Testing the PR Hypothesis in Greek: The selective role of Tense and Aspect

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Theoretical and experimental approaches to Relative Clauses
DGfS Marburg  March 5 2014
OUTLINE

- Asymmetries of attachment preferences for Relative Clauses (across languages and structures),
- PR-first Hypothesis (Grillo, 2012; Grillo & Costa, 2012, forthcoming)
- Pseudo Relatives in Greek
- Previous Results (Papadopoulou, 2006; Papadopoulou & Clahsen, 2003)
- A novel experiment testing the role of PR-availability in Greek
- A note on PRs and Locality
**ASYMMETRIES IN RCs ATTACHMENT**

Variation in attachment preferences with Relative Clauses (RCs) across languages, Cuetos & Mitchell (1988)

(1)  

a. Someone shot the maid<sub>1</sub> of the actress<sub>2</sub> that <EC><sub>2</sub> was standing on the balcony

b. Algúien disparó contra la criada<sub>1</sub> de la actriz<sub>2</sub> que <EC><sub>1</sub> estava en el balcón
ASYMMETRIES IN ATTACHMENT PREFERENCE

These findings are at odds with uniform LOCAL / low attachment preference found for other structures in the same languages i.e. strength of local attachment (Phillips & Gibson, 1997).

They lead to question the universality of parsing principles, in particular of Right Association (Kimball, 1973) / Late Closure (Frazier, 1978) / Recency (Gibson, 1991) / Merge Right (Phillips, 1996);

They pose serious problems to theories of acquisition and processing (Fodor, 1998a,b).
Asymmetries in RC Attachment

Several factors have been shown to influence attachment, including lexical, prosodic and syntactic.

We aim at explaining the residual asymmetries still observable across languages once these factors are controlled for.
Several accounts have been proposed to explain these variations, e.g. the Tuning Hypothesis (Brysbaert & Mitchell, 1996), Construal (Gilboy et al., 1995; Frazier & Clifton, 1996), Predicate Proximity (Gibson et al., 1996), Anaphoric Binding (Hemforth et al., 1998, 2000b,a; Konieczny & Hemforth, 2000), Implicit Prosody (Fodor, 1998a,b)

Substantial agreement that none of these accounts is fully satisfactory
THE ROLE OF PSEUDO RELATIVES

Grillo & Costa (2012) show that previous work on RC attachment overlooked the role of Pseudo Relatives:

In some languages (e.g. Spanish) but not in others (e.g. English) the embedded clause can also be read as a Pseudo Relative, i.e. a type of Small Clause:

(2)  

a. Ho visto [PR Gianni che correva]  
   I saw I saw [SC John running]  

b. *I saw John that ran
PSEUDO RELATIVES

**ASYMMETRIES BETWEEN RCs AND PR/SC**

PRs and RCs, despite being string identical, are structurally and interpretively very different:

<table>
<thead>
<tr>
<th>Property</th>
<th>RCs</th>
<th>PRs</th>
<th>SCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long distance ‘gap’</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Refers to individuals</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Available w. objects</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Available w. Rel. Pronouns</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>NP modifier</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Conjunction with RC</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Conjunction with SCs</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Refers to events</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Available in SC environments</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Available w. Proper Names</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>VP modifier</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Aspectual restrictions</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tense restrictions</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Restrictions on matrix V</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
OBLIGATORY HIGH ATTACHMENT WITH PRs

→ PR reading: DP1 only accessible subject

(3) Ho visto [PR la figlia del postino che pro1/*2 correva]. Have I seen [the daughter of the postman that run.impf]. ‘I saw [SC the daughter of the postman running]’.

\[
\begin{align*}
V' & \\
\text{saw} & \quad \text{SC} \\
\text{NP}_1 & \quad \text{PP} \quad \text{CP} \\
\text{the daughter}_1 & \quad \text{of} \quad \text{DP}_2 \\
\text{the postman}_2 & \quad \text{that pro}_1/*2 \text{ ran}
\end{align*}
\]
PR-first Hypothesis

Grillo & Costa (2012, forthcoming)

(4) 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).

