for a review and a discussion of the effects of attraction in comprehension see Wager et al. 2009). Attraction effects occur also in the absence of ambiguity and crucially this explanation does not require stipulating commitment to a parse followed by reanalysis. Preliminary empirical support for this interpretation, which we are currently investigating, can be found in Lourenço-Gomes et al. (2011). A similar claim is made in Miyamoto (2005), cited in Maia et al. (2006). See (8) for an illustration of this point through Number manipulation. A full paradigm involves crossing both local and non-local configurations (i.e. LA and HA) with the number specification.

(8) a. NON-LOCAL SING-PL-SING
Someone shot the maid.SING of the actresses.PL that was.SING on the balcony

b. NON-LOCAL PL-SING-PL
Someone shot the maids.PL of the actresses.SING that were.PL on the balcony

c. LOCAL PL-SING-SING
Someone shot the maids.PL of the actress.SING that was.SING on the balcony

d. LOCAL SING-PL-PL
Someone shot the maid.SING of the actresses.PL that were.PL on the balcony

On the basis of the attraction literature we can predict the non-local agreement configuration in (8-a) and (8-b) to be harder to process than the local configuration in (8-c,d). On the basis of the same literature, we expect (8-a) to be harder than (8-b). The results in Lourenço-Gomes et al. (2011), who tested the full paradigm above, support this prediction. Grillo et al. (2013b), who also manipulated PR availability, obtained similar results.

A thorough review of the online attachment literature is necessary to fully assess both the extent of the parallelism between early-attachment preference and *attraction*, i.e. to what extent is the former reducible to the latter, and the effects of PR-availability on online results. This asymmetry requires further investigation, but this is complicated by the difficulty of accessing the original stimuli along with the great extent of variation in the type (e.g. semantic vs. grammatical gender, number, plausibility) and position of disambiguation (early vs. late in the sentence) used across studies.

Individual variation. Finally, an interaction of reading span with attachment preferences was consistently observed in both children Felser et al. (2003) and adults (Mendelssohn & Pearlmutter, 1999; Swets et al., 2007; Omaki, 2005). Somewhat surprisingly, these studies reported a preference for HA in participants with low reading span and a preference for LA in participants with high reading span.[4]

1.2. Previous accounts

Several accounts have been proposed to explain this complex pattern of variation. These accounts (and other studies that tested their predictions) have made it clear that several factors are ultimately involved in determining attachment preferences, including: lexical, prosodic, and frequency/recency of exposure to prior attachment resolution. The findings presented here in no way deny the relevance of these factors in the resolution of RC-attachment nor stand in opposition to them. Critically, however, none of them have considered the potential role of PR-availability in RC-attachment. For excellent critical reviews of this literature see Fernández (2003) and Augurzky (2005).

The Tuning Hypothesis.. Mitchell & Cuetos (1991); Mitchell et al. (1995); Cuetos et al. (1996) reduces variation across both languages and individuals to different statistical distributions of (and/or individual exposure to) HA and LA. The literature provides conflicting results on this. See Cuetos et al. (1996) for supporting data from corpus analyses of English and Spanish and Mitchell & Brysbaert (1998) for problematic results from Dutch (see also Desmet et al. 2002a; Desmet & Gibson 2003; Gibson & Schütze 1999 for further discussion).

One essential question for this hypothesis is whether a form is less frequent because it is inherently more complex or less favored by the parser, limiting its explanatory power. More importantly, for the present discussion, is that none of the corpus studies on attachment took into account Pseudo Relatives, whereby attachment is obligatorily high.

[4] Fraga et al. (2012) reported offline effects of the emotional charge associated with nouns on RC attachment. Emotionally (both positive / pleasant, *orgasm* and negative / unpleasant *killer*) charged nouns appear to act as attractors for RC attachment.

Construal. (Gilboy et al., 1995; Frazier & Clifton, 1996). Structural parsing principles, i.e. Minimal Attachment and Late Closure (Frazier, 1978; Frazier & Fodor, 1978; Frazier, 1987), apply only to *primary* (e.g. verb-argument) relations, while *non-primary* relations (e.g. modification by a RC) are *construed* (within the current thematic processing domain)[5] in accordance to a variety of non-structural (pragmatic and discourse representation) principles. Restriction of construal to current thematic domains explains LA preference in the presence of the thematic preposition *with* (De Vincenzi & Job, 1993, 1995; Gilboy et al., 1995). The interaction of language specific properties with pragmatic principles explain cross-linguistic variation and universal effects of *Referentiality* on RC-attachment. English, but not Spanish, allows expressing forced HA using the genitive form, in addition to prepositional complex NPs. Because of the Gricean maxim of clarity (Grice, 1975), English, but not Spanish, speakers should resort to the prepositional option to express LA. Similarly, for pragmatic reasons restrictive modifiers, including restrictive RCs, preferentially seek referential hosts, the presence of a definite Determiner being one of the diagnostics for referentiality.

Experimental results presented in Gilboy et al. (1995) strongly support the effects of both *Thematic Domain* and *Referentiality* on attachment (but see section 3.3.1 for a PR-based account of Thematic Domain effects). As it is often recognized, however, studies with other languages that allow for an alternative genitive form do not support this account, including Greek (Papadopoulou & Clahsen, 2003), Dutch and Afrikaans (Mitchell et al., 2000) and Croatian (Lovrić, 2003), each of which has been classified as an HA language. It is of interest to point out that Pseudo Relatives are allowed in each of these problematic languages, which can independently explain why HA is found. Recognition of PRs, therefore, calls for a re-evaluation of this data, and verification of the various principles advocated by the Construal approach in the context of unambiguous RCs.

Predicate Proximity. To account for variation, and the U-shaped attachment preference in 3-NP sites, Gibson et al. (1996) and Gibson & Schütze (1999) propose that principles of locality (i.e. *Recency*) interact with the parametrized principle of *Predicate Proximity*, which is weak in English but strong in Spanish. We discuss this account, and the relevant data, in section 3.3.2.

Anaphoric Binding. German RCs are necessarily introduced by relative pronouns. In English, on the other hand, RCs can also be introduced by complementizers (*that*) or even null elements. Hemforth et al. (1996, 1998, 2000) propose that since pronominals tend to refer to salient discourse antecedents, we can expect a strong effect of saliency in the interpretation of RCs in German. This would favor attachment to NP1, associated with the matrix clause, and thus more salient than NP2, which predicts HA preference in this language. It also predicts an asymmetry between RC and PP attachment, the latter has been shown to be universally low.

It has been argued (e.g. Fernández 2003) that problems for this account arise when more languages are considered, and in particular when the behavior of HA languages in presence of an optional relative pronoun is taken into account. Fernández (2003), p. 31, discusses how replacing the complementizer *que* with the relative pronoun *el cual* in Spanish produces a sharp change in attachment preference from High to Low, against the predictions of *Anaphoric Binding*. Interestingly there seems to be a generalized ban on PRs in languages with obligatory relative pronouns (German, Russian and Bulgarian). In section 3.2 we will discuss this further and suggest that the Anaphoric Binding approach might indeed provide the best explanation for the RC attachment behavior in this set of languages.

[5]Thematic processing domain: "*The extended maximal projection of the last thematic role assigner.*"

Implicit Prosody. As mentioned above, several experiments have demonstrated an effect of prosody in RC-attachment, as predicted by the *Implicit Prosody Hypothesis* (IPH, Fodor, 1998a,b, 2002). The idea being that a default prosodic contour is projected while reading and and various factors affecting this prosodic representation are able to influence the syntactic choices of the parser. Intonational boundaries are more likely to precede longer RCs than shorter RCs, because speakers (and listeners / readers) prefer projecting independent intonational phrases for long RCs, than short stand-alone RCs. The presence of a phrase boundary, in turn, creates a HA bias for these RCs.

The IPH was also claimed to be able to account for the cross-linguistic variation in attachment. Variation across languages might be explained as the by-product of variation in prosodic phrasing imposed by the different grammars of those languages. Speakers of different languages behave differently because their grammar projects different prosodic contours over similar stimuli (see Jun 2003 for evidence in favor of this account). A proper assessment of the IPH in light of the present findings is beyond the scope of this paper, but see section 3.4 for a discussion of potential interactions between PR-availability and prosody.

Despite their success in explaining often-subtle contrasts (between e.g. long and short RCs, or the role of Referentiality in attachment), there is substantial agreement that *no account* proposed so far offers a satisfactory explanation for the full pattern of variation discussed above. This might in part reflect that *none of these accounts* recognized the contribution of PR- availability to this complex pattern. The PR confound, moreover, is ubiquitous in the data supporting / falsifying these accounts, which calls for reappraisals with this variable in mind; an endeavor far beyond the scope of the present paper. The eventual outcome of this enterprise, however, might be that, with PR-availability controlled for, some of these problems disappear demonstrating their epiphenomenal nature. The first necessary step in this direction is the investigation of PRs in relation to attachment and processing. In the next section we introduce the PR / RC distinction and successively we will attempt to reorganize previous findings in light of this distinction. While a great deal of work is still necessary to properly assess the effects of PR-availability in attachment preferences, we will show that a much more organic picture emerges once this simple cross-linguistic difference is taken into account.

2. Not all Complementizers are created equal

A standard assumption in the RC attachment literature is that the syntactic structures under consideration, both across languages and syntactic environment, are equivalent in all relevant respects. Instances of Relative Clauses embedded within a complex DP.[6] (9) (a) and (9) (b) are treated as equivalent and both two way ambiguous. Assuming identity, at the grammatical level, puts the burden of explaining the existing attachment preference variation on the parser, generating the problems mentioned above for a theory of universals in parsing.

(9) a. I saw the son of the doctor that was running
b. Vi al hijo del medico que corría

[6] Obviously we are abstracting away from both the difference between Complementizers and Relative Pronouns (Hemforth et al., 1996, 1998, 2000), and the role of Referentiality and type of relation between the NPs analyzed in Gilboy et al. (1995).

Thankfully, the assumption of identity is wrong. English *that* and Spanish (or Italian / French / Dutch) *que / che / qui / die* are not syntactically identical. Complementizers, like Prepositions, demonstrate a domain extreme and often subtle variation across languages (with respect to e.g. subjacency effects, *that*-trace effects etc.) and a careful analysis of their combinatorial properties shows that even superficially similar and homophonous Cs like the Italian, French and Spanish *che / que* reveal important differences in their structural distribution.

These distinctions become particularly relevant in the context of complex DPs. These distinctions become particularly relevant in the context of complex DPs. In the case at hand, the English (9-a) is two-ways ambiguous in that the RC introduced by *that* can be attached to either NP1 and NP2, its Spanish "counterpart", as shown in (10), is three-ways ambiguous. As in the English sentence, *que* can introduce a RC attaching either to NP1 or NP2, but additionally it can also introduce a Pseudo Relative Small Clause, which attaches to the VP and, thereby obligatorily takes NP1 as its subject.

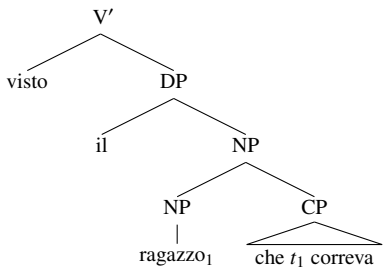
(10) a. Vi al [$_{DP}$ [$_{NP1}$ hijo del medico] [$_{CP}$ que corría]]. RC, HA
b. Vi al [$_{DP}$ hijo [del [medico [$_{CP}$ que corría]]]]. RC, LA
c. Vi al [$_{SC}$ [$_{DP}$ hijo$_1$ del medico$_2$] [$_{CP}$ que EC$_{1/*2}$ corría]]. PR, obligatory HA
'I saw the son of the doctor running.'

Pseudo Relatives are a particular type of clausal complement that, despite their name, have little to nothing in common with Relative Clauses but roughly correspond to English *Acc*-ing constructions, as the gloss to (10-c) indicates. The following section discusses these claims in some details.

2.1. Pseudo Relatives

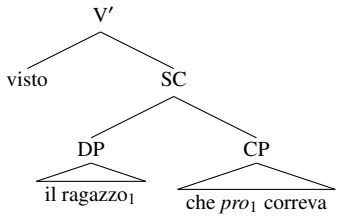
Pseudo Relatives and Relative Clauses are string identical, are distinguished along structural and semantic properties.[7] In this section we will illustrate these differences and show, following Cinque (1992), that PRs share crucial structural and semantic properties with English Small Clauses of the *Acc*-ing type (e.g. *I saw John running*). The PR and RC parse of the same string are illustrated in (11-a,b) respectively.

(11) RC: Ho visto [$_{DP}$ il [$_{NP}$ ragazzo [$_{RC}$ che correva]]]
I saw [$_{DP}$ the [$_{NP}$ boy [$_{RC}$ that ran]]]



[7] On Pseudo Relatives see: Radford (1975); Graffi (1980); Burzio (1981, 1986); Kayne (1981); Taraldsen (1981); Declerck (1981, 1982); McCawley (1981); Auwera (1985); Guasti (1988, 1992, 1993); Rizzi (1992); Raposo (1989); Cinque (1992); Barros de Brito (1995); Labelle (1996); Rafel (1999); Côté (1999); Koenig & Lambrecht (1999); Koopman & Sportiche (2010); Donati & Cecchetto (2011); Casalicchio (2013), among others. As almost everything we'll say about PRs also applies to SCs of the *Acc*-ing type, for ease of presentation from now on we'll simply refer to the former, glosses and translations to the examples however clearly show this correspondence. Similarly, when we talk about SCs we are referring to the "*eventive*" *Acc*-ing type (i.e. not to SCs of the "*stative*" type, such as *I [consider [$_{SC}$Mary smart]]*). PRs are available in a number of languages including Dutch, French, Serbo-Croatian and Greek, but the discussion in this section is based on Italian. See Appendix C for a short discussion of PRs in other languages.

(12) PR: Ho visto [$_{PR}$ il ragazzo che correva]
I saw [$_{SC}$ the boy running]



In (12-a) the main verb takes a DP as its complement and the RC modifies that DP; at the interpretive level this maps onto the perception of an entity / individual having certain additional restrictions specified in the RC. In comparison in (12-b),the matrix verb takes the whole PR Small Clause as its complement, and the DP is the subject of that clause; at the interpretive level this maps onto the perception of an *event*. Several syntactic tests demonstrate this fundamental difference between PRs and RCs. For reasons of space, we will illustrate only a few of them here, selecting those that best set the stage for Experiment 1 and 2 (below), and refer the interested reader to the cited literature for more evidence.

i. PRs appear freely with proper names (13-a), contrary to RCs (13-b).[8]

(13) a. Ho visto Gianni che correva (Italian)
He visto a [$_{PR}$ Juan que corría] (Spanish)
J'ai vu [$_{PR}$ Jean qui courait] (French)
'I saw Gianni running.'
b. *I saw John that ran.
c. Ho visto Gianni, che correva. Appositive

ii. Relative pronouns are banned from PRs, but obviously not from RCs:

(14) *Ho visto Gianni il quale correva.
Have.I seen Gianni the which run.IMPF.
'I saw Gianni who was running.'

iii. Just like other types of Small Clauses (see ungrammatical translation), PRs are only available with embedded subjects and cannot be construed with embedded objects (15-a), this restriction obviously doesn't apply to RCs (15-b):[9]

(15) a. *Luigi ha visto [$_{PR}$ Gianni$_i$ che Maria baciava EC$_i$].
Luigi saw Gianni that Maria kissed EC.
*'Luigi saw John Mary kissing EC.'

[8]With the irrelevant (for the present purposes) exception in which they behave like nouns (e.g. *I am talking about the Mary who came from Alabama*), proper names cannot be modified with restrictive RCs. These exceptional cases often require an overt determiner. Whilst appositive RCs can also be headed by proper names, they require a prosodic break between the head and the RC, often indicated with a comma in writing (13)(c). No such break is required in PRs. Obviously PRs can also appear with other NPs (e.g. *the boy*), we will however use proper names in many of the following examples to signal the presence of a PR.

[9]There are very few exceptions to this generalization (e.g. *l'ho visto che lo inseguivano / I saw him that they were chasing him*), see Casalicchio 2013 for discussion.

b. Luigi ha visto il ragazzo che Maria ha baciato <ragazzo>.
'Luigi saw the boy that Mary kissed.'

iv. Tense restrictions in PRs. Tense within PR is dependent on the Tense specification of the matrix clause.[10] This restriction obviously doesn't hold for RCs:

(16) Ho visto il ragazzo / *Gianni che correrà.
Have.I seen the boy / *Gianni that run.FUT 'I saw the boy /*Gianni that will run.'

v. Restrictions to both inner and outer aspect hold for PRs. PRs require imperfective, but not perfective, aspect (17-a), as they denote ongoing events. They are further restricted to stage level properties and cannot denote individual level properties (17-b). Neither of these restrictions applies to RCs.

(17) a. Ho visto Gianni che correva / *che è corso a casa.
'I saw Gianni running / that had run home.'
b. Ho visto Gianni che *aveva gli occhi rossi /*aveva gli occhi blu*.
I saw Gianni that had the eyes red / had the eyes blue.
'I saw Gianni with red eyes / with blue eyes.' (Casalicchio, 2013, p.117, ex.160)

vi. While RCs modify NPs, and as such can appear in any environment in which NPs can appear, PRs are selected by a subset of predicates and therefore appear in a much more restricted set of contexts.[11]

(18) Ho incontrato / *Vivevo con Gianni che correva.
'I met / *lived with Gianni running.'

Having established that PRs are not RCs, we will follow Cinque (1992) in claiming that PRs are structurally equivalent to English Small Clauses of the eventive (progressive) type. This is supported by the observation that PRs can occur in all contexts in which eventive SCs can. A few cases are illustrated in (19).

(19) a. COMPLEMENT SMALL CLAUSES
Non sopporto Gianni e Mario [*vestiti così / che fumano in casa mia*]
'I can't stand Gianni and Mario dressed like that / smoking in my house.'
b. ADJUNCT SCs PREDICATED OF A SUBJECT
Gianni lasciò la stanza [*ubriaco / che era ancora sotto l'effetto dell' alcohol*]
Gianni left the room drunk / still under the effects of alcohol.'

