

Dissociating Dependency and Reanalysis Costs: CC/RC Disambiguation in Vietnamese

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A persistent methodological challenge in the garden-path literature is that the processing difficulty observed at the disambiguation regions can typically be attributed to several distinct sources, making it difficult to assess their independent contribution. In the classic Complement Clause (CC) vs. Relative Clause (RC) ambiguity (*Mary told the man that she kissed the boy/to wait*): at the disambiguation point, readers who pursued a CC parse must revise their initial analysis, while simultaneously integrating a long-distance filler-gap dependency and processing a word whose surprisal is elevated relative to the expected CC continuation. The relative contribution of these factors remains contested [1–4].

Vietnamese provides a new empirical handle into this problem. Unlike languages tested so far, Vietnamese has distinct lexical relativizers (*mà*) and complementizers (*rằng*) introducing RCs and CCs respectively, but both can be optionally omitted, creating the familiar local ambiguity. This permits a 2 STRUCTURE (RC/CC) × 2 LOCAL AMBIGUITY (Unambiguous/Ambiguous) design (Table 1) in which unambiguous conditions contain an overt marker which disambiguates the embedded clause from the start. Crucially, dependency integration costs should arise only for Unambiguous RCs, already at the verb; reanalysis costs only at or after the ROI.

We used this design in a self-paced reading study (N=55 Native Vietnamese), followed by acceptability judgments and comprehension questions. **Results:** Significant STRUCTURE × AMBIGUITY interactions emerged at both the verb and disambiguation (ROI) regions ((Fig.1); Verb: $\beta=0.03$, $t\text{-value}=2.40$; ROI: $\beta=0.09$, $t\text{-value}=5.35$), driven at both regions by slower RTs for unambiguous than ambiguous RCs (Verb: $\beta=0.06$, $t\text{-value}=3.70$; ROI: $\beta=0.13$, $t\text{-value}=6.09$), reflecting dependency integration cost. At spillover the interaction reversed ($\beta=-0.04$, $t\text{-value}=-2.64$), driven entirely by RC ambiguity effect ($\beta=-0.1$, $t\text{-value}=-4.78$), consistent with delayed reanalysis cost following the garden-path. In CCs, RTs at ROI showed the opposite pattern, i.e. shorter for unambiguous than ambiguous CCs ($\beta=-0.04$, $t\text{-value}=-2.12$), possibly reflecting a processing advantage of early commitment to a gap-free structure. Offline measures (Fig.2, 3) corroborate these patterns: RCs were rated less acceptable ($\beta=-0.94$, $p<.001$) and comprehended less accurately ($\beta=-0.81$, $p<.001$) than CCs, with ambiguity reducing acceptability ($\beta=0.92$, $p<.001$) and accuracy ($\beta=0.36$, $p<.001$) across structures. **Discussion:** Vietnamese allowed us to dissociate dependency integration and reanalysis costs, which typically co-occur at the disambiguation region, with dependency integration visible *before* the disambiguation region in unambiguous RCs, and reanalysis emerging only at the spillover region. The processing disadvantage of unambiguous RCs relative to unambiguous CCs demonstrate an inherent cost of object RC structures even in the absence of ambiguity, compatible both with a structural gap-avoidance account [3, 4] and a referential account in which unambiguous RCs incur a cost of building a more complex discourse model [1]. Crucially, this cost remains confounded with reanalysis even in paradigms achieving early RC disambiguation by other means, such as verbal mood morphology in Spanish [2]. Vietnamese thus allows us to address not only the dissociation of parsing costs, but the mechanisms underlying the initial CC preference itself.

References

- [1] Altmann, Garnham, and Dennis. *JML*, 31(5):685–712, 1992.
- [2] Demestre and García-Albea. *Experimental Psychology*, 51(1):59–71, 2004.
- [3] Konrad, Burattin, Cecchetto, Foppolo, Staub, and Donati. *Syntax*, 24(2):191–223, 2021.
- [4] Staub, Foppolo, Donati, and Cecchetto. *JML*, 98:26–44, 2018.

Figures and Tables

All critical trials began with an identical ambiguous region, e.g., *Anh Duy nói với người phụ nữ.../Duy told the woman...*. Table 1 shows only the sentence continuations across conditions.