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

→ PRs are structurally and interpretively simpler than RCs
PR AVAILABILITY AND RC-ATTACHMENT ACROSS LANGUAGES

<table>
<thead>
<tr>
<th>Language</th>
<th>Attachment</th>
<th>PRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Low</td>
<td>*</td>
</tr>
<tr>
<td>Romanian</td>
<td>Low</td>
<td>*</td>
</tr>
<tr>
<td>Basque</td>
<td>Low</td>
<td>*</td>
</tr>
<tr>
<td>Chinese</td>
<td>Low</td>
<td>*</td>
</tr>
<tr>
<td>Spanish</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Galician</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Dutch</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Italian</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>French</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Serbo-Croatian</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Japanese</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Korean</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Greek</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Portuguese</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>German</td>
<td>High/Low</td>
<td>*</td>
</tr>
<tr>
<td>Russian</td>
<td>High/Low</td>
<td>*</td>
</tr>
<tr>
<td>Bulgarian</td>
<td>High/Low</td>
<td>*</td>
</tr>
</tbody>
</table>

German, Russian and Bulgarian: obligatory Relative Pronoun preceded by comma might induce prosodic break. Alternative explanation under silent prosody / anaphoric binding Fodor (2002b); Hemforth et al. (1996).
PREVIOUS FINDINGS

Evidence supporting *PR-first Hypothesis*:

- Italian (Grillo & Costa, 2012, forthcoming)
- English (Grillo et al., 2013a, 2014)
- French (Grillo et al., 2014)
- Portuguese (Grillo et al. 2012a,b, 2013a,b; Fernandes 2012; Tomaz 2014)
- Spanish (Grillo et al., 2012b)
**PR-first AND GREEK**

- Greek classified as HA language (Papadopoulou & Clahsen, 2003)
- Following PR-first we might expect PRs to be available in Greek.
PRs in Greek

PRs are available in Greek (although not identified in the literature so far).

(6) I Maria evelpe ton Jani pu etrexe.
the Mary watch.past.imp the John.acc that run.past.imp
‘Mary was watching John running.’
**PRs in Greek**

Conform to all the tests identified in the literature:

They **do allow** reference to events, are available with proper names, are VP modifiers, show aspectual and tense restrictions, are subject to restrictions on matrix V, are available in SC environments.

They **do not allow** long distance gaps, do not refer to individuals, are not available with objects (unless resumed by clitics) and the relative pronoun *o opios*, are not NP modifiers.
PRs in Greek

Restrictions on matrix verb: PRs are selected by perceptual verbs. (i.e. verbs that select for SCs in English, *Accusativus cum Conjunctivo* in Greek, Guasti 1993)

(7) a. I Maria evlepe ton Jani pu etrexe.  
    the Mary watch.past.imp the John that run.past.imp  
    ‘Mary was watching John running.’

b. *I Maria emene me ton Jani pu etrexe.  
    the Mary stayed.past.imp with the John that run.past.imp  
    ‘Mary was staying with John that was running.’

c. I Maria emene me ton athliti pu etrexe.  
    the Mary stayed.past.imp with the athlete that run.past.imp  
    Mary was staying with the athlete that was running.’
PRs in Greek

Restrictions on tense/aspect: PRs must describe an interval of time in which the matrix time is included.

(8) a. I Maria evlepe ton Jani pu etrexe. PR the Mary watch.past.imp the John that run.past.imp. ‘Mary was watching John running.’
   b. *I Maria evlepe ton Jani pu tha treksi. the Mary watch.present.imp the John that fut. run.perf. ‘Mary was watching John that will run.’
   c. I Maria evlepe ton athliti pu tha treksi. the Mary watch.past.imp the athlete that fut. run.perf. ‘Mary was watching the athlete that will run.’
PR-first in Greek

We tested the effects of PR-availability contrasting Globally and Locally ambiguous PR/RC sentences with unambiguous RCs.

- **Method**: Offline Questionnaire, with google questionnaire.
- **Participants**: (n=48) Greek Speakers.
- **Materials and Design**: 24 stimuli in 4 conditions, 72 fillers. Latin-square design. Counterbalanced materials and questions.
**STIMULI**

We manipulated PR-availability in a 2 [Matrix-Verb-Type: *perceptual* vs. *stative*] X 2 [Embedded-Tense/Aspect: *imperfective.past* vs. *perfective.future*] design.