[10] In PRs, but not in RCs, the matrix event and the embedded event are interpreted as unfolding within the same temporal window. This possibly also explains the aspectual restriction and the requirement for these type of SCs to appear in the progressive form in many languages (including English, Brazilian Portuguese, Spanish and Sardinian) as progressive provides the required imperfectivity. Strict *identity* of Tense is not necessary. Present Tense, for example, is required when the matrix verb bears future T (*Domani vedrò Gianni che corre / Tomorrow I will see John that runs*).

[11] PR-verbs include e.g. *meet, catch, find, dream, imagine, discover, imitate, draw, surprise*, among others. PRs, and Acc-ing SCs, also appear in a variety of other contexts, including presentational and so called *absolute with* constructions. See Cinque (1992) for a more comprehensive list.

c. ADJUNCT SCs PREDICATED OF AN OBJECT
Mangiò la pizza [*calda / che stava ancora fumando*]
'He ate the pizza hot / that it was still smoking.'

Additionally, PRs and SCs can be freely coordinated (20-a,b), while neither of them can be coordinated with RCs (which is further evidence against a RC analysis of PRs) or other types of clausal complements (20-c,d).

(20) a. SC & PR:
Ho visto [Gianni depresso] e [Piero che cercava di risollevarlo].
'I saw G. depressed and P. that was trying to cheer him up.'
b. SC & PR:
Ho visto [Gianni [depresso] e [che piangeva]].
'I saw G. depressed and that was crying.'
c. *RC & PR/SC:
*Ho visto [Gianni, [che vive con Maria], e [depresso / che piangeva]].
'I saw G., who lives with M. and depressed / that was crying.'
d. *PR/SC & FINITE CP:
*Ho visto [Gianni [che piangeva / depresso] e [che P. cercava di risollevarlo]].
'I saw G. crying / depressed and that P. tried to cheer him up.'

Semantically, both PRs and eventive SCs involve *direct perception* (21-a), i.e. they don't allow the content of the embedded clause to be inferred. This sets them apart from normal finite clauses in similar contexts (21-b).

(21) a. *Dalle medaglie vedo Gianni che corre.
From.the medals see.I Gianni that runs.
'*From the medals I see Gianni running.'
b. Dalle medaglie vedo che Gianni correva.
'From the medals, I see/deduce that Gianni is a runner.'

(22) and (23) illustrate the semantic distinction between PRs and RCs, while DPs modified by RCs denote individuals / entities, PRs denote events.

(22) PSEUDO RELATIVE / SMALL CLAUSES COMPLEMENTS
Gianni ha visto [$_{PR}$ la ragazza che correva] / John saw [$_{SC}$ the girl running].
∃s ∃s' [see(s) & AGENT(s)(John) & THEME(s')(s) & run(s') & AGENT(s')(the girl)]
There is an event of seeing and the agent of that event is John and the theme of the event is an event of running and the agent of running is the girl.

(23) RELATIVE CLAUSES
Gianni ha visto [$_{DP}$ la [$_{NP}$ ragazza [$_{CP}$che correva]]] / John saw [$_{DP}$ the [$_{NP}$ girl [that was running]]].
∃s [see(s) & AGENT(s)(John) THEME(the unique girl that ran)(s)]
There is an event of seeing and the agent of that event is John and the theme of the event is the unique girl that ran.

The PR-complement interpretation (22) reports the perception of an event, i.e. the theme of *see* is an eventuality: THEME(s')(s), s = an eventuality (of the running type). The RC interpretation in (23), on the other hand, reports the perception of an entity, i.e. the theme of *see* is an ordinary individual: THEME(x)(s), x = an individual (the girl).

This semantic difference is well illustrate by the pronominalization contrast in (24-a,b):

(24) a. Chi$_i$ ho visto è il ragazzo/*Gianni$_i$ che correva. RC / *PR
'Who I saw is the boy / Gianni that ran.'
b. Ciò$_i$ che ho visto è il ragazzo/Gianni che correva$_i$. PR / *RC
'What I saw is the boy / Gianni running.'

(24-a) is ungrammatical as a PR because events can only be referred to with inanimate pronominals. The animate *wh*-pronoun *chi / who* in (24-a) is free to refer to *il ragazzo / the boy*, an animate entity modified by the RC *that ran*. Using the proper name '*Gianni*' renders the sentence ungrammatical, since this prevents the RC interpretation.

The exact opposite pattern emerges when the inanimate *ciò / what* is used in (24-b): here the pronoun refers to the whole clause "*Gianni che correva*", which forces it to be interpreted as a PR. As the glosses to (25-b) indicate, this is not a quirk due to the presence of a proper name: even with NPs that would otherwise accept a RC (*the boy*) a SC reading is the only available option. This test also shows that PRs in the context of perception verbs can form a single constituent. The latter contrast does not apply to all types of PRs (25), which forms the basis of the tripartite distinction proposed by Declerck (1981) for SCs and Cinque (1992) for PRs.

(25) Chi / *Ciò che ho incontrato è Gianni che correva.
Who / What that have.I met is Gianni that run.IMPF.
'Who / *What I met is Gianni running.'

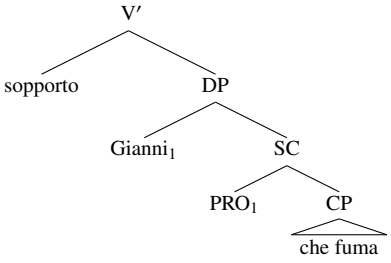
Since reference with inanimate *ciò* is not allowed with verbs like '*meet*' shows (i) that the argument of the matrix verb is the DP '*Gianni*' and not the whole event as above. We therefore assume like Cinque that PRs come in 3 different varieties: PR arguments of V (26-a), PR adjunct within NP (26-b) and PR adjunct of VP (26-c) (original examples from Cinque 1992, ex. 38 p. 9).

(26) a. Small Clause complement:
Ho [$_V$, visto [$_{SC}$ Mario [che correva a tutta velocità]]]
I saw Mario that was running at full speed
b. Small Clause adjunct within NP:
Ho [$_V$, visto [$_{NP}$ [$_{NP}$ Mario] [$_{SC}$ PRO [che correva a tutta velocità]]]]
c. Small Clause adjunct within VP:
Ho [$_{VP}$ [$_V$, visto Mario [$_{SC}$ PRO che correva a tutta velocità]]]

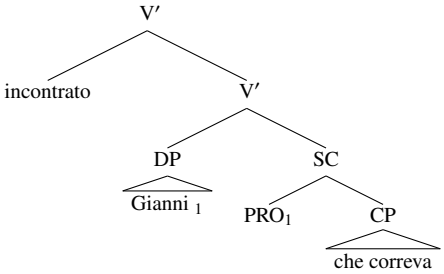
Each of these structures is supported by a number of syntactic tests and corresponds to a slightly different semantic interpretation.[12] Importantly, the PR complement analysis in (26-a) is not available with all PR taking verbs, which, however, allow for at least one of the adjunct interpretations. The two types of structural relations are depicted in the trees in (27) and (28).

[12]For reasons of space, we refer the reader to Declerck's and Cinque's original papers for discussion of the syntactic tests at the basis of these distinctions, which include the possibility for the PR-head to cliticize (*l'ho incontrato che correva / him I met that ran* vs. **non lo sopporto che correva / not him can stand that ran*) and passivize (*Gianni è state colt che rubava / John was caught stealing* vs. **Gianni non è amato che fuma / G. is not loved that smokes*). See **?** for a critical discussion of the NP-adjunct analysis.

(27) *PR adjunct within NP*
Non sopporto Gianni che fuma
I can't stand G. smoking



(28) *PR adjunct within VP*
Ho incontrato Gianni che correva
I met G. running



The parse as *PR-adjunct within NP* is interpreted as a temporal modification on the NP itself: (27) does not mean that I cannot stand Gianni, it roughly means *I can't stand Gianni* when *he is smoking*, or *I can't stand the situation in which Gianni is smoking*. This is similar to other types of adverbial NP-modifiers (e.g.: *Non sopporto Gianni vestito da boy scout / I can't stand J. dressed as boy scout*), which mean '*I* can't stand (to see) G. *when* he is dressed as a boy scout'. The restriction, therefore, is not among a set of different people called Gianni, but among different instantiations of the same person.

Similarly, the parse as *PR-adjunct within VP* derives an interpretation in which, as in complement PRs, the embedded event has to unfold within the same temporal window of the matrix event. For example: *Ho incontrato la ragazza che correva / I met the girl running* requires the meeting event and the running event to overlap in time, i.e.: *I met the girl while she was running*.

In summary, there is ample evidence, both their syntactically and semantically, that PRs and RCs are distinct. PRs typically refer to events and are selected by a restricted set of predicates. The relation between the 'head' and the embedded clause in PRs is akin to the relation between a subject and a predicate in eventive Small Clauses. Finally, PRs come in 3 varieties (complement of V, adjunct of NP, adjunct of VP), which can all appear in the context of perceptual verbs, while other verbs (e.g. 'meet, surprise') can only select adjunct PRs.

Table 3 summarizes the various tests in support of this account:

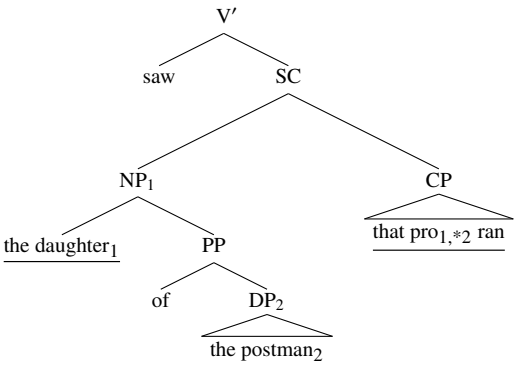
3. PRs and 'attachment'

In the preceding section we have established that the grammar of some languages (e.g. Italian and Spanish) but not others (e.g. English) a Relative Clause and Pseudo Relative interpretation. We have also claimed that when PR / SC are projected in the environment of complex NPs, as in (30), the familiar attachment ambiguity disappears and the only possible subject for the embedded verb is DP1 (i.e., the PR reading is selected).

(29) PR READING: DP1 ONLY ACCESSIBLE SUBJECT
Ho [$_{V'}$ visto [$_{SC}$ [$_{DP1}$ la figlia$_1$ [$_{PP}$ del [$_{DP2}$ postino$_2$]]] [$_{CP}$ che *pro*$_{1/*2}$ correva]]].
'I saw [$_{SC}$ the daughter$_1$ of the postman$_2$ running$_{1/*2}$].'

Property	**RCs**	**PRs**	**SCs**
Long distance 'gap'	✓	*	*
Refers to individuals	✓	*	*
Available w. objects	✓	*	*
Available w. Rel. Pronouns	✓	*	*
NP modifier	✓	*	*
Conjunction with RC	✓	*	*
Conjunction with SCs	*	✓	✓
Refers to events	*	✓	✓
Available in SC environments	*	✓	✓
Available w. Proper Names	*	✓	✓
VP modifier	*	✓	✓
Aspectual restrictions	*	✓	✓
Tense restrictions	*	✓	✓
Restrictions to matrix V	*	✓	✓

Table 3: Summary of asymmetries between RCs and PR/SC



This is more clearly visible when a PR reading is forced. As shown in (24), it is possible to force a RC or PR reading of the *che* string by making overt reference to it as an animate individual, as in (30-a), or an (inanimate) event (30-b,c) respectively.

(30) a. Chi ho visto è la figlia del postino che corre da solo. RC/*PR
'Who I saw is the daughter of the postman that runs by himself / herself.'

b. Ciò$_i$ che ho visto è [la figlia del postino che correva da sola/*da solo]$_{\cdot i}$ PR/*RC
'What I saw is the daughter of the postman running by herself / *by himself.'

c. [La figlia del postino che corre (da sola/*da solo)]$_i$ è un evento$_i$ eccezionale. PR/*RC
'The daughter of the postman running (by herself/*by himself) is an exceptional event.'

As both the Italian examples and the English translations show, contrary to when the RC reading is forced, DP2 is not an accessible subject when a PR/SC reading is forced. DP2 cannot be interpreted as the subject of the embedded verb, and moreover an optional gender marked, modifier (*by himself / herself*) that agrees only with DP2 (and not DP1) within the embedded

clause (30-b,c) renders the sentence ungrammatical. This shows it is interpretively restricted to the higher DP1 and gives the "illusion" of High Attachment. Actually, no preference is at stake here: DP1 is the only available subject for the embedded verb, i.e. the only grammatical option. Since "High Attachment" is forced in the environment of PRs; eliminating a PR reading is essential to avoid confounds when testing RC attachment preferences in complex DP environment. In the remainder of this section we claim that the following generalization holds: once a PR reading is prevented (and everything else being equal, i.e. when factors such as prosody and referentiality are controlled for) a Low Attachment preference emerges both across languages and syntactic structures.

3.1. Variable Syntax, Uniform Parsing

In this section we propose that the residual variation in RC-attachment, i.e. the variation observed when factors such as prosody or referentiality are properly matched, can be reduced to the selective availability of PRs. The theoretical advantage of this is obvious: the universality of locality principles can be reintroduced.[13] Support for this claim and the specific generalizations in (31) can obviously only come from empirical work. In what follows, after presenting a formalization of this idea, we will provide its rationale and then present the empirical arguments in their support. We propose that everything else being equal, once the distinction between RCs and PRs is taken into account, the following generalizations hold:

(31) A. Low Attachment preference is observed, across languages and structures, with genuine restrictive RCs, i.e. when PRs are not available.

B. High Attachment preference is observed in languages and structures which allow for a PR / SC reading (in contexts in which PRs are allowed by the grammar of each particular language).

The generalization in (31-A) reflects the prediction of a universal locality principle, be it Late Closure, Recency, Merge Right or otherwise. Locality is a natural principle of economy of computation, whose universality and appeal are so strong that when apparent counterexamples to this universal principle are found, as in the RC-attachment literature at hand, a massive amount of work is rightly dedicated to explain their origins. We should underline that the universality of a principle doesn't imply that that principle will always *win* over other factors such as e.g. *referentiality*. As we have seen above, several factors ultimately contribute to attachment selection and many of them can apparently override locality (see e.g. Altmann et al. 1998 on the effects of context on Late Closure). The factors external to syntax that potentially affect attachment are compatible with locality applying universally *within* syntax. The biggest concern arising from the residual cross-linguistic variation in the RC attachment literature is that it questioned the universality of locality, not that it showed that other factors could take priority over it.

As for (31-B), the first thing to be recognized is that when PRs are available, the parser is not dealing with an issue of RC-attachment any longer. First it will have to decide whether to project the relevant string as an RC or a PR. This type of choice is not regulated by Late Closure types of principles, but by principles of the *Minimal Attachment* type.[14] While both

[13] With 'universality' we intend a principle that applies in the same way in every language under comparable conditions, abstracting away from the independent issue of how locality interacts with other components of the language system. See below for more on this point.

[14] Minimal Attachment: Attach incoming material into the phrase-marker being constructed using the fewest nodes consistent with the well-formedness rules of the language.

principles can be seen as two instantiations of a universal principle of locality, favoring closer, most accessible, targets (differently operationalizing distance: structural complexity, structural distance, recency, frequency), they are clearly involved in different processes. The Late Closure type relates more directly to Recency effects applying *within the string just parsed*, i.e. attach α to the most recent element capable of carrying a particular relation with α; the Minimal Attachment type relates to the relative ease of projecting a given string as a constituent of type A or B, i.e. when deciding between two, or more, alternative parses for a constituent, choose the simplest option. We propose the following:

(32) PR-first Hypothesis: When PRs are available, everything else being equal, they will be preferred over RCs.

This preference arises because PRs are simpler than RCs, both structurally and pragmatically (in terms of presupposition)[15]:

- From a structural perspective, Small Clauses are arguably less complex than full Relative Clauses, despite the presence of CP in both (Starke, 1995). The structural constraints imposed on PRs, but not on RCs, in terms of Tense, Aspect, type of argument etc. analyzed in the preceding section, point to the presence of a richer and more articulated functional domain in the latter than the former.

- From a Reference Theory perspective (Crain & Steedman, 1985; Altmann & Steedman, 1988), the RC analysis requires building a context which contains more referents than the SC analysis. The felicitous utterance of a sentence like: *Ho visto il ragazzo che correva / I saw the boy running*, as a RC presupposes a context containing a set of boys. The PR interpretation, on the other hand, only requires to introduce an event of running as the theme of see, and this event has a boy as its agent, i.e. only one boy is presupposed in the PR context.[16]

Importantly, because of their tripartite nature (on which see Declerck 1981; Cinque 1992 and the discussion in section 2.1 above), PRs become an option for the parser at multiple points: i. at the offset of the verb, as a complement SC; ii. at the offset of the NP, as a PR adjunct within VP or NP. Consider the options of the parser at these two points:

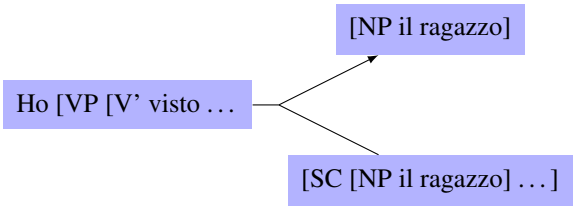
i. In the presence of a PR taking verb the parser needs to choose between an NP continuation or a SC continuation. Much literature in psycholinguistics has shown a strong tendency for the parser to posit nominal complements over clausal complements (cf. the well-know garden-path effects with: *the students knew the answer was in the back of the book*, Ferreira

[15]Notice that the generalization in **??** and the hypothesis in (32), while obviously connected, are also independent from each other: falsifying one doesn't necessarily falsify the other. We thank Richard Breheny for pointing out that PRs are also interpretively simpler than RCs.

[16]The two types of *principles* can obviously coexist and interact and it is reasonable to suppose that, as in other such cases, contextual effects might override structural principles of parsimony. The important question, as usual, is whether this influence can be found at all stages of processing or only at a later stage. This is obviously an empirical questions that we reserve to address in future work. The only data using context in RC attachment, that we are aware of, comes from Desmet et al. (2002b) who manipulated the preceding context in Dutch and did *not* find it to interfere with attachment preferences (the usual generalized HA preference emerged), at least not at the earliest stages of parsing. This results, however, like all the others considered so far, did not take into account possible effects of PR availability, and therefore do not allow strong conclusions to be drawn.