Structure	Ambiguity	Stimuli
RC	Unambiguous	mà người đàn ông đã hôn rằng trời sắp mưa. that _{REL} class. man ANT kiss that _{COMP} sky soon rain 'who the man kissed that it was going to rain.'
RC	Ambiguous	người đàn ông đã hôn rằng trời sắp mưa. class. man ANT kiss that _{COMP} sky soon rain '(who) the man kissed that it's going to rain.'
CC	Unambiguous	rằng người đàn ông đã hôn Quỳnh trong công viên. that _{COMP} class. man ANT kiss Q. in park 'that the man kissed Quỳnh in the park.'
CC	Ambiguous	người đàn ông đã hôn Quỳnh trong công viên. class. man ANT kiss Q. in park '(that) the man kissed Quỳnh in the park.'

Table 1: Experimental design and example stimuli

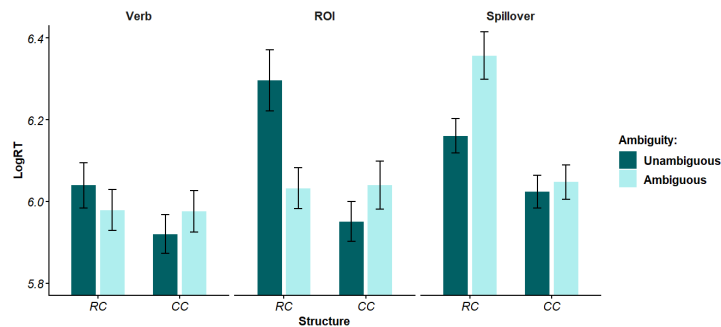


Figure 1: LogRT by Region

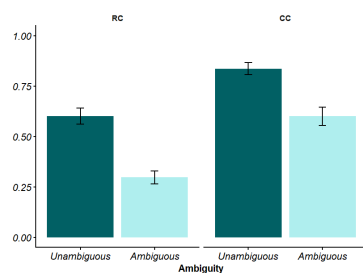


Figure 2: Acceptability Judgments

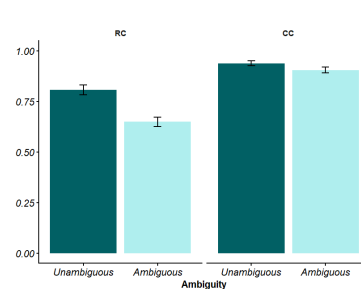


Figure 3: Question Accuracy

Vietnamese Syntax

In Vietnamese, RCs and CCs are introduced by distinct lexical markers, respectively by complementizers (*mà*) and relativizers (*rằng*). Therefore when an overt complementizer/relativizer is present, CCs and RCs are globally unambiguous (ANH/PRO = kinship term; REL = Relativizer; COMP = Complementizer; class = classifier; ANT = anteriority marker):

COMPLEMENT CLAUSE

- (1) Anh Duy nói với người phụ nữ rằng người đàn ông đã hôn ...
pro. Duy tell class. woman that_{COMP} class. man ANT kiss ...
Duy told [DPthe woman] [CCthat the man kissed ...]

RELATIVE CLAUSE

- (2) Anh Duy nói với người phụ nữ mà người đàn ông đã hôn ...
pro. Duy tell class. woman that_{REL} class. man ANT kiss ...
Duy told [DPthe woman [RCthat/who the man kissed]] ...'

Vietnamese relativizers and complementizers can also be omitted, much like in English CCs (*I told John he was being cheeky*) and RCs (*I know the woman you love*). This generates the familiar local ambiguity between RC and CC:

AMBIGUOUS CC/RC

- (3) Anh Duy nói với người phụ nữ người đàn ông đã hôn ...
pro. Duy tell class woman class man ANT kiss ...
'Duy told the woman that the man kissed ...

This contrast allows us to estimate the cost of the filler-gap dependency (present in RCs (2) but not in CCs (1)) at the verb independently from disambiguation/reanalysis needed in (3).

Crucially the local ambiguity is resolved immediately *after* the region of the embedded verb (where the filler gap dependency should be interpreted). In our study this is achieved by manipulating the region following the transitive verb, contrasting a DP complement, followed by a prepositional phrase in the CC condition (4). In the locally ambiguous RC condition (5) the verb is followed by an unambiguous complement clause.

COMPLEMENT CLAUSE

- (4) Anh Duy nói với người phụ nữ người đàn ông đã hôn Quỳnh trong công viên.
pro. Duy tell class. woman class. man ANT kiss Quỳnh in park
Duy told [DPthe woman] [CCthat the man kissed Quỳnh in the park].

RELATIVE CLAUSE

- (5) Anh Duy nói với người phụ nữ người đàn ông đã hôn rằng trời sắp mưa.
pro. Duy tell class. woman class. man ANT kiss that_{COMP} sky soon rain
Duy told [DPthe woman [RCthat the man kissed]] [CCthat it was going to rain].'