<table>
<thead>
<tr>
<th>Matrix Vtype</th>
<th>Embedded Tense</th>
<th>PR-availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCEPTUAL <em>(see)</em></td>
<td>Match</td>
<td>PR/RC ambiguity</td>
</tr>
<tr>
<td>PERCEPTUAL <em>(see)</em></td>
<td>Mismatch</td>
<td>Local ambiguity</td>
</tr>
<tr>
<td>STATIVE <em>(lives with)</em></td>
<td>Match</td>
<td>Unambiguous RC</td>
</tr>
<tr>
<td>STATIVE <em>(lives with)</em></td>
<td>Mismatch</td>
<td>Unambiguous RC</td>
</tr>
</tbody>
</table>
STIMULI

A Globally ambiguous PR / RC
O Janis evlepe ton filo tu fititi pu etrexe.
the John watch.past.imp the friend the.gen student that run.past.imp.
`John was watching the friend of the student (that was) running.'

B Locally ambiguous PR / RC (RC disambiguation with Tense Mismatch)
O Janis evlepe ton filo tu fititi pu tha treksi.
the John watch.past.imp the friend the.gen student that fut run.perf.
`John was watching the friend of the student that will run.'

C Unambiguous RC (Tense Match)
O Janis emene me ton filo tu fititi pu etrexe.
the John stay.past.imp with the friend the.gen student that run.past.imp.
`John was staying with the friend of the student (that was) running.'

D Unambiguous RC (Tense Mismatch)
O Janis emene me ton filo tu fititi pu tha treksi.
The John stay.past.imp with the friend the.gen student that fut run.perf
`John was staying with the friend of the student that will run.'
RESULTS

% of High Attachment Preference

<table>
<thead>
<tr>
<th>condition</th>
<th>perceptual T-Match</th>
<th>perceptual T-Mismatch</th>
<th>stative T-Match</th>
<th>stative T-Mismatch</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR_Tmatch</td>
<td>62.4%</td>
<td>48.5%</td>
<td>30.7%</td>
<td>36.1%</td>
</tr>
<tr>
<td>PR_TMismatch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC_Tmatch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC_TMismatch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANALYSIS

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 *Vtype* and *Tense* were fit as fixed factors, and subject and items as random factors.

Random slopes were fit for both fixed effects and their interaction.
ANALYSIS

→ Significant effect of $V$-type:
> HA with perceptual than stative verbs:

<table>
<thead>
<tr>
<th>contrast</th>
<th>coefficient</th>
<th>SE</th>
<th>z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA in PR vs. RC</td>
<td>-1.5718</td>
<td>0.1978</td>
<td>-7.947</td>
<td>&lt; .0001</td>
</tr>
</tbody>
</table>

→ Significant interaction of $V_{type}^{*}Tense$:

<table>
<thead>
<tr>
<th>contrast</th>
<th>coefficient</th>
<th>SE</th>
<th>z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{type}^{*}Tense$</td>
<td>-1.4621</td>
<td>0.3458</td>
<td>-4.228</td>
<td>&lt; .0001</td>
</tr>
</tbody>
</table>
**Analysis**

→ Significant effect of *Tense* for perceptual verbs only:

<table>
<thead>
<tr>
<th>contrast</th>
<th>coefficient</th>
<th>SE</th>
<th>z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tense (perceptual)</td>
<td>1.1090</td>
<td>0.2398</td>
<td>4.625</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

→ No effects of *Tense* with statives (RC-only) condition:

<table>
<thead>
<tr>
<th>contrast</th>
<th>coefficient</th>
<th>SE</th>
<th>z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tense (stative)</td>
<td>-0.3461</td>
<td>0.2783</td>
<td>-1.243</td>
<td>0.21373</td>
</tr>
</tbody>
</table>


**Analysis**

→ Significant effect of $V_{type}$ across all conditions

<table>
<thead>
<tr>
<th>contrast</th>
<th>coefficient</th>
<th>SE</th>
<th>z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vtype (matching T)</td>
<td>-2.2953</td>
<td>0.3064</td>
<td>-7.492</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Vtype (mismatching T)</td>
<td>-0.7728</td>
<td>0.2324</td>
<td>-3.325</td>
<td>.0008</td>
</tr>
</tbody>
</table>
Discussion