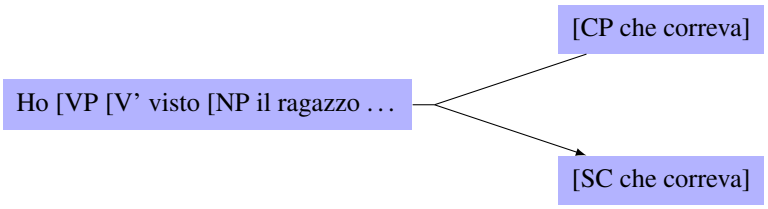
& Clifton (1986); Traxler et al. (1998); Pickering et al. (2000)). It should be noted that this literature has dealt with a relatively small set of verbs that allow clausal complements, and to our knowledge it has never dealt with the type of verbs we are presently discussing, nor with the choice between NP and SC complements. It is an empirical question (to be addressed in future work) whether this preference also extends to the present environment. [17]

If this preference also extends to SCs, we might expect the parser to prefer a NP complement parse:



Importantly, at this stage there's no difference between PR languages and non-PR languages like English, i.e. the English parser will also have to decide whether to parse NP as the direct object of *see* or as the subject of a Small Clause. If the parser considers multiple options in parallel, this might explain the relatively high number of HA preferences in LA languages like English (around 40%).

ii. Assuming a preference for NP complements over clausal complements, a cross-linguistic difference arises when the parser hits the complementizer: in languages allowing PRs, it will be presented with a choice between an RC and a PR, as there is still the possibility to interpret the *che*-clause as a PR adjunct. Importantly, there are good reasons to postulate that a PR / SC parse is less complex, both structurally and interpretively, than the RC parse.



Whether the best way to capture Minimal Attachment is in terms of number of nodes, relative accessibility of the contextual representation associated with each alternative, or as a function of frequency / predictability of each parse, or even as a combination of these factors, is beyond the scope of this work, and in many ways irrelevant to the point we arguing for, especially since different approaches would probably converge on this prediction.[18] What is relevant to the present

[17] It should also be kept in mind that many PR-taking verbs also allow a number of other clausal complements, which raises the question (not addressed in this paper) of whether the parser deals with these multiple possibilities. For a detailed discussion of clausal complementation see Moulton (2009). Here is a list of different types of clausal complements introduced by perceptual verbs (from Moulton, 2009, ex.1, p.2): i. *John saw Fred leave early*, bare infinitive, direct perception; ii. *John saw Fred leaving early*, gerundive, direct perception; iii. *John saw Fred owning a house*, gerundive, imaginative; iv. *John saw Fred to be a party-pooper*, infinitive, belief; v. *John saw that Fred left early*, finite clause, factive.

[18] See e.g. Hale (forthcoming) for an implementation of these ideas in an automatic parser.

point is that some principle akin to Minimal Attachment is at stake here. We argue that when a simpler option is available, restrictive relatives are not the preferred parse in the absence of a context supporting the relevant presupposition. There is potentially a third reason, based on principles such as *Relativized Relevance*, of why PRs should be preferred to RCs: with the former, but not the latter, the *che*-clause is conveying additional information about the event described in the matrix clause, i.e. the most salient part of the clause in the discourse representation.

The hypothesis in (32) is easily falsifiable since it makes several strong predictions, both about offline judgments and online measures, a few of which are listed below. All else being equal (i.e. in the absence of strong biases introduced by prosodic, contextual, lexical and other factors):

i. High Attachment preferences will emerge whenever PRs are available;

ii. RC-only continuations should be harder to parse than PR-compatible continuations in locally ambiguous environments, e.g. we expect the globally ambiguous (and PR-compatible) (33-a) to be easier to parse than the locally ambiguous (and PR-incompatible) (33-b)[19]:

(33) a. Ho visto il ragazzo che correva la maratona
I saw the boy that ran the marathon
PR: I saw the boy running the marathon / RC: I saw the boy that ran the marathon
b. Ho visto il ragazzo che correrà la maratona
RC only: I saw the boy that will run the marathon

iii. In the context of complex NPs, HA disambiguation should be easier to parse for PR-verbs than RC-only verbs.

iv. High Attachment preferences will also be observed in any context allowing an ambiguity between a reduced RC and a correlate of PR interpretation, e.g. the Acc-*ing* construction in English (*I saw the son of the doctor (that was) running*), Prepositional Infinitive Constructions in Portuguese and a variety of northern Italian dialects (PIC, Raposo 1989; Casalicchio 2013: *Vi o filho do medico a correr*).[20]

That a SC reading is preferred in Acc-ing constructions in English, is visible also from the following garden-path effect:

(34) I saw the daughter of the woman dancing tomorrow at the gala.

The local ambiguity between an SC and a reduced RC reading, seems to be resolved in favor of the former: introducing a temporal mismatch between the *dancing* event (tomorrow) and the matrix event *saw* (past) forces reanalysis of the embedded clause as an RC (temporal mismatch is not allowed with SCs and PRs):

[19] An anonymous *Cognition* reviewer asked whether we also expect locally unambiguous RCs to be relatively harder than unambiguous PRs. This is indeed a prediction of the present approach, which is supported by preliminary results (Grillo et al., 2013b) which show significantly shorter reading times and faster reaction times for comprehension questions in PR-compatible than in RC-only contexts. Ongoing work is directly testing this hypothesis.

[20] On PIC see Fernandes (2012); Grillo et al. (2012) and Grillo et al. (2013a) on Acc-*ing* constructions.

(35) I saw the daughter of the woman (that will be) dancing tomorrow at the gala.

An anonymous reviewer, while agreeing with us that this sentence is intuitively hard to process, suggested that this difficulty might be simply due to the Tense mismatch between the matrix and the embedded (*saw / tomorrow*) and, if this is true, the same complexity should emerge when the same mismatch is present in unambiguous RCs (e.g. *The person who I saw was the daughter of the woman dancing tomorrow at the gala.*). This is certainly a possibility which needs to be empirically tested. It is possible, however, to make the same point while avoiding Tense mismatch. In sentence (36-a), and in its counterpart in Italian (36-b) we forced an RC reading of '*dancing*' by adding the infinitival clause '*kiss a man*'. The same garden-path effect obtains.

(36) a. I saw the ballerina dancing kiss a man.
b. Ho visto la ragazza che ballava baciare un uomo.

In the remainder of this paper, we show that (at least some of) these predictions are corroborated by both previous findings and novel experimental results. Variation across languages is discussed first in 3.2, followed by variation across structures 3.3. Finally, two novel experiments on attachment preference in Italian are presented in section 4. The results from the experiments, which manipulate PR availability, strengthen the generalizations in (31).

3.2. Explaining variation across languages

Since the pioneer study of Cuetos & Mitchell (1988), a great number of studies have investigated RC attachment across several languages. The pattern found, or better, the lack of a pattern has puzzled psycholinguists for more than twenty years. English speakers appear to behave like Romanian and Basque speakers (among others) in showing a preference for LA, while Dutch speakers match Italian, Greek and Japanese in their preference for HA.

Importantly, it should be pointed out that (all, to our knowledge) previous work on RC attachment used subject RCs, which, as mentioned above, are the only type compatible with a PR reading. More in depth investigation is certainly needed to settle this issue, still it seems hard to reduce the strength of the above correspondence to random factors. Pending further research on Russian, Swedish and Norwegian a reanalysis of the mixed results in Bulgarian and German, we take the generalization in (31) to be strongly supported by the empirical results. It is worth noticing that RCs are obligatorily introduced by a relative pronoun in Bulgarian, Russian and German. Additionally, all three languages have writing systems that force the use of a comma in between the NP and the relative pronoun. Importantly, the presence of a comma has been shown to have a strong influence on reading, particularly in disambiguating ambiguous structures (Hill & Murray, 1998). Commas have also been shown to elicit a Closure Positive Shift component in ERP, a component associated with the processing of prosodic boundaries (Steinhauer et al., 1999; Steinhauer & Friederici, 2001; Steinhauer, 2003). The presence of commas, by triggering a prosodic boundary between N2 and the relative pronoun, might have an influence on attachment, crucially in the direction of HA, in line with the predictions of the *Implicit Prosody* account.[21] More generally, HA in these languages might receive an independent explanation under the *Anaphoric Binding* approach. Recognizing the central role of PR-availability, in fact, does not exclude the relevance of other factors in deciding RC-attachment.

[21] (See Augurzky 2005, p. 99 for results in German which do not seem to support this argument).

Language	Attachment	PRs
English	Low	*
Romanian	Low	*
Basque	Low	*
Chinese	Low	*
German (?)	High/Low	*
Russian (?)	High	*
Bulgarian (?)	High/Low	*
Norwegian (?)	Low	✓
Swedish (?)	Low	✓
Spanish	High	✓
Galician	High	✓
Dutch	High	✓
Italian	High	✓
French	High	✓
Serbo-Croatian	High	✓
Japanese	High	✓
Korean	High	✓
Greek	High	✓
Portuguese	High	✓

Table 4: Attachment Preferences and PR availability

A few notes, and a general recommendation, are in order when dealing with sets of data of this magnitude and heterogeneity (for methods, analyses etc.), since we often do not have the possibility to assess all characteristics of the studies that produced them. This is particularly important in the present context in which a novel, previously unnoticed, factor is introduced into the equation and was not taken into account when these studies were designed/conducted. This means that such data should be handled with care both to support and to falsify a theory. In the remainder of this section we briefly discuss some of the potential issues that arise when considering such a large dataset in the absence of all information about the methods employed.

First of all, remember that several factors can determine the availability of PR: not only the semantic properties of the matrix verb (does the matrix V subcategorize for PRs?), but also the temporal and aspectual properties of the matrix and embedded verb. Remember further that different kinds of PRs exist (i.e. argument/adjunct) and different types of verbs differ in their ability to combine with them (e.g. perceptual verbs can take both argument and adjunct PRs, whereas verbs of the *incontrare / meet* kind only take adjunct PRs; see section 2.1 and Cinque 1992 for discussion). For this reason to obtain a complete picture we need to proceed to a more detailed study of previous results, one that takes into account the fine structural and semantic properties of the stimuli used.

The problematic data from Swedish and Norwegian, as well as the unproblematic ones from Romanian, come all from Ehrlich et al. (1999), a study which is often cited in the RC-attachment literature, but which has never been published in paper format (only a CUNY abstract is available online). This makes it obviously very hard to recover even the most basic (and in this context most important) information: whether PR-verbs were used and how many of them were used.

Secondly, as mentioned above, contrasting results are often found in the literature. Experi-

mental work on attachment in German, for example, has given mixed results: HA preference was found by Hemforth et al. (1996, 1998, 2000) and LA by Murray et al. (2000); Augurzky (2005). Conflicting data at times comes even from the same sources. Sekerina et al. (2003) discuss 2 experiments on attachment in Bulgarian that yielded opposite results: High Attachment preference was obtained in the first experiment and Low Attachment in the second.
Bulgarian being a nonPR language, we would predict LA preference, everything else being equal. Importantly for the present point, while in the first experiment the stimuli were presented in a *out-of-the-blue* setting, the stimuli of the second experiment were introduced by strong Relative Clause context.

In the second experiment the sentence stimuli were preceded by two sentences (37-a,b) and a visual cue. The latter consisted of two sets of objects (e.g. two sets of triangles and triangle tips) distinguishable by some specific property (e.g. color). The complex DPs were contained in a question (37-c), which prompted the participant to single out a specific member from the two sets of triangles. This type of context functions as a perfect introduction for a RC reading.[22] More importantly, the sentences used in this second experiment do not allow for PRs for independent reasons (i.e. there is no verb capable of selecting a PR).

(37) a. Eto edin rozov triâgâlnik i edin žâlt triâgâlnik.
This one pink triangle and one yellow triangle
b. Vârxovete im sa različno ocveteni.
The tips them are differently colored
c. Kakâv cvjat e vârxât na triâgâlnika, v kojto e narisuvan čadâr?
What color is the tip of the triangle in which is drawn umbrella
What color is the tip of the triangle that has an umbrella in the middle?

Experiment 1 required *reading* the stimuli, which might have influenced the prosodic phrasing because of the presence of a comma separating NP2 and the relative pronouns. The stimuli of experiment 2, however, were presented auditorily, which eliminates the possibility that the comma might have played a role. In sum, we predict that when a RC context is used, as in experiment 2, a Low Attachment preference should be observed, while the results of experiment 1 still need to be further investigated.

Thirdly, while PRs are widely attested in a variety of environments in certain languages, e.g. in Italian, their availability in other languages (e.g. Portuguese) is subject to great variation, both regional, generational and often what appears to be purely individual. This variation obviously needs to be taken into account, but obviously this has never been done. Even in those cases in which we do have access to the sentence stimuli used in the experiments, we still do not know what kind of fillers were used. This is particularly important in the light of possible syntactic priming effects: a filler containing a Small Clause immediately preceding a sentence stimulus, for example, might well prime the subject for a PR reading. A final note on non-PR languages and SC contexts: as discussed in section 3.1, in the presence of PR-type verbs even the parser of a non-PR language like English might temporarily consider an SC continuation. It might thus be reasonable to hypothesize that in the presence of SC introducing verbs (such as perceptual verbs) a higher tendency for HA might be observed also in non-PR languages such as English. Given

[22] Note that this type of setting is very different from, and much more restrictive than, the one used in Desmet et al. (2002b). While the context in Desmet et al. still allows for a PR reading (it only introduces a set of alternatives for either NP1 or NP2), the present context simply rules out a PR reading completely.

its serial nature, when the parser encounters an SC introducing predicate, it will have to choose between an SC and NP parse of the following material. Early commitment to an SC reading might have effects later on in the parse even when the RC is introduced and ultimately influence attachment preferences. This might explain the relatively weak effect of Late Closure in English and other LA languages (around 60% LA). Preliminary results from an undergoing study on the role of SC-taking verbs in RC attachment in English appear to support this claim (Grillo et al., 2014).

In sum, in order to strengthen these results, in-depth comparative work must be conducted, taking into account the various factors involved in the availability of PRs. Yet, while we cannot take this generalization at face value, it is hard not to be struck by the strength of the prediction and the variety of languages it correctly applies to (Basque, Chinese, Dutch, English, European Portuguese, French, Galician, Greek, Italian, Korean, Japanese, Romanian, Serbo-Croatian, Spanish). Once again, advocating for the importance of PR-availability does not imply claiming that other factors will not play a role in RC-attachment, especially when the PR option is not available.

3.3. Explaining variation across syntactic structures

As mentioned above, several authors have shown that the characteristic asymmetry in attachment preferences disappears in certain specific syntactic environments. Speakers of languages commonly classified as HA, such as Spanish, display a Low Attachment preference in environments such as those listed below:

(38) UNAMBIGUOUS RELATIVE PRONOUNS (Fernández, 2003, p.31)
Vi al hijo del medico el cual estaba en el balcón
I saw the son of the doctor [$_{RC/*SC}$ who$_{rel\text{-}pro}$ was on the balcony]

(39) SUBJECTS (Hemforth et al., unpublished)
a. La criada de la actríz que estava sentada en el balcón es rubia
b. The maid of the actress that was sitting on the balcony is blonde
c. The maid of the actress [$_{RC/*SC}$ sitting on the balcony] is blonde

(40) TYPE OF P (De Vincenzi & Job, 1993, 1995)
a. Qualcuno ha sparato alla governante con l'attrice che stava seduta in balcone
b. Someone shot the maid with the actress that was sitting on the balcony
c. Someone shot the maid with the actress [$_{RC/*SC}$ sitting on the balcony]

(41) NOMINALS (Gibson et al., 1996)
a. la lámpara cerca de la pintura de la casa que fué dañada en la inundación
b. The lamp near the painting of the house that was damaged by the flood
c. The lamp near the painting of the house [$_{RC/*SC}$ damaged by the flood]

Crucially, what all these contexts have in common is their inability to introduce events, which makes PRs unavailable. Given these premises, and following the account proposed in (31), we correctly predict a generalized LA preference in these environments.

The English sentences in (39)[c], (41)[c] and (40)[c], serve as a good illustration of the general ban of PRs in the context of subjects, nominals and thematic prepositions. These sentences, in fact, can only be interpreted as reduced RCs and not as Small Clauses. The lack of PR readings in (38) is due to the presence of the relative pronoun, which, as discussed in example (14)

above, can only introduce genuine RCs. As for subjects, we should point out that it is not *all* subjects that prevent PRs, the example in (30)[a] reported in (42), is an example of felicitous (even obligatory) PR in subject position.

(42) [La figlia del postino che corre da sola/*da solo]$_1$ è un evento$_1$ eccezionale.
The daughter of-the postman that runs by herself/by himself is an event exceptional.
'The daughter of the postman running by herself/*by himself is an exceptional event.'

In this case, however, the PR interpretation is authorized (and enforced) by making reference back to the whole subject as an event. The ungrammaticality of the RC reading in these contexts can be diagnosed easily also in English, the overt presence of the restrictive marker *that was* makes the sentence ungrammatical:

(43) The maid of the actress (*that was) dancing the polka is an event you shouldn't miss.

When explicit reference to an event, or other licensing elements are not present, as in e.g. (39), the PR interpretation is not available. Importantly, the experimental works cited above did not make use of these special contexts.

The case of thematic prepositions (42) and that of nominals (43) not only involve more subtle distinctions to be made, but have also played a central role in previous accounts of variation in RC attachment (e.g. *Construal* and *Predicate Proximity*) and for these reasons require a more detailed discussion, and are addressed in sections (3.3.1) and (3.3.2) respectively. The discussion on prepositions, will also allow us to propose a generalization of the *PR-first Hypothesis* to other cases of Small Clause / Restrictive ambiguity.

3.3.1. Type of Preposition

[23] We have claimed that the preposition '*with*' excludes a PR reading of the sentence in (40). As an anonymous reviewer pointed out, this is clearly an oversimplification, as shown by the grammaticality of the Small Clause example in (44-a). The same is true of PRs, as shown in (44-b). Nevertheless, a sharp contrast exists between (44-a,b) and their variants with proper names (44-c,d)

(44) a. The girl with blond hair dancing the polka is an event you shouldn't miss.
b. La ragazza con i capelli biondi che balla la polka è uno spettacolo imperdibile.
c. *Bill with Mary dancing the polka is an event you shouldn't miss.
d. *Gianni con Maria che balla la polka è uno spettacolo da non perdere.

To explain this contrast we first need to recognize that a number of structural / interpretive alternatives are allowed with thematic prepositions like '*with*', which includes at least the following cases:[24]

A Restrictive: The [$_{NP}$ girl [$_{PP}$ with blond hair]] = the girl that has blond hair.
B 'Restrictive comitative': the [$_{NP}$ boy [$_{PP}$ with Mary]] = the boy who is with Mary.
C Small Clause comitative: I saw [$_{SC}$ John with Mary] = I saw John being in the company with Mary'.

[23] We are grateful to Giorgos Spathas for detailed comments and suggestions on this section.

[24] 'Agentive comitative' (*John washed the car with Bill*) and 'instrumental' (John washed the car with a sponge) interpretations are also available, but are irrelevant for the present discussion.'*Absolute-with*' constructions (*with [$_{SC}$ John sick], we can't leave*) are discussed below.

What is at stake here is the difference between Restrictive (A and B above, both of which can be replaced by an RC) (45) and non-Restrictive (*SC comitative*, indicated in C above) uses of *with*.[25] The examples in (44)[a,b] both involve a clear case of restrictive preposition, both NPs can be paraphrased with: *the actress who has blonde hair*. Restrictive-*with* modifiers denote properties of entities (e.g. *being blonde*), can be used in subject position, and in complement position of stative verbs, such as "*be married to*", which obligatorily select NP complements (45). Restrictive-*with*, finally, is more easily parsed when the NP within the PP is inanimate than when it is animate (45-c) ('*being blonde*' makes a better *out-of-the-blue* restrictor than *being with the actress*).

(45)	a.	[The maid with blond hair] is beautiful.	Restrictive Only
	b.	John is the brother of [the maid with blond hair].	Restrictive Only
	c.	#[The maid with the actress] is taking a bath.	Restrictive Only

SC-comitative *with*, on the other hand, denote situations and not entities. This explains why they are not allowed in the environment of stative predicates (45-b). Importantly, SC-comitatives are not available in the environment of subjects, both in matrix (46-a) and embedded (small) clauses (46-b,c):

(46) a. *John with Mary is / are arriving.
b. *John saw [Mary with Bill run / running / sad / to be party poopers].
c. *Gianni ha visto [$_{PR}$ Maria con Piero che correva].
G. has. seen M. with P. that run.impf.
Gianni saw Maria with Pietro running.

The ungrammaticality of (44)[c,d] follows from the combined use of proper names (which force SC-comitative) and reference to an event, which would force a PR/SC reading, which in turn cannot take SC-comitatives as subjects.[26]

In summary, we partially addressed the problem in (44) by showing that SCs and PRs are allowed only when restrictive-*with* is used in a complex NP, because SC-comitative *with* is not allowed in subject position. What still needs an explanation, is the LA preference in '*with*' environments. This preference can follow from a generalized version of the *PR-first Hypothesis*. SC-comitatives, in fact, seem to be strongly preferred over restrictives when an ambiguity is present, e.g. when animate nouns are used (47-a) (notice also that comitatives are forced with proper names (47-b)).

(47)	a.	John saw the maid with the actress.	
		Comitative = 'John saw the maid be with the actress.'	Preferred
		Restrictive = 'John saw the maid that is with the actress.'	Dispreferred
	b.	John saw Bill with Mary.	
		Comitative = 'John saw Bill be with Mary.'	
		*Restrictive = '*John saw the Bill that is with Mary.'	

[25] On the comitative interpretation see e.g. Mcnally (1993); Lasersohn (1995); Kayne (1994), among others.

[26] It is interesting to note that the same factors that disambiguate between PRs and RCs, also disambiguate between restrictive and SC-comitative. See Kayne (1994), p.63-66, for a discussion of why comitative *with* is not allowed in subject position. Thanks to Klaus Abels for referring us to Kayne's discussion.

As above, we hypothesize that the SC-comitative interpretation is simpler than the restrictive interpretation of '*with*': restrictives require building a context which contains more referents than the SC analysis. While more work is needed to fully elucidate the structural differences between SC-*with* and restrictive-*with*, it is clear that a structural difference exists between the two (e.g. extraction is allowed in the former but not in the latter, as shown by the following example in which only the SC-reading survives: *who did you see the boy with?*) we will assume that SC-comitative are not only interpretively, but also structurally simpler than restrictives. The pattern in (47-a), therefore, finds a natural explanation under a generalized version of the *PR-first Hypothesis*, as in (48). This is a welcome result, as it shows that the same underlying principle predicts the behavior of the parser in a range of only apparently independent environments.

(48) SC-first Hypothesis: When a SC interpretation is available, everything else being equal, they will be preferred over restrictive interpretations.

All the experiments under discussion used complex NPs containing two animate Nouns, thus, prompting a SC-comitative reading of *with*, under (48). As comitative-*with* cannot be the subject of a PR/SC, the relevant sentences can only be interpreted as RCs and LA is predicted.

'Absolute with construction'. A special type of PR that is licensed in the environment of '*with*' deserves a separate final note: the so-called *absolute-with* constructions (49).

(49) Con Gianni che ha la febbre non possiamo partire.
With G. that has the fever not can.we leave.
'With G. sick, we can't leave.'

Absolute-with constructions modify the situation presented in the matrix clause as illustrated in the glosses of (50) and, more crucially, exclude HA in the context of complex NPs under discussion (51).[27]

(50) Hanno sparato alla governante [$_{\text{PR}}$ con l'attrice che stava seduta in balcone].
Have.they has shot the maid with the actress that was sitting on the balcony.
PR reading: 'While the actress was sitting on the balcony, they shot the maid.'

(51) Hanno sparato al colonnello [$_{\text{PR}}$con l'attrice che stava [seduta/*seduto] in balcone]
Have.they shot the colonel with the actress that was [seated$_{\text{FEM.}}$/*$_{\text{MASC.}}$] on the balcony.
'While the maid was sitting on the balcony, they shot the colonel.'

The obligatory LA with *absolute-with* constructions strengthens our general argument: LA is predicted with this type of prepositions and this prediction is based on the availability of PRs.

3.3.2. No need for parametrization of Relativized Relevance in Three-NP sites

As discussed above (see ex.(7)/(52)), in the context of 3 possible attachment sites, both in a "subject position" of sentence fragments (Gibson et al., 1996), and in object position (52-b) (Gibson et al., 1999), in Spanish and English, a U-shaped pattern of attachment was reported.

(52) a. La lámpara$_1$ cerca de la pintura$_2$ de la casa$_3$ que fué$_{3>1>2}$ dañada en la inundacíon.
b. The lamp$_1$ near the painting$_2$ of the house$_3$ that was$_{3>1>2}$ damaged by the flood.

[27] We thank Jan Casalicchio (p.c. 2013) for this important observation.

c. EI astronomo predijo el cambio$_1$ de la orbita$_2$ del planeta$_3$ que se observó$_{3>1>2}$ desde el satelite.

d. The astronomer predicted the change$_1$ of the orbit$_2$ of the planet$_3$ that was observed$_{3>1>2}$ from the satellite.

Gibson and colleagues propose that principles of locality (i.e. *Recency*) interact with the parametrized principle of *Predicate Proximity*, which is weak in English but strong in Spanish. Similar to its precursor *Relativized Relevance* (Frazier, 1990), *Predicate Proximity* recognizes the central role played by predicates in structuring sentences: "*the core predicate structure* [...] *is ranked more highly for attachment by the parser*" (Gibson et al. 1996:41). NPs that stand in a predicate-argument relation with the matrix predicate are preferred in cases in which multiple attachment sites are available. The parametrization of this principle is claimed to follow from the relative degree of freedom in word order in a given language, in languages with relatively free word order (like Spanish, French and German) the predicate plays a more central role in parsing than in languages with relatively fixed word order like English.
The strength of *Predicate Proximity* in Spanish would explain the HA preference in 2-NP sites in this language, while its relative weakness in English would account for the observed LA preference. The increased distance between the predicate and the RC, would in turn account for the identical non-monotonic preference in the two languages, i.e. increasing the distance lowers the strength of *Predicate Proximity* over *Recency*.

We propose a slightly different account for the two findings. First, concerning the results of Gibson et al. (1996) (52-a,b), recall that sentence fragments, i.e. complex nominals that could be the subject of a potential forthcoming predicate, were used in this experiment. The primary (and from our perspective *universal*) LA preference found in these contexts is explained by considering that (offline) PRs cannot possibly be introduced in this context as no PR-taking predicate (either Verbal or Nominal) is present. In the absence of a PR option, the embedded clauses can only be interpreted as RCs, whose attachment will be heavily influenced by Locality principles. We argue that the secondary preference for NP1 depends on the prominence of NP1 within the complex NP. In this 'sentence fragment' context, NP1 qualifies as the head of the whole complex NP and thus as the head of the subject of a potential forthcoming predicate. The structural prominence of NP1, which ensures e.g. that it will trigger agreement on a forthcoming predicate, and the role it plays in attracting attachment, is well captured by principles such as *Relativized Relevance* or *Predicate Proximity*. Importantly, however, there is no need to parametrize the strength of this type of principle, as the variation across languages (or lack thereof) is already explained by the unavailability of PRs in this environment.[28]

A similar account can be extended to the findings in Gibson et al. (1999) (52-c,d), with the additional conjecture that due to decay in the activation of syntactic representations, the likelihood of projecting a PR decreases with increasing distance between the PR-taking predicate and the *that*-clause. Keep in mind, PRs are not obligatory in these contexts. As the likelihood of a PR parse diminishes, that of a RC parse increases, which puts Locality in charge again and explains

[28]One difficulty with evaluating these results is that speakers of different varieties of Spanish were recruited, which makes it hard to know whether PRs are available in all these varieties of Spanish, especially since PR-availability in some languages is strongly subject to dialectal variation. (Gibson et al. (1996), p. 28:"*The 24 subjects included were from Mexico (8 subjects), Puerto Rico (6), Spain (3), Argentina, Chile, Salvador, Guatemala, Peru, and Venezuela; the remaining subject was a native of the United States, with a Mexican father, and learned Spanish in the home.* The same is true for the participants in Gibson et al. (1999), p. 606: "*Spain (8 participants), Mexico (3), the Canary Islands (2), EI Salvador (2), Peru (2), the United States (2), Colombia, Cuba, the Dominican Republic, Nicaragua, or Venezuela.*").

the primary LA preference. As above, the application of Relativized Relevance / Predicate Proximity accounts for the secondary preference for N1 attachment. It is important to reiterate, this account does not require a parametrization of this principle. The difference between these results and the results in Dutch (Wijnen, 1998; Wijnen et al., 1999), in which the U-shaped pattern still favors HA (NP1 > NP3 > NP2) might be due to a difference in the number of PR-verbs used in the two experiments. However, we are not in possession of the stimuli for all these experiments and more empirical work is required to provide a full account for these differences.

Summing up, once the availability of PRs is taken into account, previous (often conflicting) results from the experimental literature on RC attachment are amenable to a uniform explanation: High Attachment is observed in a given language only in contexts that allow for a PR reading, whereas in all genuine RC contexts, unless factors such as prosody or referentiality are involved, a Low Attachment preference prevails. The patterns discussed in this section do not simply follow from position (subject vs. object) or category (N vs. V). What drives attachment preferences is the availability of PRs, i.e. the presence of a context capable to introduce events. Importantly, the different effects are derived from the grammatical (un)availability of PRs and do not require postulating the potentially problematic parametrization of parsing principles.

3.4. A note on PRs and prosody

In section 1.2 we briefly discussed the Implicit Prosody Hypothesis (Fodor, 1998a,b, 2002). Now that we have introduced PRs and discussed the confounding role they might have played in the preceding RC attachment literature, we can ask to what extent, if any, PR-availability might contribute to the observed differences in prosodic phrasing across languages (Jun, 2003). A full answer to this question is beyond the scope of the present paper, and we will limit ourselves to point out that, besides having a different syntax / semantics, PRs are also associated with different prosodic representations. Notice in claiming that PRs might be involved in determining default prosodic phrasing across languages does not in any way constitute a threat for the IPH, in fact we believe the contrary to be true, as the IPH itself has little to say about those default preferences.

We will first point out that a specific intonational phrasing is required by PRs, which is different in crucial ways from that of RCs. PRs are compatible with the presence of a prosodic boundary placed in between NP2 and the *che-clause*, as in (53-a); and incompatible with a boundary following NP1.

(53) a. *PR compatible break*
Ho visto la figlia del postino // che correva da sola / *da solo.
I saw the daughter of the postman that ran by herself / himself.
I saw the daughter of the postman // running by herself. SC / RC

b. *PR incompatible break*
Ho visto la figlia // del postino che correva da solo / *da sola.
I saw the daughter of the postman that ran by himself / herself.
I saw the daughter // of the postman running by himself / herself. RC / *SC

The phrasing of English SCs seems to pattern in a similar way, as both the glosses to (53) above and the examples in (54) show:

(54) a. *SC compatible break*
John saw the daughter of the postman // working by herself / ?? himself.

b. *SC incompatible break*
John saw the daughter // of the postman (that is) working by himself / ?? herself.

Reappraisal of the RC length effects in attachment might also be required, as such manipulations might involuntarily affect PR availability:

(55) a. *Short RC, PR available*
Ho visto il ragazzo che correva.
I saw the boy that ran.
I saw the boy running.
b. *Short RC, PR unavailable*
Ho visto il ragazzo che ami.
I saw the boy that you love.
c. *Long RC, PR available*
Ho visto il ragazzo che correva la maratona domenica scorsa.
I saw the boy that ran.IMPERF. the marathon last sunday.
d. *Long RC, PR unavailable*
Ho visto il ragazzo che ha corso la maratona domenica scorsa.
I saw the boy that has run.PERF. the marathon last sunday.

Here we will simply point out that extra care should be taken with length manipulations, as this can also involve manipulation of e.g *inner aspect* of the embedded verb, compare the PR-compatible process *run* in (55-a) with the PR-incompatible state *love* in (55-b); or *outer aspect* of the embedded verb, compare the PR-compatible imperfective *correva* with the PR-incompatible perfective form *ha corso* in (55-c,d). Inner and outer aspect are just two of the possible factors that are involved in deciding PR-availability, and are in turn influenced by a number of other factors (e.g. *Ho visto il ragazzo che correva ogni giorno / I saw.*PERF *the boy that ran.*IMPERF *every day*, contains an imperfective, but the modifier *every day*, forces a habitual reading which rules out a PR interpretation because of its incompatibility with the perfective of the matrix verb).

The above suggests PR-availability may partially explain cross-linguistic differences in default phrasing in complex NPs plus RC / PR strings. PR-availability might also underlie changes in attachment preferences that accompany RCs of different lengths. This requires that PR-availability be controlled for when investigating this effects. Once again, advocating a role for PRs simply amounts to saying that these structures are real and cannot be ignored when investigating attachment and prosody, it does not negate the important role played by prosody in parsing.

Having discussed some of the potential implications of the role of PR-availability in the previous literature, we now turn to the discussion of two novel experiments in which this availability was the direct object of manipulation.

4. New experimental evidence

In the remainder of this section we present the results of two novel experiments in Italian in which we apply grammatical constraints (from those presented in section 2.1) to selectively manipulate PR availability. Based on the PR-first hypothesis in (32) we predict a LA preference in unambiguous RC contexts, and a HA preference in ambiguous (PR vs. RC) contexts.

Most previous experiment on RC-attachment introduced the complex NP using a variety of verbs, mixing PR-taking verbs (e.g. *see*) with verbs that can only select for NPs (e.g. *know*).

This might explain why a relatively low preference (around 60%) for HA preference is also observed in PR-languages. To support this claim we conducted a first experiment using sentences containing a mixed set of verbs (8 PR-taking and 12 nonPR-taking) which introduced a complex NP modified by a *che* clause. Additionally, we manipulated the syntactic structure in which the verb + complex NP + RC appeared, using PR compatible and PR incompatible environments. In a second experiment, we directly compared attachment preferences in sentences containing PR or nonPR verbs, keeping syntactic structure identical across conditions. The results of both experiments strongly support the PR-first hypothesis.

4.1. Experiment 1

The first experiment aims

As discussed above, PRs can only be constructed with subjects of the embedded clause and in the presence of a verb or noun selecting for an event. (32) predicts LA preference to arise in all the conditions in which an RC is the only available parse (condition B, C, D below), and a significantly higher preference for HA preference to arise when both PR and RC are allowed (condition A).

Method and Participants (N=31) Italian native speakers participated in an offline questionnaire on attachment preferences in complex DPs. All the participants gave their informed consent before taking part in the study and were naive as to the goals of the experiment.

Materials and Design 20 sets of target sentences were constructed with 4 versions for each sentence in a 2x2 design crossing *Position* (right branching [RB] vs. center embedding [CE]) and *ExtractionSite* (subject vs. object). 4 lists of 20 target and 80 filler sentences were created using a latin-square design. The fillers did not contain either RCs or SCs/PRs. Target and filler sentences were pseudo randomized so that subjects would never see a target sentence immediately following another target sentence. Meaning was kept constant using passives in the A and C condition. An example of the sentence stimuli and questions is reported in (56). Position of extraction is indicated with <>.

(56) **Stimuli**

a. PR / RC CONDITION: RB-SUBJECT
Il barista ha guardato l'amico del cliente che <> veniva sorpreso dai colleghi.
The barman has watched the friend of.the client that <> came surprised by.the colleagues.
'*The barman watched the friend of the client (that was) being surprised by his colleagues*.'

b. RC ONLY CONDITION: RB-OBJECT
Il barista ha guardato l'amico del cliente che i colleghi avevano sorpreso <>.
The barman has watched the friend of-the client that the colleagues had surprised <>.
'*the barman watched the friend of the client that his colleagues had surprised*.'

c. RC ONLY CONDITION: CE-SUBJECT
L'amico del cliente che <> veniva sorpreso dai colleghi è molto buono.
The friend of-the client that <> became surprised by-the colleagues is very nice.
'*the friend of the client that was surprised by his colleagues is very nice*'.

d. RC ONLY CONDITION: CE-OBJECT
L'amico del cliente che i colleghi avevano sorpreso <> è molto buono.
the friend of-the client that the colleagues had surprised <> is very nice.
'*the friend of the client that his colleagues had surprised is very nice*.'