- Results in line with predictions of PR-first (Grillo & Costa, 2012),
- Significant effect of PR-availability (even temporary)
- Significant difference between Tmatch and Tmismatch with PR verbs
- No effect of Tense with stative verbs (globally unambiguous RCs)
- Effect of early availability of PR explains relative weakness of previous results in English and other LA languages (around 40% HA still observed)
**A note on PR-availability and Locality**


<table>
<thead>
<tr>
<th>PR-compatible</th>
<th>RC-Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>subject</td>
<td>93.9%</td>
</tr>
<tr>
<td>object</td>
<td>78%</td>
</tr>
<tr>
<td>subject</td>
<td>87.1%</td>
</tr>
<tr>
<td>object</td>
<td>81%</td>
</tr>
</tbody>
</table>

→ PR-availability modulates intervention effects!

<table>
<thead>
<tr>
<th>contrast</th>
<th>coefficient</th>
<th>SE</th>
<th>z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vtype*Locality</td>
<td>-1.4550</td>
<td>0.6703</td>
<td>-2.171</td>
<td>0.029947 *</td>
</tr>
</tbody>
</table>
PR-availability and sentence to picture matching

- Cumulative effect of PR-prediction (obligatory subject) and Locality.
- PR-compatible verbs best avoided when testing Locality effects.
- Sentence-to-picture Matching ("show me the N that . . .") is a PR-licensing context: Handle with Care!
- Might explain tendency to produce (causative-passives) Subject Relatives (Belletti, this workshop), compatible with PRs / events.
CONCLUDING REMARKS

▶ Greek further validates PR-first Hypothesis and Universality of parsing principles.
▶ Local ambiguity (i.e. early PR-availability) still influences RC attachment (see also English results from Grillo et al. 2014).
▶ SPM: Handle with Care!
THANK YOU!

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.
# Analysis of Interaction

Grillo & Lungu (2014) Locality effect only in PR-condition:

<table>
<thead>
<tr>
<th>contrast</th>
<th>coefficient</th>
<th>SE</th>
<th>z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locality (PRverbs)</td>
<td>1.9920</td>
<td>0.5416</td>
<td>3.678</td>
<td>0.000235 ***</td>
</tr>
<tr>
<td>Locality (RC-only)</td>
<td>0.4413</td>
<td>0.4350</td>
<td>1.014</td>
<td>0.31</td>
</tr>
</tbody>
</table>
Mean HA per Condition

attachment

attachment

PR
RC
condition
attachment
Mean HA per Condition
Mean HA per Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>PR</th>
<th>RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>nominal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>verbal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RC ATTACHMENT IN GREEK

Papadopoulou & Clahsen (2003); Papadopoulou (2006): Asymmetry between genitive (HA) and ‘with’ (LA):

(9) a. Enas krios fonakse ton fititi tis kathighitrias pu itan
    apoghoitevmenos apo to neo ekpedheftiko sistima. HA
    ‘A man called the student of the teacher who was disappointed
    by the new educational system.’

   b. Enas krios fonakse ton fititi me tin kathighitria pu itan
    apoghoitevmenos apo to neo ekpedheftiko sistima. LA
    ‘A man called the student with the teacher who was
    disappointed by the new educational system.’

Consistent with previous findings (De Vincenzi & Job, 1993; Gilboy et al., 1995)
RC ATTACHMENT IN GREEK

HA in genitive condition is readily explained by PR-first Hypothesis.

Papadopoulou & Clahsen (2003) experiments contains a high number of PR-taking verbs:

- 7 perceptual verbs (over 20 stimuli): ‘look at’ (N=5), ‘watch’ (N=2), i.e. 35% of the stimuli
- Other PR-taking verbs: ‘frown-at, greet, like, tease, approach’

This is comparable with previous experiments (see discussion in Grillo & Costa forthcoming)
What makes ‘me’ special?

- Comitative ‘with’ environment incompatible with PRs.
- This explains the asymmetry between genitive and me.
- LA in ‘with’ environment also follows from PR-first.