→CHI ERA SORPRESO? A. AMICO B. CLIENTE
(*who was surprised? A. friend B. client*)

To obtain as close a match as possible between this study and previous studies on attachment, we used a mix of verb types in the matrix clause, namely: 5 verbs that allow PRs complements (*watch, observe, see, listen, hear*), 3 verbs that can take PR adjuncts (*admire, hate, intercept*) and 12 verbs that don't allow PRs (e.g. *run over*). 16 of these verbs were previously used in De Vincenzi & Job (1995). Thematic assignment in the embedded clauses was kept constant across conditions using passive voice in the A and C condition.[29] As indicated in (56), condition A is the only globally ambiguous PR/RC condition. Condition B, on the other hand, is locally ambiguous up to the subject of the embedded clause, which disambiguates it as an RC-only structure. This is also the only condition allowing for a PR reading of the embedded clause is condition A. This is also the condition that most closely resembles previous studies on RC-attachment, the main difference being the use of passives in the present experiment. An RC reading was forced in all other conditions: extraction of the object prevents a PR reading in condition B, while embedding within a subject in the absence of any predicate selecting for an event disallows the PR reading in condition C and D. The target sentences were interspersed among 80, unambiguous, unrelated fillers. No SCs or RCs were used in the fillers.

The sentences were organized in a latin-square design so that each subject saw only one version of each sentence. To ensure proper attention was paid to the task, a comprehension question followed each sentence. We counterbalanced questions and answers of both stimuli and fillers. For the stimuli, we made sure that NP1 was presented first in 50% of the answers. For the fillers, we ensured that only 50% of the answers to the fillers were true. The study was conducted using a PC running the *Linger* software developed by Doug Rodhe. (http://tedlab.mit.edu/dr/Linger) or it was presented to the subjects on an Excel spreadsheet.

Results and Analysis One subject was excluded from the analysis because of answering only 46.5% of the unambiguous filler item questions correctly. Table 5 reports the percentages of High Attachment per condition.

	RB	**CE**
Subject	56.6%	32.8%
Object	44.0%	40.1%

Table 5: Percentage of High Attachment Preferences

Data were fit with mixed effects logistic regression using the lmer() function of the *lme4* package (Bates et al., 2011) of the R analysis program (R core development team). In the main model *position* and *extractionsite* were fit as fixed factors, and subject and items as random factors. Random slopes were fit for both fixed effects and their interaction. The analysis showed a significant effect of position (coefficient = 0.9915, SE = 0.4321, z-score = 2.300, $p < .01$). and significant interaction *position*extractionsite* (coefficient = 1.5059, SE = 0.6083, z-score = 2.476 $p < .01$). An additional analysis, looking at effects of extraction for the two positions separately, showed a significant effect of extraction site in the RB condition only (coefficient =

[29]Thanks to Colin Phillips for the suggestion to use passives.

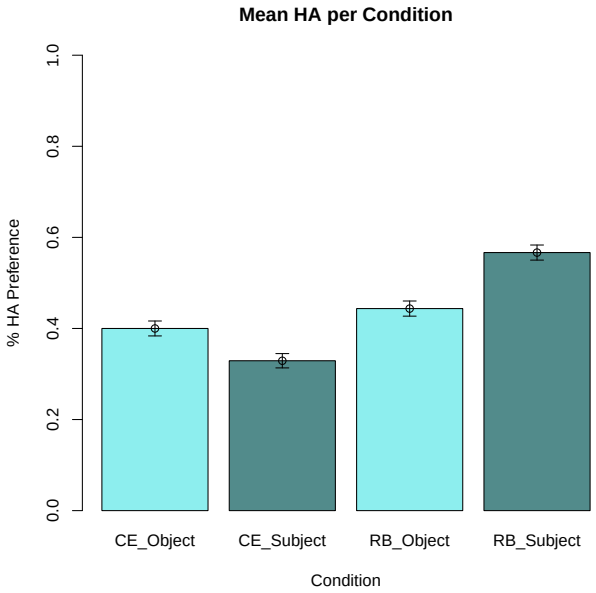


Figure 1: Summary of Attachment Preferences Experiment 1

0.9672, SE = 0.4023, z-score = 2.404, p<.01), with significantly more HA preferences for subject extraction than object extraction. Finally, analyzing effects of position for the two extraction sites separately revealed an effect of position for subject extraction only (coefficient = 1.7751, SE = 0.5954, z-score = 2.982, p <.001), with significantly more HA preferences for RB than CE.

Taken together these results show that, as predicted, the number of High Attachment decisions was significantly higher for subject extraction than for object extraction *in the RB condition only*, i.e. condition A.

4.2. Discussion

The results fully support our predictions. A LA preference was found in all conditions in which an unambiguous RC reading had been forced: using object extraction in the RB environment in condition B, and both subject and object extraction in CE, in condition C and D. High Attachment preference was observed only when PRs were available i.e. limited to subject extraction in RB cases (condition A). The absence of a statistically significant difference between condition C and D shows that the asymmetry between condition A and B boils down to the availability of PRs. Notice that these results have been obtained despite the extremely conservative use of PR-complement taking verbs. We deliberately chose to limit the use of these verbs to better demonstrate the possible influence of PR availability in previous studies even in the presence of a restricted number (8) of PR-taking verbs, i.e. 40% of the stimuli.[30] Importantly, HA preference for the PR-taking verbs taken separately goes up to 71.1% (i.e. an increment in average

[30]As mentioned above, it is not always possible to have access to the sentence stimuli used in published work, and even less information (usually none) can be found about fillers. However, a quick look at the literature shows that a

HA of 14.5%) in condition A, but it remains unvaried in condition B (46.9%). Conversely, when the eight PR-taking verbs are excluded from the analysis, HA preference for condition A goes down to 40% and to 34.7% in condition B, which indicates an effect of verb type even with such restricted numbers. A complete list of the item, together with average HA per item / condition, is reported in Appendix A.

An anonymous reviewer pointed out that these results might be offered an alternative explanation in terms of the higher memory load imposed on conditions B, C and D by object extraction and center embedding respectively. It is well established that object extraction is harder to parse than subject extraction (on extraction see King & Just, 1991; Gibson, 1998; Gordon et al., 2001, among many others). The literature on the relative complexity of Center Embedding and Right Branching is more divided (see Gibson et al. 2005 for a review of the literature and a claim that RB is in fact harder than CE and Santi et al. 2011a,b for a critical review of the results in Gibson et al. and for additional data asserting the higher complexity of CE).

As the same reviewer suggests "*working memory demands are minimized in Condition A, while the three other conditions where low attachment is found each have at least one extra burden on working memory*".[31] The reviewer further suggests we strengthen our position by avoiding structural manipulation, i.e. by manipulating only the type of the matrix verb, which is what we do in the next experiment.

4.3. Experiment II: Manipulating the matrix verb

As discussed in section 2.1, PRs behave much like other types of clausal complements in being selected only by a restricted class of verbs. Among these, perceptual (e.g. *see, hear, feel* etc.) or quasi-perceptual (e.g. *photograph, film, record*), are the ones that most readily allow for PRs across languages.

To further test the role of PR availability in attachment, and avoid possible structural confounds in an additional experiment we tested the effects of PR availability on RC attachment preference by manipulating the type of verb in the matrix clause. We used sentences containing strings ambiguous between a RC and PR interpretation, which displayed perceptual or quasi-perceptual verbs, and identical sentences in which the same string could not only be interpreted as a RC because of the stative nature of the matrix verb. If our account holds, we expect LA to arise in the unambiguous RC condition and HA in the ambiguous PR / RC condition.

Method and participants (N=30) Italian native speakers participated in an offline questionnaire on attachment preferences in complex DPs. All participants gave their informed consent before taking part in the study and were naive as to the goals of the experiment.

---

similar (or higher) percentage of PR-verbs was generally used: PR-taking verbs are used in 9 / 24 of the sentence stimuli (i.e. 37.5%) in Cuetos & Mitchell (1988); 8 / 20 (40%) in Brysbaert & Mitchell (1996); 6 / 16 (37.5%) in Carreiras & Clifton (1999); up to 13/24, i.e. more than 50% in Zagar et al. (1997). All these experiments revealed a HA preference in languages allowing PRs. Carreiras & Clifton (1993) used two sets of stimuli, the first set was used for experiments 1-4, this is the same set used by Carreiras & Clifton (1999), i.e. 37.5% of the sentences allow a PR interpretation. A second set of sentences was used for experiment 5. This contains at least 6 PR-verbs over 24 (*5, photograph; 15, draw; 16, bump into; 19 photograph; 21 meet; 12, see*), i.e. 25% of the stimuli.

[31] Two studies addressed the interaction of memory span and attachment preferences:Felser et al. (2003) with children, and Swets et al. (2007) with adults. Both reported a preference for *local* attachment in subjects with high working memory span. While these results do not directly inform us on the interaction of object RCs and higher memory load with attachment preferences, they might in fact predict this interaction to go in the opposite direction we observed, which would explain the relatively high percentage of HA in the Object RC condition and ultimately strengthen our results.

Materials and Design 24 minimal pairs of target sentences were constructed, keeping everything but the matrix verb constant. Condition A contained a PR taking predicate (e.g. *see, hear, film, photograph* among others), while Condition B contained stative predicates (e.g. *lives with, works with, is married to*) which only allow for NP complements, and therefore RC interpretation of the embedded clause. Two lists were created, with 24 target and 80 fillers. As in the previous experiment, the fillers did not contain either RCs or SCs / PRs. (57) depicts an example of the sentence stimuli used.

(57) **Stimuli Experiment II**

a. PR / RC CONDITION: PR-VERBS
Gianni ha visto il figlio del medico che correva.
G. saw the son of the doctor running.

b. RC ONLY CONDITION: STATIVE VERBS
Gianni vive con il figlio del medico che correva.
G. lives with the son of the doctor running.

Each subject only saw one version of each sentence. To ensure proper attention was paid to the task, a comprehension question followed each sentence. The questions and answers to both targets and fillers were counterbalanced so that NP1 was presented first in 50% of the answers, 50% of the answer to the fillers were true. The study was conducted using *Google Questionnaire*.

Results and Analysis All subjects performed at ceiling on the filler items. Table 6 reports the percentages of High Attachment preference per condition.

Eventive	**Stative**
78.6%	24.2%

Table 6: Percentage of High Attachment Preferences

Data were fit with mixed effects logistic regression using the lmer() function of the *lme4* package (Bates et al., 2011) of the R analysis program (R core development team). In the main model *verb-type* was fit as fixed factor, and subject and items as random factors. Intercept and random slopes were fit for the fixed effect. The analysis showed a highly significant effect of verb-type (coefficient = -3.95604, SE = 0.51992, z-score = -7.609, $p < .0001$), with significantly more HA preferences for event-taking (Condition A) than entity-taking (Condition B) verbs.
As predicted, LA was observed with stative predicates, which can only take nominal complements and with which the embedded clause can only be interpreted as a RC. A very strong HA preference emerged with perceptual predicates, which can take both nominal complements and clausal complements of the PR type. The extreme values obtained (around 75% vs. 25% in opposite directions in the two conditions) strongly support the PR-first Hypothesis.

5. Conclusions

In this paper we have shown that the literature on RC attachment preferences in complex DPs has ignored a grammatical distinction between the string identical RCs and PRs. We have argued that this distinction potentially confounds previous results in this area of research and claimed that much cross-linguistic differences in parsing preferences can be reduced to the asymmetric

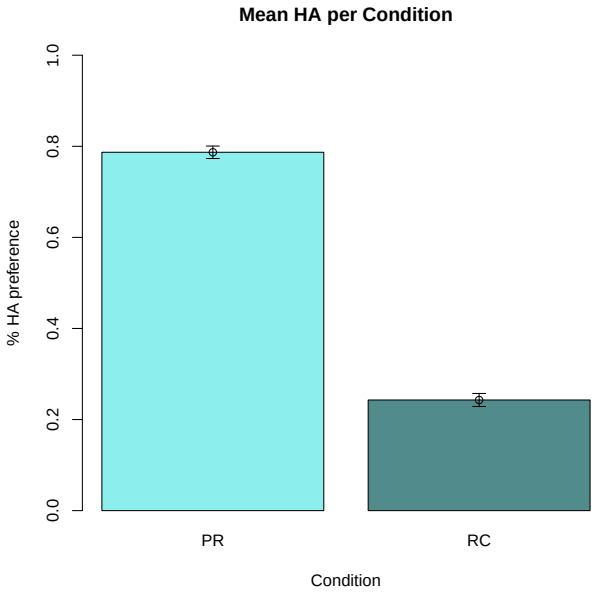


Figure 2: Summary of Attachment Preference Experiment 2

availability of PRs. Support for this claim was discussed, from both previously published and original results.

Looking back at the previous literature we see that, all else being equal, once a PR reading is excluded, i.e. once only genuine RCs are considered, LA preference is observed. This was shown to explain not only variation across languages, but also variation across syntactic structures within the same languages (e.g. type of Preposition / Relative Pronoun, position of the complex NP etc.). This discussion allowed us to present the various interpretations of '*with*' and to propose the *SC-first analysis*: a generalized preference for SCs over restrictive interpretations, which nicely correlates with previous results in the literature.[32].

Our experiments on RC-attachment in Italian further support our hypothesis: in the first experiment we have shown that ambiguity is resolved differently when the same sequence, NP1 of NP2 + RC, is embedded in different positions, and crucially LA preference arises in all cases in which a PR reading was excluded through grammatical means (i.e. object extraction, position of embedding), HA preference, on the other hand, is found when PRs are available (subject extraction in Right Branching context). Importantly, the first experiment was designed to replicate previous studies, i.e. only a small subset of the stimuli contained verbs that can select for a PR. The size of the effect is also representative of those earlier studies (the observed 56% HA over all verb types goes up to 68.8% when only PR compatible verbs are considered), which shows that even a small number of PR-verbs can strongly influence the final result. The second experiment directly tackles the role of the matrix verb in determining attachment preferences: we constructed

[32]We leave it for future research to investigate to what extent this account can generalize over classic cases of *Minimal Attachment*, such as the preference for instrumental over restrictive *with*

minimal pairs of sentences containing either PR-verbs as matrix predicates or stative verbs that can only select for NP complements (and therefore in which the embedded clause can only be parsed as a Relative Clause). The results are strongly in line with our prediction (78.6% HA in the PR vs. 24.2% HA in the RC-only condition), supporting the claim that a strong LA preference is to be expected in the absence of PR ambiguity. To complete the picture we should add that identical stimuli were used in an experiment in English by Grillo et al. (2014). As predicted, the results found here were not replicated in that experiment, i.e. a generalized LA preference was found in English across both conditions.

To interpret these results, and more generally the residual variation across languages and syntactic structures, we have proposed that when both PRs and RCs are available (in the absence of additional factors such as prosody, plausibility etc.) the parser prefers PRs over RCs because the former are simpler both at the structural (i.e. PRs are Small Clauses, while RCs are full clauses) and interpretive level (PRs require simpler presuppositions at the contextual level). This account also allowed us to dispense with parametrization of principles such as Relativized Relevance (Frazier, 1990) / Predicate Proximity (Gibson et al., 1996, 1999).

Notable exceptions to this generalization, which require further investigation, include a set of languages (German, Bulgarian, Russian) which have been classified as HA, albeit with contrasting results in the literature. We have noted that these languages share three important characteristics: i. they all disallow PRs; ii. they all require obligatorily require a relative pronoun to introduce RCs (which reasonably explains the lack of PRs in these languages), and iii. they all instantiate writing systems that require a comma between the second NP and the RC. These characteristics might reduce the observed HA preference to *Anaphoric Binding* (obligatory relative pronoun) and / or the *Implicit Prosody* (obligatory comma) accounts.

We conclude that PR availability plays a major role in shaping attachment preference and we hypothesize that the observed residual differences across languages are determined by this factor. This does not amount to saying that PR availability is the *only* factor involved in deciding attachment preferences, but that the origin of many otherwise obscure asymmetries in attachment reported in the literature can be traced back to this factor. Similarly, recognizing that PR-availability plays a central role in shaping attachment preferences does not automatically question the validity of previous approaches to the problem. The relevance of *Referentiality* and *Prosody*, for example, has been repeatedly demonstrated (Gilboy et al., 1995; Fodor, 2002a) *within* languages and independently from PR availability, i.e. also in clear RC-only contexts and in nonPR languages such as English. This clearly shows that, PRs aside, one cannot ignore these factors when attempting to identify what determines RC attachment in unambiguous RC environments and that both *Construal* and *Implicit Prosody* contribute crucial pieces to the puzzle. The same seems true of *Anaphoric Binding* if our characterization of attachment in German, Russian and Bulgarian is on the right track. In section 3.3.2, we also used *Relativized Relevance / Predicate Proximity* to explain attachment in Three-NP sites. What's crucial, however, is that taking PR-availability into account allowed us to avoid assuming a parametrized version of these principles. Finally, as mentioned above, much of the evaluation (both positive and negative) of the *Tuning Hypothesis* was made on potentially confounded data, as PR availability was never considered. A detailed, much needed, reevaluation of these studies in light of this factor is far beyond the scope of this paper.[33] Effects of frequency in processing are well-known, and PRs raise important questions that were not previously addressed in this debate. One such question,

[33]On this issue, Marc Brysbaert (p.c. 2012) pointed out that the difference in RC-attachment between animate nouns (>HA) and inanimate nouns (>LA) observed by Desmet et al. (2002a) might be explained assuming that PRs can only

for example, is whether PR-availability in a given language, which likely makes HA more frequent, will also raises HA preference in nonPR environments. The data presented here would appear to provide a strong negative answer to this question. Further, once we consider that the obligatory nature of subject-predicate relation in PRs should not be misclassified as HA, as no attachment choice is ever possible with PRs, the previous question, and the negative answer we tentatively offered, assume a quite different meaning.

What we have shown here is that speakers of those languages that allow for PRs in the a given context prefer HA in that context, while speakers of languages that disallow PRs in those same contexts prefer LA. Moreover, within the same language, we saw that whenever PRs are not available, LA preferences are observed universally. The main contribution of this work is *not* to replace previous approaches, but to free them from the unfair burden of having to explain away that (important) part of the observed variation generated by the asymmetric availability of PRs.

More work needs to be carried on to fully explore the interaction of the *PR-first* with other parsing principles. Similarly, at the theoretical level, a great effort is needed to describe the availability of PRs across syntactic environments and languages (keeping in mind that PR availability in a given structure is not the same across different languages, e.g. Italian vs. Spanish nominals) and thus make precise falsifiable predictions about RC-attachment in those languages. Future work will need to address several questions left open at present, including how and when does the parser decide between PRs and RCs and at what stage is PR-first affected by context manipulation.[34]

Other questions include the role of plausible differences among PR-complement and PR-adjunct taking verbs, the prosody of PRs and more generally SCs, and finally the relation between PR preference and memory span. We are currently running experiments to test many of these questions and to extend the empirical basis of the claim to cover more languages and syntactic environments. Results on Spanish, Portuguese (Grillo et al., 2012), English, French (Grillo & Spathas, 2014) and Greek (Grillo et al., 2013b) further support these claims. Results from timed questionnaires and self-paced reading also suggests an online preference for PRs / SCs over RCs in both European Portuguese and English (Grillo et al., 2013a). Finally, Costa et al. (2013) addressed the question of acquisition of PRs and found evidence for early knowledge of the obligatory HA in these structures and in Prepositional Infinitive Constructions in European Portuguese.

On these bases we have argued that once PRs are taken into the equation, the Universality of Parsing principles of locality can be stated once again. The question of whether these principles act independently from or in harmony with other factors (lexical, semantics, plausibility, prosody, context, frequency) is completely independent from this claim. Here, we address the residual variation that appeared to be present *after* these factors were taken into account; this

occur with animate nouns, and that this be further evidence for the central role of PR-availability in influencing RC attachment. PRs, however, are available with both animate and inanimate NPs, e.g. *Ho visto il vaso che si spaccava per il freddo / I saw the vase break itself because of the cold*. Still, there seem to us to be a clear preference for PRs to be built with animate subjects, this is because subjects of PRs have to undergo some kind of perceivable change of state. Change of state are obviously also available with inanimate nouns (e.g. the stone rolled), but some PR-verbs only allow animate subjects (e.g. *meet, surprise*. A proper assessment of the role of PRs in this pattern would require reanalyzing the relevant corpora to see whether the RCs under consideration could also be interpreted as PRs, and whether there was a difference in their internal structure when attached to animate or inanimate NPs.

[34]Remember that Desmet et al. (2002b) reports a clear but delayed effect of context in attachment in Dutch, but it is hard to judge from the outset whether PR availability acted as a potential confounding factor in that experiment.

residual variation created a huge theoretical problem that might be manageable once the role of PR availability in attachment is fully recognized.

Acknowledgments: This research is part of the project *Syntactic and lexical factors in processing complexity* funded by the Fundação para a Ciência e a Tecnologia with the research grant PTDC/CLE-LIN/114212/2009 awarded to Nino Grillo. We gratefully acknowledge the FCT contribution. Thanks to Keir Moulton for letting the first author know that the structures he had "*discovered*" already had a name, and for pointing us to the relevant literature and discussing it with us, it is an accident of geography that he is not a co-author of this paper. For extensive comments, suggestions and criticisms thanks to Andrea Santi. This paper was significantly improved thanks to the detailed comments of Gerry Altmann, Charles Clifton, Giorgos Spathas, Don Mitchell and three anonymous *Cognition* reviewers. This paper required lots of help with judgments about PR readings in several languages, we are grateful to the following people for providing it, often coupled with insightful comments and suggestions: Klaus Abels, Boban Arsenijević, Petra Augurzky, Valentina Bianchi, Richard Breheny, Marc Brysbaert, Jan Casalicchio, Meghan Clayards, Moreno Coco, Bruno Fernandes, Janet Dean Fodor, Berit Gehrke, Ted Gibson, Yosef Grodzinsky, John T. Hale, Gueorgui Hristovsky, Axiotis Kechagias, Young Shin Kim, Hans van de Koot, Tania Kouteva, Maria do Carmo Lourenço-Gomes, Marcus Maia, Donka Mangatcheva, Ad Neeleman, Roumiana Pancheva, Colin Phillips, Natalia Slioussar, Anca Sevcenco, Junko Shimoyama, Irina Sekerina, Natalia Slioussar, Giorgos Spathas, Mina Sugimura, Margarida Tomaz, Michael Wagner, Toshiyuki Yamada, Larraitz Zubeldia. Adriana Belletti, Valentina Bianchi and Luigi Rizzi helped us collecting data for the second experiment, for which we are very grateful. Previous versions of this work were presented at XXIV ENAPL, 2nd ETAP Conference (Montréal), 25^{th} CUNY Conference on Human Sentence Processing, AMLaP 2012, and as invited talks at University College London, Queen Mary and Geneva. We thank the organizers, reviewers and participants for useful comments and suggestions.

References

Abdelghany, H., & Fodor, J. (1999). Low attachment of relative clauses in arabic. Poster presented at the 5th Annual Conference on Architectures and Mechanisms for Language Processing (AMLaP), Edinburgh, UK, September 23-25.

Altmann, G. T. M., van Nice, K. Y., Garnham, A., & Henstra, J.-A. (1998). Late closure in context. *Journal of Memory and Language*, *38*, 459–484.

Altmann, G. T. M., & Steedman, M. (1988). Interaction with context during human sentence processing. *Cognition*, *30*, 191–281.

Augurzky, P. (2005). *Attaching Relative Clauses in German: The Role of Implicit and Explicit Prosody in Sentence Processing*. Ph.D. thesis University of Leipzig.

Auwera, J. (1985). The predicate relatives of French perception verbs. In A. Bolkstein, C. de Groot, & J. Mackenzie (Eds.), *Predicates and terms in functional grammar* (pp. 219–234). Dordrecht: Foris.

Baccino, T., Vincenzi, M. D., & Job, R. (2000). Cross-linguistic studies of the late closure strategy: French and italian. In M. D. Vincenzi, & V. Lombardo (Eds.), *Cross-Linguistic Perspectives on Language Processing* (pp. 89–118). Dordrecht: Kluwer.

Barros de Brito, A. M. (1995). Sobre algumas construções pseudorelativas em Português. *Línguas e Literaturas*, *12*, 23–54.

Bates, D., Maechler, M., & Bolker, B. (2011). lme4: linear mixed-effects models using S4 classes. R package version 0.999999-0. http://CRAN.R-project.org/package=lme4.

Bock, K., & Miller, C. A. (1991). Broken agreement. *Cognitive Psychology*, *23*, 45 – 93.

Brysbaert, M., & Mitchell, D. (1996). Modifier attachment in sentence parsing: Evidence from dutch. *Quarterly Journal of Experimental Psychology*, *49A*, 664–695.

Burzio, L. (1981). *Intransitive verbs and Italian auxiliaries*. Ph.D. thesis MIT Cambridge, MA.

Burzio, L. (1986). *Italian Syntax: A Government and Binding Approach*. Dordrecht: D. Reidel.

Carreiras, M., & Clifton, C. (1993). Relative clause interpretation preferences in Spanish and English. *Language and Speech*, *36*, 353–372.

Carreiras, M., & Clifton, C. (1999). Another word on parsing relative clauses: Eye-tracking evidence from Spanish and English. *Memory and Cognition*, *27*, 826–833.

Casalicchio, J. (2013). *Pseudorelative, gerundi e infiniti nelle varietà romanze: Affinità solo superficiali e corrispondenze strutturali*. Ph.D. thesis Università degli Studi di Padova.

Cinque, G. (1992). The Pseudo-Relative and Acc-*ing* constructions after verbs of perception. In *University of Venice Working Papers in Linguistics*. Università di Venezia.

Colonna, S., & Pynte, J. (2001a). Relative clause attachment in french: The role of fodor's "same size sister" constraint. Poster presented at the Prosody in Processing workshop, Utrecht, July 5-6.

Colonna, S., Pynte, J., & Mitchell, D. (2000). Relative clause attachment in french: The role of constituent length. Poster presented at the 13th Annual CUNY Conference on Human Sentence Processing, La Jolla, CA, March 30 - April 1.

Costa, J., Vaz, S., Fernandes, B., & Grillo, N. (2013). Pseudo-relatives and PIC in the parsing and acquisition of European Portuguese. Submitted to Probus.

Côté, M.-H. (1999). Quantification existentielle sur des événements et structure des pseudorelatives. In F. Corblin, C. Dobrovie-Sorin, & J.-M. Marandin (Eds.), *Empirical issues in formal syntax and semantics 2* (pp. 169–190). The Hague: Thesus.

Crain, S., & Steedman, M. (1985). On not being led up to garden path: The use of context by the psychological parser. In D. Dowty, L. Karttunen, & A. Zwicky (Eds.), *Natural language processing: Psychological, computational, and theoretical perspectives*. Cambridge University Press.

Cuetos, F., Mitchell, D., & Corley, M. (1996). Parsing in different languages. In M. Carreiras, J. García-Albea, & N. S. Gallés (Eds.), *Language processing in Spanish* (pp. 145–187). Mahwah, N.J.: Lawrence Erlbaum.

Cuetos, F., & Mitchell, D. C. (1988). Cross-linguistic differences in parsing. *Cognition*, *30*, 73–105.

De Vincenzi, M. (1991). *Syntactic parsing strategies in Italian*. Dordrecht: Kluwer.

De Vincenzi, M., & Job, R. (1993). Some observations on the universality of the late closure strategy. *Journal of Psycholinguistic Research*, *22*, 189, 206.

De Vincenzi, M., & Job, R. (1995). An investigation of late closure: The role of syntax, thematic structure, and pragmatics in initial interpretation. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *21*, 1303–1321.

Declerck, R. (1981). On the role of progressive aspect in nonfinite perception verb complements. *Glossa*, *15*, 83–113.

Declerck, R. (1982). The triple origin of perception verb complements. *Linguistic Analysis*, *10*, 1–26.

Desmet, T., Brysbaert, M., & Baecke, C. D. (2002a). The correspondence between sentence production and corpus frequencies in modifier attachment. *Quarterly Journal of Experimental Psychology*, *55A*, 879–896.

Desmet, T., De Baecke, C., & Brysbaert, M. (2002b). The influence of referential discourse context on modifier attachment in Dutch. *Memory and Cognition*, *30*, 150–157.

Desmet, T., & Gibson, E. (2003). Disambiguation preferences and corpus frequencies in noun phrase conjunction. *Journal of Memory and Language*, *49*, 353–374.

Donati, C., & Cecchetto, C. (2011). Relabeling heads: A unified account for relativization structures. *Linguistic Inquiry*, *42*, 519 – 560.

Dragoy, O. (2007). Accessibility of referents and attachment processing in russian. In *Architectures and Mechanisms for Language Processing AMLaP*. Turku, Finland.

Ehrlich, K., Fernández, E., Fodor, J., Stenshoel, E., & Vinereanu, M. (1999). Low attachment of relative clauses: New data from Swedish, Norwegian and Romanian. Poster presented at the 12th Annual CUNY Conference on Human Sentence Processing. New York, NY, March 18-20.

Fedorova, O., & Yanovich, I. (2004). Relative clause attachment in russian: The role of constituent length. In *Architectures and Mechanisms for Language Processing AMLaP*. Aix-en-Provence, France.

Fedorova, O., & Yanovich, I. (2006a). Can the rc-attachment processor work without semantics? Poster presented at FDSL 6.5, Nova Gorica, Slovenia.

Fedorova, O., & Yanovich, I. (2006b). Early preferences in RC-attachment in Russian: The effect of Working Memory differences. in: (eds.), ann. In J. Lavine, S. Franks, M. Tasseva-Kurktchieva, & H. Filip (Eds.), *Proceedings of FASL 14* (pp. 113–128). Ann Arbor, MI: Michigan Slavic Publications.

Felser, C., Marinis, T., & Clahsen, H. (2003). Children's processing of ambiguous sentences: A study of relative clause attachment. *Language Acquisition*, *11*, 127–163.

Fernandes, B. (2012). *Attachment Preferences in Prepositional Infinitive Constructions*. Master's thesis Centro de Linguística da Universidade Nova de Lisboa.

Fernández, E. (2003). *Bilingual sentence processing: Relative clause attachment in English and Spanish*. Amsterdam: John Benjamins.

Fernández, E. M. (1999). Processing strategies in second language acquisition: Some preliminary results. In E. Klein, & G. Martohardjono (Eds.), *The Development of Second Language Grammars: A Generative Approach* (pp. 217–239). Amsterdam: John Benjamins.

Ferreira, F., & Clifton, C. J. (1986). The independence of syntactic processing. *Journal of Memory and Language*, *25*, 348 – 368.

Fodor, J. D. (1998a). Learning to Parse? *Journal of Psycholinguistic Research*, *27*, 285–319.

Fodor, J. D. (1998b). Parsing to Learn? *Journal of Psycholinguistic Research*, *27*, 339–374.

Fodor, J. D. (2002). Prosodic disambiguation in silent reading. In M. Hirotani (Ed.), *Proceedings of the North East Linguistic Society*. GSLA, University of Massachusetts, Amherst.

Fodor, J. D. (2002a). Psycholinguistics cannot escape prosody. Paper presented at Speech Prosody 2002, Aix-en-Provence, France, April 11-13.

Fodor, J. D. (2002b). Prosodic disambiguation in silent reading. In *Proceedings of the North East Linguistic Society* (pp. 113–132). Amherst: GSLA, University of Massachusetts volume 32.

Fraga, I., García-Orza, J., & Acuña, J. (2005). La desambiguación de oraciones de relativo en Gallego: nueva evidencia de adjunción alta en lenguas romances. *Psicológica*, *26*, 243–260.

Fraga, I., Piñeiro, A., Acuña Fariña, C., Redondo, J., & García-Orza, J. (2012). Emotional nouns affect attachment decisions in sentence completion tasks. *The Quarterly Journal of Experimental Psychology*, *65*, 1740–1759. PMID: 22512733.

Franck, J., Frauenfelder, U. H., & Rizzi, L. (2007). A syntactic analysis of interference in subject-verb agreement. In C. Shutze, & V. Ferreira (Eds.), *The state of the art in speech error research* (pp. 173–190). MITWPL.

Franck, J., Lassi, G., Frauenfelder, U. H., & Rizzi, L. (2006). Agreement and movement; A syntactic analysis of attraction. *Cognition*, *101*, 173–216.

Franck, J., Soare, G., Frauenfelder, U. H., & Rizzi, L. (2010). Object interference in subject-verb agreement: The role of intermediate traces of movement. *Journal of Memory and Language*, *62*, 166–182.

Frazier, L. (1978). *On comprehending sentences: Syntactic parsing strategies*. Ph.D. thesis U. of Connecticut.

Frazier, L. (1987). Syntactic processing: Evidence from Dutch. *Natural Language and Linguistic Theory*, *5*, 519–559.

Frazier, L. (1990). Parsing modifiers. special purpose routines in the human sentence processing mechanism? In D. Balota, & G. F. d'Arcais (Eds.), *Comprehension Processes in Reading* (pp. 303–330). Hillsdale, N.J.: Lawrence Erlbaum.

Frazier, L., & Clifton, C. (1996). *Construal*. Cambridge, MA: MIT Press.

Frazier, L., & Fodor, J. D. (1978). The sausage machine: A new two-stage parsing model. *Cognition*, *6*, 291–326.

Frenck-Mestre, C., & Pynte, J. (2000a). Resolving syntactic ambiguities: Crosslinguistic differences? In M. D. Vincenzi, & V. Lombardo (Eds.), *Cross-Linguistic Perspectives on Language Processing* (pp. 119–148). Dordrecht: Kluwer Academic Publishers.

Frenck-Mestre, C., & Pynte, J. (2000b). Romancing syntactic ambiguity: Why the French and the Italians don't see eye to eye. In A. Kennedy, R. Radach, D. Heller, & J. Pynte (Eds.), *Reading as a Perceptual Process* (pp. 549–564). Oxford, UK: Elsevier.

Gibson, E. (1991). *A computational theory of human linguistic processing: Memory limitations and processing breakdown*. Ph.D. thesis Carnegie Mellon University.
Gibson, E. (1998). Linguistic complexity: locality of syntactic dependencies. *Cognition*, *68*, 1–76.
Gibson, E., Desmet, T., Grodner, D., Watson, D., & Ko, K. (2005). Reading relative clauses in English. *Cognitive Linguistics*, *16*, 313–353.
Gibson, E., Pearlmutter, N., Canseco-Gonzalez, E., & Hickok, G. (1996). Recency preference in the human sentence processing mechanism. *Cognition*, *59*, 23–59.
Gibson, E., Pearlmutter, N., & Torrens, V. (1999). Recency and lexical preferences in spanish. *Memory & Cognition*, *27*, 603–611.
Gibson, E., & Schütze, C. (1999). Disambiguation preferences in noun phrase conjunction do not mirror corpus frequency. *Journal of Memory and Language*, *40*, 263–279.
Gilboy, E., Sopena, J., Clifton, C., & Frazier, L. (1995). Argument structure and association preferences in spanish and english complex NPs. *Cognition*, *54*, 131–167.
Gordon, P. C., Hendrick, R., & Johnson, M. (2001). Memory interference during language processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *27*, 1411 – 1423.
Graffi, G. (1980). Su alcune costruzioni "pseudorelative". *Rivista di Grammatica Generativa*, *5*, 115–139.
Grice, H. P. (1975). Logic and conversation. In J. Morgan (Ed.), *Spech Acts* (pp. 41–58). New York: Academic Press.
Grillo, N., Fernandes, B., & Costa, J. (2012). Attachment preferences in Prepositional Infinitive Constructions in European Portuguese. In *AMLaP (Architectures and Mechanisms for Language Processing)*. Riva del Garda, Italy.
Grillo, N., Santi, A., Fernandes, B., & Costa, J. (2013a). Highs and Lows in English attachment. In *26th CUNY Conference on Human Sentence Processing*. Columbia, South Carolina.
Grillo, N., Santi, A., Pozniak, C., & Hemforth, B. (2014). The asymmetric role of pr-taking verbs in RC attachment in English and French. submitted.
Grillo, N., & Spathas, G. (2014). Tense and Aspect modulate RC attachment: Testing the PR hypothesis in Greek. In *Experimental and theoretical approaches to relative clauses reconciled*. Marburg, Germany: 36 DGfS (Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft).
Grillo, N., Tomaz, M., Lourenço Gomes, M., & Santi, A. (2013b). Pseudo relatives vs. Relative clauses: Greater preference, Lower costs. In *AMLaP (Architectures and Mechanisms for Language Processing)*. Marseille, France.
Guasti, M. (1988). La pseudorelative et les phénomenènes d'accord. *Rivista di Grammatica Generativa*, *13*, 35–57.
Guasti, M. (1992). Progressive in the complements of perception verbs. In Bonomi, Casalegno, & Zwarts (Eds.), *Proceedings of the Gargano Conference on "Perceptual Reports"*.
Guasti, M. (1993). *Causatives and perception verbs: a comparative study*. Torino: Rosenberg and Sellier.
Gutierrez-Ziardegi, E., Carreiras, M., & Laka, I. (2004). Bilingual sentence processing: Relative clause attachment in basque and spanish. In *CUNY Conference on Human Sentence Processing*. University of Maryland.
Hale, J. T. (forthcoming). *Automaton theories of human sentence comprehension*. CSLI Press.
Hemforth, B., Fernández, S., Clifton, C., Frazier, L., Konieczny, L., & Walter, M. (unpublished). Relative clause attachment in German, English, Spanish and French: Effects of position and length. Unpublished ms.
Hemforth, B., Konieczny, L., & Scheepers, C. (1996). Syntactic and anaphoric processes in modifier attachment. In *9th CUNY Conference on Human Sentence Processing*.
Hemforth, B., Konieczny, L., & Scheepers, C. (2000). Syntactic attachment and anaphor resolution: Two sides of relative clause attachment. In M. Crocker, M. Pickering, & C. Clifton (Eds.), *Architectures and Mechanisms for Language Processing* (pp. 259–281). Cambridge, UK: Cambridge University Press.
Hemforth, B., Konieczny, L., Scheepers, C., & Strube, G. (1998). Syntactic ambiguity resolution in German. In D. Hillert (Ed.), *Syntax and Semantics: A cross-linguistic perspective* (pp. 293–312). San Diego: Academic Press.
Hill, R., & Murray, W. (1998). The dissociation of processing and eye-movement patterns: Evidence from punctuation. In *Poster presented at the 4th Annual Conference on Architectures and Mechanisms for Language Processing (AMLaP)*. Freiburg, Germany.
Igoa, J., Carreiras, M., & Meseguer, E. (1998). A study on Late Closure in Spanish: Principle-grounded vs. frequency-based accounts on attachment preferences. *Quarterly Journal of Experimental Psychology*, *51A*, 561–592.
Jun, S. (2003). The effect of phrase length and speech rate on prosodic phrasing. In *Proceedings of the International Congress of Phonetic Sciences*. Barcelona, Spain.
Kamide, Y., & Mitchell, D. (1997). Relative clause attachment: Nondeterminism in Japanese parsing. *Journal of Psycholinguistic Research*, *26*, 247–254.
Kayne, R. (1981). Binding, quantifiers, clitics and control. In F. Heny (Ed.), *Binding and Filtering* (pp. 87–102). London: Croom Helm.
Kayne, R. (1994). *The Antisymmetry of Syntax*. Linguistic Inquiry Monograph 25. Cambridge, MA: MIT Press.
Kim, M.-J. (2009). E-type anaphora and three types of *kes*-constructions in korean. *Natural Language and Linguistic Theory*, *27*, 345–377.
Kimball, J. (1973). Seven principles of surface structure parsing in natural language. *Cognition*, *2*, 15–47.

King, J., & Just, M. (1991). Individual differences in syntactic processing: the role of working memory. *Journal of Memory and Language*, *30*, 580–602.
Koenig, J.-P., & Lambrecht, K. (1999). French relative clauses as secondary predicates: A case study in construction theory. Unpublished ms. Communication présentée au 2e Colloque de Syntaxe et Sémantique de Paris, 17 octobre.
Koopman, H., & Sportiche, D. (2010). The *que/qui* alternation: New analytical directions. Ms. UCLA.
Labelle, M. (1996). Remarques sur les verbes de perception et la sous-catégorisation. *Recherches Linguistiques de Vincennes*, *25*, 83–106.
Lasersohn, P. (1995). *Plurality, Conjunction, and Events*. Dordrecht: Kluwer.
Lourenço-Gomes, M. d. C., Costa, A., & Maia, M. (2011). Number and gender integration in sentence processing: data from european portuguese. Poster presented at the 10th International Symposium of Psycholinguistics Donostia-San Sebastian. Spain. April 13th-16th, 2011.
Lovrić, N. (2003). *Implicit prosody in silent reading: Relative clause attachment in Croatian*. Ph.D. thesis City University of New York.
Maia, M., Costa, A., Fernández, E., & Lourenço-Gomes, M. (2006). Early and late preferences in relative clause attachment in Portuguese and Spanish. *Journal of Portuguese Linguistics*, *5*, 203–226.
Maia, M., & Maia, J. (2001). The comprehension of relative clauses by monolingual and bilingual speakers of portuguese and english. Paper presented at the Congresso de Sociedade Internacional de Português como Lingua Estrangeira (SIPLE), November 2001.
McCawley, J. D. (1981). The syntax and semantics of english relative clauses. *Lingua*, *53*, 99–149.
Mcnally, L. (1993). Comitative coordination: A case study in group formation. *Natural Language Linguistic Theory*, *11*, 347–379.
Mendelssohn, A., & Pearlmutter, N. (1999). Individual differences in relative clause attachment preferences. In *Poster presented at the 12th CUNY Conference on Human Sentence Processing*. New York, NY.
Mitchell, D., Cuetos, F., & Zagar, D. (1990). Reading in different languages: is there a universal mechanism for parsing sentences? In D. Balota, & G. F. d'Arcais (Eds.), *Comprehension processes in reading* (pp. 285–302). Hillsdale, N.J.: Lawrence Erbaum.
Mitchell, D. C., & Brysbaert, M. (1998). Challenges to recent theories of crosslinguistic variation in parsing: Evidence from Dutch. In D. Hillert (Ed.), *Sentence Processing: A Crosslinguistic Perspective* (pp. 313–335). San Diego, CA: Academic Press.
Mitchell, D. C., Brysbaert, M., Grondelaers, S., & Swanepoel, P. (2000). Modifier attachment in Dutch: Testing aspects of Construal Theory. In D. H. A. Kennedy, R. Radach, & J. Pynte (Eds.), *Reading as a Perceptual Process* (pp. 493–516). Oxford, UK: Elsevier.
Mitchell, D. C., & Cuetos, F. (1991). The origin of parsing strategies. In C. Smith (Ed.), *Current issues in Natural Language Processing* (pp. 1–12). Center for Cognitive Science, U. of Austin, TX.
Mitchell, D. C., Cuetos, F., Corley, M. M. B., & Brysbaert, M. (1995). Exposure-based models of human parsing: Evidence for the use of coarse-grained (nonlexical) statistical records. *Journal of Psycholinguistic Research*, *24*, 469–488.
Miyamoto, E. (1999). *Relative clause processing in Brazilian Portuguese and in Japanese*. Ph.D. thesis MIT Cambridge, MA.
Miyamoto, E. (2005). Orações relativas ambeiguas e a homogeneidade do processamento de sentenças. In M.Maia, & I. Finger (Eds.), *Processamento da Linguagem* (pp. 71–90). Pelotas: Educat.
Miyamoto, E., Gibson, E., Pearlmutter, N., Aikawa, T., & Miyagawa, S. (1999). A u-shaped relative clause attachment preference in Japanese. *Language and Cognitive Processes*, *14*, 663–686.
Moulton, K. (2009). *Natural selection and the syntax of clausal complementation*. Ph.D. thesis University of Massachusetts Amherst.
Murray, W., Rahman, A., & Heydel, M. (2000). Modifier attachment preferences across languages and across structures.
Omaki, A. (2005). *Working memory and relative clause attachment in first and second language processing*. Unpublished ma thesis University of Hawaii.
Papadopoulou, D., & Clahsen, H. (2003). Parsing strategies in L1 and L2 sentence processing: A study of relative clause attachment in Greek. *Studies in Second Language Acquisition*, *25*, 501–528.
Phillips, C. (1996). *Order and Structure*. Ph.D. thesis Massachusetts Institute of Technology Cambridge, MA.
Phillips, C., & Gibson, E. (1997). The strength of the local attachment preference. *Journal of Psycholinguistic Research*, *26*, 323–346.
Pickering, M. J., Traxler, M. J., & Crocker, M. W. (2000). Ambiguity resolution in sentence processing: Evidence against frequency-based accounts. *Journal of Memory and Language*, *43*, 447 – 475.
Pynte, J., Portes, C., Holcomb, P., & Di Cristo, A. (2003). Relative clause attachment in french: an erp study. In *AMLaP (Architectures and Mechanisms for Language Processing)*. Glasgow, Scotland.
Quinn, D., Abdelghany, H., & Fodor, J. (2000). More evidence of implicit prosody in reading. French and Arabic relative clauses.

Radford, A. (1975). Pseudo-relatives and the unity of subject-raising. *Archivum Linguisticum*, *6*, 32–64.
Radford, A. (1977). *Italian Syntax. Transformational and Relational Grammar*. Cambridge: Cambridge University Press.
Rafel, J. (1999). *Complex Small Clauses*. Ph.D. thesis Universitàt Autonoma de Barcelona.
Raposo, E. (1989). Prepositional Infinitival Constructions in European Portuguese. In J. Osvaldo, & K. J. Safir (Eds.), *The Null Subject Parameter* (pp. 277–305). Kluwer.
Ribeiro, A. (1998). Um caso de não aplicaao de late closure no português do brasil. Rio de Janeiro: UFRJ / FL. Mimeo.
Ribeiro, A. (2005). Late closure em parsing no português do brasil. In I. F. M. Maia (Ed.), *Processamento da Linguagem* (pp. 51–70). Pelotas: Educat.
Rizzi, L. (1992). Direct perception, government and thematic sharing. In Bonomi, Casalegno, & Zwarts (Eds.), *Proceedings of the Gargano Conference on Perceptual Reports*.
Santi, A., Grillo, N., Grodzinsky, Y., & Wagner, M. (2011a). Planned production and self-paced reading of relative clause attachment. In S. University (Ed.), *The 24th CUNY Conference on Human Sentence Processing*. California.
Santi, A., Grillo, N., Grodzinsky, Y., & Wagner, M. (2011b). Planned production and self-paced reading of relative clause attachment. In M. University (Ed.), *2nd ETAP (Experimental and Theoretical Advances in Prosody) Conference*. Montreal.
Sekerina, I. (1997). The Late Closure Principle vs. the Balance Principle: Evidence from on-line processing of ambiguous Russian sentences. In P. Costa (Ed.), *The Proceedings of the Second European Conference on Formal Description of Slavic Languages*. University of Potsdam, Germany.
Sekerina, I. (2004). Cross-linguistic variation in gender use as a parsing constraint: Dutch vs. Russian. Paper presented at the 13th Annual Meeting Formal Description of Slavic Languages, 13 FASL, Columbia, February 24-29.
Sekerina, I., Petrova, K., & Fernández, E. (2003). Relative clause attachment in Bulgarian. Paper presented at the 12th Annual Meeting Formal Description of Slavic Languages, 12 FASL, Ottawa, May 9-11.
Shen, X. (2006). *Late assignment of syntax theory: evidence from Chinese and English*. Ph.D. thesis University of Exeter.
Shimoyama, J. (1999). Internally headed relative clauses in japanese and E-type pronoun anaphora. *Journal of East Asian Linguistics*, *8*, 147–182.
Starke, M. (1995). On the format for Small Clauses. In A. Cardinaletti, & M. Guasti (Eds.), *Syntax and Semantics: Small Clauses* (pp. 237–269). Academic Press, London.
Steinhauer, K. (2003). Electrophysiological correlates of prosody and punctuation. *Brain and Language*, *86*, 142–164.
Steinhauer, K., Alter, K., & Friederici, A. D. (1999). Steinhauer, k., alter, k., friederici, a.d. (1999). brain potentials indicate the immediate use of prosodic cues in natural speech processing. *Nature Neuroscience*, *2*, 191–196.
Steinhauer, K., & Friederici, A. D. (2001). Prosodic boundaries, comma rules, and brain responses: The Closure Positive Shift in ERPs as a universal marker for prosodic phrasing in listeners and readers. *Journal of Psycholinguistic Research*, *30*, 267–295.
Swets, B., Desmet, T., Hambrick, D. Z., & Ferreira, F. (2007). The role of working memory in syntactic ambiguity resolution: A psychometric approach. *Journal of Experimental Psychology-General*, *136*, 64–81.
Taraldsen, T. (1981). *The theoretical implications of a class of marked extraction*. Theory of Markedness in Generative Grammar. Pisa: Scuola Normale Superiore.
Traxler, M., Pickering, M., & Clifton, C. (1998). Adjunct attachment is not a form of lexical ambiguity resolution. *Journal of Memory and Language*, *39*, 558–592.
Wager, M. W., Lau, E. F., & Phillips, C. (2009). Agreement attraction in comprehension: Representation and processes. *Journal of Memory and Language*, *61*, 206–237.
Wijnen, F. (1998). Dutch relative clauses in two- and three-site contexts. Poster presented at the 11th Annual CUNY Conference on Human Language Processing, New Brunswick, NJ, March 19-21.
Wijnen, F., Troos, C., & Quené, H. (1999). Prosodic phrasing and relative clause attachment in a three-site context. Poster presented at the 12th Annual CUNY Conference on Human Language Processing, New York, NY, March 18-20.
Zagar, D., Pynte, J., & Rativeau, S. (1997). Evidence for early-closure attachment on first-pass reading times in French. *Quarterly Journal of Experimental Psychology*, *50A*, 421–438.

Appendix A. Items Experiment 1

Note: Mean HA preference is indicated for each item. (*) marks items containing clear instances of PR taking verbs.

1. a. il dottore ha chiamato il figlio del signore che veniva attaccato dai poliziotti 50
   b. il dottore ha chiamato il figlio del signore che i poliziotti avevano attaccato 25

	c. il figlio del signore che veniva attaccato dai poliziotti ha superato la prova	33.3
	d. il figlio del signore che i poliziotti stavano attaccando ha superato la prova	11.1
2.	a. il barista ha guardato l'amico del cliente che veniva sorpreso dai colleghi	* 44.4
	b. il barista ha guardato l'amico del cliente che i colleghi avevano sorpreso	25
	c. l'amico del cliente che veniva sorpreso dai colleghi è molto buono	75
	d. l'amico del cliente che i colleghi avevano sorpreso è molto buono	66.6
3.	a. l' avvocato ha diffidato il padre del ragazzo che veniva tradito dai compagni	0
	b. l' avvocato ha diffidato il padre del ragazzo che i compagni avevano tradito	22
	c. il padre del ragazzo che veniva tradito dai compagni è molto amareggiato	0
	d. il padre del ragazzo che i compagni avevano tradito è molto amareggiato	37.5
4.	a. il cronista ha intervistato l'amico del senatore che veniva colpito dai rivoltosi	50
	b. il cronista intervistato l'amico del senatore che i rivoltosi avevano colpito	33
	c. l'amico del senatore che veniva colpito dai rivoltosi è molto diligente	55.5
	d. l'amico del senatore che i rivoltosi avevano colpito è molto diligente	50
5.	a. il duca ha aiutato il figlio del sarto che veniva aggredito dai ladri	50
	b. il duca ha aiutato il figlio del sarto che i ladri avevano aggredito	50
	c. il figlio del sarto che veniva aggredito dai ladri è ancora intristito	44.4
	d. il figlio del sarto che i ladri avevano aggredito è ancora intristito	33.3
6.	a. il visitatore ha riconosciuto il collega del dirigente che veniva zittito dai moderatori	22.2
	b. il visitatore ha riconosciuto il collega del dirigente che i moderatori avevano zittito	25
	c. il collega del dirigente che veniva zittito dai moderatori è poco cortese	62.5
	d. il collega del dirigente che i moderatori avevano zittito è poco cortese	22.2
7.	a. il direttore ha conosciuto il segretario del supervisore che veniva promosso dai colleghi	88.8
	b. il direttore ha conosciuto il segretario del supervisore che i colleghi avevano promosso	33.3
	c. il segretario del supervisore che veniva promosso dai colleghi è molto influente	0
	d. il segretario del supervisore che i colleghi avevano promosso è molto influente	62,5
8.	a. il marchese ha osservato la nipote della ballerina che veniva protetta dalle amiche	* 87.5
	b. il marchese ha osservato la nipote della ballerina che le amiche avevano protetto	100
	c. la nipote della ballerina che veniva protetta dalle amiche è davvero affascinante	29.4
	d. la nipote della ballerina che le amiche avevano protetto è davvero affascinante	25
9.	a. il tecnico ha ammirato il sosia del calciatore che veniva esaltato dai tifosi	* 75
	b. il tecnico ha ammirato il sosia del calciatore che i tifosi avevano esaltato	62.5
	c. il sosia del calciatore che veniva esaltato dai tifosi è proprio bravo	22.2
	d. il sosia del calciatore che i tifosi avevano esaltato è proprio bravo	22.2
10.	a. la cameriera ha visto l'amico del poliziotto che veniva insultato dai teppisti	* 100
	b. la cameriera ha visto l'amico del poliziotto che i teppisti avevano insultato	0
	c. l'amico del poliziotto che veniva insultato dai teppisti è stato ricompensato	37.5
	d. l'amico del poliziotto che i teppisti avevano insultato è stato ricompensato	44.4
11.	a. lo studente ha odiato il nipote del preside che veniva premiato dai giurati	* 100
	b. lo studente ha odiato il nipote del preside che i giurati avevano premiato	100
	c. il nipote del preside che veniva premiato dai giurati è stato avvertito	0
	d. il nipote del preside che i giurati avevano premiato è stato avvertito	62.5
12.	a. la psicolabile ha sparato al maestro del pianista che veniva applaudito dai musicisti	50
	b. la psicolabile ha sparato al maestro del pianista che i musicisti avevano applaudito	33.3
	c. il maestro del pianista che veniva applaudito dai musicisti è molto orgoglioso	11.1
	d. il maestro del pianista che i musicisti avevano applaudito è molto orgoglioso	0

13.	a. la signora ha aiutato il garzone del cuoco che veniva chiamato dai clienti	100
	b. la signora ha aiutato il garzone del cuoco che i clienti avevano chiamato	62.5
	c. il garzone del cuoco che veniva chiamato dai clienti è stato licenziato	44.4
	d. il garzone del cuoco che i clienti avevano chiamato è stato licenziato	33.3
14.	a. la talpa ha avvertito il cugino del ragazzo che veniva spiato dai carabinieri	33.3
	b. la talpa ha avvertito il cugino del ragazzo che i carabinieri avevano spiato	0
	c. il cugino del ragazzo che veniva spiato dai carabinieri merita una lezione	50
	d. il cugino del ragazzo che i carabinieri avevano spiato merita una lezione	33.3
15.	a. il responsabile ha nascosto la sorella della segretaria che veniva inseguita dai malviventi	100
	b. il responsabile ha nascosto la sorella della segretaria che i malviventi avevano inseguito	77.7
	c. la sorella della segretaria che veniva inseguita dai malviventi è tanto cara	25
	d. la sorella della segretaria che i malviventi avevano inseguito è tanto cara	37.5
16.	a. la contessa ha ascoltato l' ospite del marchese che veniva interrotto dai commensali	* 62.5
	b. la contessa ha ascoltato l' ospite del marchese che i commensali avevano interrotto	44.4
	c. l' ospite del marchese che veniva interrotto dai commensali è davvero sguaiato	0
	d. l' ospite del marchese che i commensali avevano interrotto è davvero sguaiato	25
17.	a. la polizia ha sentito il vicino del dottore che veniva interrogato dalla portiera	*50
	b. la polizia ha sentito il vicino del dottore che la portiera aveva interrogato	50
	c. il vicino del dottore che veniva interrogato dalla portiera è sempre distratto	44.4
	d. il vicino del dottore che la portiera aveva interrogato è sempre distratto	44.4
18.	a. il camionista ha investito il nipote del farmacista che veniva distratto dai clienti	33.3
	b. il camionista ha investito il nipote del farmacista che i clienti avevano distratto	50
	c. il nipote del farmacista che veniva distratto dai clienti è molto sensibile	50
	d. il nipote del farmacista che i clienti avevano distratto è molto sensibile	77.7
19.	a. la presidentessa ha salutato il corriere del commerciante che veniva eletto dai rappresentanti	11.1
	b. la presidentessa ha salutato il corriere del commerciante che i rappresentanti avevano eletto	33.3
	c. il corriere del commerciante che veniva eletto dai rappresentanti è stato fortunato	25
	d. il corriere del commerciante che i rappresentanti avevano eletto è stato fortunato	50
20.	a. l' investigatore ha intercettato il sostituto del ministro che veniva corrotto dai finanzieri	*50
	b. l' investigatore ha intercettato il sostituto del ministro che i finanzieri avevano corrotto	44.4
	c. il sostituto del ministro che veniva corrotto dai finanzieri ha poco potere	0
	d. il sostituto del ministro che i finanzieri avevano corrotto ha poco potere	25

Appendix B. Items Experiment 2

1.	a. Gianni ha visto il figlio del medico che correva la maratona	92.8
	b. Gianni vive con il figlio del medico che correva la maratona	25
2.	a. Maria ha sentito la nonna della ragazza che gridava	68.7
	b. Maria lavora con la nonna della ragazza che gridava	14.2
3.	a. Pietro ha sentito il maestro del ragazzo che cantava	71.4
	b. Pietro si allena con il maestro del ragazzo che cantava	0
4.	a. lo scrittore guardava la zia della ragazza che saltava	62.5
	b. lo scrittore ha sposato la zia della ragazza che saltava	7.1
5.	a. Silvia ascoltava la figlia del poliziotto che parlava	92.8
	b. Silvia lavora per la figlia del poliziotto che parlava	18.7
6.	a. Paola osservava l'amico del politico che cucinava	87.5
	b. Paola è fidanzata con l'amico del politico che cucinava	28.5

7.	a. Mario ha sorpreso l'assistente dell'attrice che rubava	100
	b. Mario è affezionato all'assistente dell'attrice che rubava	56.2
8.	a. l'avvocato ha beccato l'autista del vicino che fumava	100
	b. l'avvocato si esercita con l'autista del vicino che fumava	28.5
9.	a. Lucia osservava il vicino del segretario che si allenava	100
	b. Lucia è innamorata del vicino del segretario che si allenava	25
10.	a. Giorgio guardava il nipote dell'infermiera che mangiava	87.5
	b. Giorgio è imparentato col nipote dell'infermiera che mangiava	7.1
11.	a. Carlo ha fotografato il collega dell'impiegato che rubava	71.4
	b. Carlo odia il collega dell'impiegato che rubava	31.2
12.	a. Sara ha visto l'amico del giudice che guidava	87.5
	b. Sara convive con l'amico del giudice che guidava	35.7
13.	a. Francesco immaginava l'amica dell'estetista che lavorava	78.5
	b. Francesco cena con l'amica dell'estetista che lavorava	31.2
14.	a. Rachele ha sognato l'amico del cugino che beveva	87.5
	b. Rachele è sposata con l'amico del cugino che beveva	14.2
15.	a. Ennio ha ritratto il fratello della donna che fumava	35.7
	b. Ennio lavora per il fratello della donna che fumava	6.2
16.	a. Filippo ha filmato l'agente del giocatore che russava	65.2
	b. Filippo frequenta l'agente del giocatore che russava	42.8
17.	a. Maria ha registrato il cugino dell'avvocato che parlava	62.5
	b. Maria lavora per il cugino dell'avvocato che parlava	13.6
18.	a. Roberto ha guardato l'amico del pizzaiolo che ballava	71.4
	b. Roberta ama l'amico del pizzaiolo che ballava	55.5
19.	a. Simona ha fotografato il vicino dell'infermiera che studiava	66.6
	b. Simona collabora col vicino dell'infermiera che studiava	52.3
20.	a. Michele guardava il fratello del manager che scalava	76.1
	b. Michele studia col fratello del manager che scalava	44.4
21.	a. Antonio ha filmato la sorella dell'amica che scriveva	55.5
	b. Antonio ha sposato la sorella dell'amica che scriveva	4.7
22.	a. Mario immaginava l'amica della collega che ballava	90.4
	b. Mario lavora con l'amica della collega che ballava	44.4
23.	a. Massimo ha visto l'insegnante dell'amica che guidava	55.5
	b. Massimo esce con l'insegnante dell'amica che guidava	4.7
24.	a. Anna ascoltava il figlio del vicino che cantava	90.4
	b. Anna studia col figlio del vicino che cantava	44.4

Appendix C. Pseudo Relatives across languages

Appendix C.1. Romance Languages

Table C.7 contains a list of languages for which PR-availability was discussed in the literature.

Language	Sentence	Reference
Spanish	He visto a Pedro que corria	Rafel (1999)
Italian	Ho visto Gianni che correva	Radford (1975, 1977); Graffi (1980), Taraldsen (1981); Burzio (1981, 1986), Guasti (1988, 1992, 1993); Cinque (1992), Rizzi (1992); Casalicchio (2013).
French	J'ai vu Jean qui courait	Kayne (1981); Labelle (1996), Côté (1999); Koenig & Lambrecht (1999), Koopman & Sportiche (2010)
Galician	Eu vin a Xoán que corría	Rafel (1999)
European Portuguese	Eu vejo o João que corre	Barros de Brito (1995); Fernandes (2012)

Table C.7: PRs across languages

Appendix C.2. Dutch

(58-a,b) illustrate PRs in Dutch:

(58) a. Ik zag Jan die naar huis rende
I saw J who to home run-past
b. Ik zag Jan naar huis rennen
I saw J to home run-inf

(59) illustrates the Temporal restriction on PRs in Dutch: Temporal mismatch between future Tense in the embedded clause and past tense on the matrix verb prevents a PR interpretation. The appositive reading is available, but, as usual, it requires special comma intonation (i.e. longer break between Jan and die). We are grateful to Ad Neeleman and Hans van de Koot for providing these judgments.

(59) *Ik zag Jan die naar huis zal rennen
I saw Jan who to home will run-inf

Appendix C.3. Greek

(60) illustrates PRs in Greek (We are grateful to Giorgos Spathas for providing these judgments:

(60) a. Idha ton Jani pu eplene ton skilo.
saw.PERF.I the John that washed.IMPERF the dog
I saw John washing the dog.
b. Paratirusa ton Jani pu eplene ton skilo.
observed.IMPERF.I the John that washed.IMPERF the dog
I was observing John washing the dog.

(61) illustrates the Temporal restrictions on PRs in Greek. The variant with present might be possible in a situation where it is clear that my observing coincided with John's washing the dog (i.e. an extended present for wash).

(61) Paratirusa ton Jani pu eplene/ *pleni/ *tha pleni ton skilo.
observed.IMPERF.I the John that wash.PAST.IMPERF/ wash.PRES.IMPERF/ will wash. IMPERF the dog I was observing John washing the dog

(62) shows that the same structures are not allowed with Relative pronouns *o opios*. As usual, there is a marginal, and irrelevant for our purposes, reading in which examples like (62) are ok as Restrictive RCs, i.e. when the context involves more than one John.

(62) *Paratirusa ton Jani o opios eplene ton skilo.
observed.IMPERF.I the John the.NOM.SG who.NOM.SG washed.IMPERF the dog
'I was observing John washing the dog.'

Appendix C.4. Serbo-Croatian

As (63) shows, Serbo-Croatian freely allows PRs (We are grateful to Boban Arsenijević for providing these data):

(63) Video sam Jovana koji je ljubio devojku.
seen am Jovan.Acc which is kissed girl I saw Jovan kissing the girl

While (63-a) is ambiguous between a PR and the (marginal and, once again, irrelevant) RC interpretation, RC is the only available interpretation in (64).

(64) Video sam Jovana koji ?e poljubiti devojku. RC only / *PR
seen am Jovan.Acc which will kiss.Inf girl

(65) shows that PRs are also unavailable with perfective aspect (65-a) and stative predicates (65-b). In both cases the RC reading is of course available.

(65) a. Video sam Jovana koji je ljubio / *poljubio devojku. seen am Jovan.Acc which is kissed.Imperf / Perf girl
b. *Video sam Jovana koji je znao put do grada. seen am Jovan.Acc which is known way to city

Appendix C.5. Korean and Japanese

On Japanese and Korean see Shimoyama; Kim's (1999; 2009) discussion of Internally Headed Relative Clauses (IHRC) and in particular, the discussion in Kim (2009) of the parallelism between the latter and *Perceptual Constructions*, which appear to display the same properties of PRs. (66), is ambiguous between a SC / perceptual construction reading and a restrictive RC reading, is an example of the relevant structures in Japanese.

(66) Watashi-wa [kocchi-ni hashitte-kuru Nao]-o mita.
I-top here-to run-come Nao-acc saw
I saw Nao running this way.

(67) and (68) illustrate IHRCs and Perceptual Constructions respectively, both are ambiguous between a restrictive and non-restrictive reading. See Kim (2009) for a detailed comparison and discussion of their syntax and semantics.

(67) The IHRC construction: (Kim, 2009, ex. 1, p. 346)
John-un [[totwuk-i tomangka-n]-un kes]-ul cap-ess-ta.
J.-TOP [[thief-NOM run.away-IMPRF]-REL KES]-ACC catch-PST-DECL
John caught a/the thief while he (= the thief) was running away.

(68) The perception construction: (Kim, 2009, ex. 2, p. 346)
John-un [[totwuk-i tomangka-n]-un kes]-ul po-ess-ta.
J.-TOP [[thief-NOM run.away-IMPRF]-REL KES]-ACC see-PST-DECL
John saw the event of the thief running away.

Appendix C.6. Basque

Basque does not allow PRs. (We are grateful to Larraitz Zubeldia for providing these data and judments)

(69) Gitarra jo-tzen ari zen Jon ikus-i d-u-t
guitar.det.sg play-ipfv prog 3sg.abs.pst.comp Jon see-pfv 3sg.abs.prs-have-1sg.erg
I saw John that plays guitar (RC only)

The translation given to (69) by my Basque informer is the following: "*of all the Jon I know, I saw the one that plays guitar*. The PR meaning can be expressed with the following sentence:

(70) Jon gitarra jotzen ari zela ikusi dut. Jon gitarra jo-tzen ari ze-la ikus-i d-u-t
Jon guitar.det.sg play-ipfv prog 3sg.abs.pst.comp see-pfv 3sg.abs.prs-have-1sg.erg I saw that Jon was playing the guitar I saw John playing the guitar / while he was playing the guitar

Appendix C.7. Chinese

Given that DE-modifiers can be freely constructed with proper names (71), one might suppose that they are akin to PRs.[35]

(71) Mouren kaiqiang dasi-le zhanzai yangtaishang-de Xiaoming-de puren.
Someone shoot dead-ed standing on the balcony DE Xiaoming's servant.
Someone shot the servant of [Xiaoming$_i$ who$_i$ was standing on the balcony].

However, a more in-depth analysis based on a thorough comparison between DE-modifiers and post nominal Small Clauses shows that the former cannot be treated as PRs.

i. DE-modifiers are incompatible with an event reading, while genuine SCs can have eventive/propositional contents (also in Chinese).

ii. DE-modifiers allow for temporal mismatch between the event described in the matrix sentence and the event described in the embedded clause, which genuine SCs, also in Chinese do not;

iii. De-modifiers are available with both subjects and objects, while genuine SCs in Chinese can only be construed with subjects.

iv. DE-modifiers are not bound by any aspectual restrictions, while post-nominal SCs are subjected to the same restrictions found in PRs.

As mentioned above, using an inanimate pronominal (or a definite description that clearly refers to an eventuality) to refer to the content of PRs and Scs (of the Acc-ing type) is a good diagnostics to establish its status (72).

(72) a. Ciò che ho visto è Gianni che correva
What I saw is Gianni that was running
b. What I saw is John running

DE-modifiers (73-a,b), contrary to post-nominal SCs in Chinese (73-c), however, cannot be made to co-refer to eventive NPs, which shows that they cannot be interpreted as events.

(73) a. *wo kanjian de shiqing **shi zhanzai yangtaishang de** Xiaoming.
I saw DE event is **standing on the balcony DE**

Xiaoming.
The event I saw is Xiaoming standing on the balcony.

[35] We are grateful to Shuyin Zhang for her extensive help with grammaticality judgements on the materials presented in this section.

b. *wo kanjian de shiqing **shi zai paubu de** Xiaoming.
I saw De event is **-ing run DE** Xiaoming
What I saw is Xiaoming running
c. wo kanjian de shiqing shi Xiaoming **zai paobu**
I saw DE event is Xiaoming **-ing run**
The event I saw is Xiaoming running

Conversely, as (74) shows, post-nominal SCs can only refer to eventualities and not to entities. As the glosses show, the same is true of English Acc-ing constructions:

(74) *Wo kanjian de ren shi Xiaoming zai paobu.
I saw DE the person is Xiaoming ing run.
*The person I saw is Xiaoming running.

The claim that DE-modifiers are not at all like PRs is further supported by the lack of constraints on their temporal properties. While the event denoted by PRs has to develop within the same temporal interval of the matrix event, a temporal mismatch is perfectly available with DE-modifiers (75).

(75) (zuotian) mouren kanjian-le [(mingtian) yao zhanzai yangtaishang-de] Xiaoming.
yesterday someone saw [(tomorrow) will standing on the balcony-DE] Xiaoming
Yesterday someone saw the Xiaoming who is going to stand on the balcony tomorrow.

Temporal mismatch, however, is not allowed with post-nominal SCs:

(76) *Wo (zuotian) kanjian de shiqing shi Xiaoming (jintian) zai paobu.
I (yesterday) saw DE event is Xiaoming (today) ing run.
*The event I saw yesterday is Xiaoming running today.

Contrary to PRs, DE-modifiers can be construed with both subjects and objects of the embedded clause (77-a,b). Post-nominal SCs, on the other hand, behave just like PRs and can only appear with subjects (77-c,d).

(77) a. wo kanjian qinguo nage nvhai de nage nanhai
I saw kissed girl DE boy
I saw the boy that kissed the girl
b. wo kanjian nage nanhai qinguo de nvhai
I saw boy kissed DE girl
I saw the girl that the boy kissed.
c. wo kanjian Mary zaiqin Xiaoming
I saw Mary -ing kiss Xiaoming
I saw Mary kissing Xiaoming
d. *wo kanjian Mary Xiaoming zai qin.
I saw Mary Xiaoming -ing kiss
*I saw Mary Xiaoming kissing.

Finally, aspectual restrictions typically found with PRs are observed with post-nominal SCs (78-c,d) but not DE-modifiers (78-a,b):

(78) a. wo kanjian zai paobu de Xiaoming.
I saw ing run DE Xiaoming.
I saw Xiaoming who is running
b. wo kanjian hui yingyu de Xiaoming
I saw knows English DE Xiaoming
I saw Xiaoming who knows English

c. wo kanjian Xiaoming zai paobu.
I saw Xiaoming -ing run
I saw Xiaoming running.
d. *wo kanjian Xiaoming zai hui yingyu.
I saw Xiaoming -ing know English
*I saw Xiaoming knowing English.

(78) shows that while pronominal DE-modifiers can be freely used with both eventive and stative predicates, post-nominal SCs (just like PRs and Acc-ing constructions) are completely unacceptable with stative predicates (e.g. *to know English*).

Defining the exact properties of DE-modifiers is beyond the scope of this paper, it suffices here to demonstrate that these constructions share a number of essential properties with RCs and are very unlike PRs.

Appendix C.8. Romanian

Romanian clearly does not allow PRs (Thanks to Anca Sevcenco for providing these judgments): There is no SC reading for (79), only the restrictive relative reading is allowed:

(79) Ion a văzut fata care alerga.
Ion has seen girl.the who was running
Ion saw the girl that was running

Romanian seems to behave like English in that to obtain the SC reading, the verb in the subordinate must be changed into a gerunziu / gerundive (non-predicative mood):

(80) Ion a văzut fata alergînd.
Ion has seen girl.the running-GERUNZIU
Ion saw the girl running.