Constructing dependencies between wh-words and Q-particles in in-situ languages: The case of Vietnamese questions

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Introduction. The mechanisms underlying dependency constructions in language processing have received considerable attention lately, with many experiments examining dependencies between various linguistic elements such as pronouns and their antecedents (e.g. [3,6]) or subject-verb agreement (e.g. [2,7]). Wh-dependencies, especially in languages where the wh-word remains in in-situ, however, have yet to be explored extensively. Given that many languages have overt Q-particles (special markers that occur in questions), questions come up regarding the nature of the relationship between the in-situ wh-word and the Q-particle.

In earlier work using self-paced reading in Japanese, a language where the Q-particle is compulsory and can occur in different positions, [5] concluded that comprehenders anticipate/predict a Q-particle to occur at the earliest position licensed by the grammar. More recently, [8]'s work on Mandarin showed that wh-phrases can trigger a retrieval process to look for a covert Q-operator, introduced by interrogative predicate in the sentence.

The current study examines the similarity-based interference effect (e.g. [1,4]) in a new dependency between (a) an overt Q-particle *thế* in Vietnamese, which is optional and placed at the end of the sentence (ex.1), and (b) wh-phrases in its domain.

(1) a) Lan biết ai vừa ra ngoài
Lan know who PRF go out
"Lan knew who had gone out."/ "Who has gone out that Lan knew?"

b) Lan biết ai vừa ra ngoài thế?
Lan know who PRF go out Q?
"Who has gone out that Lan knew?"

Predictions. The cue-based retrieval account (e.g.[4]) predicts that the presence of an intervening *ai đó* (who-that) 'someone' (see Table 1) – an element containing a wh-phrase but which cannot receive an interrogative interpretation – might interfere with the retrieval process. But in ungrammatical conditions where a sentence contains a Q-particle but no wh-word to license it, presence of this partially matched feature might instead facilitate processing.

Design, analysis. Our self-paced study (n=92 native Vietnamese speakers, PCIbex, conducted on the internet) manipulated two factors: (i) grammaticality (grammatical/ungrammatical) and (ii) attractor (match (wh-that interference)/mismatch (no wh-that interference) which yields 4 conditions (Table 1). We used lmer to analyze raw and log-transformed RTs. Participants with a comprehension-question accuracy rate lower than 60% were excluded (8.7%). To trigger retrieval process only, targets used the perception predicate *biết* 'know' which allows the phrase *cái gì* 'what' to be ambiguous between a relative pronoun and an interrogative phrase (as illustrated in (1)), so participants cannot anticipate whether a Q-particle is coming up.

Results (spillover 3). Word-by-word reading times (RTs, Fig.1) show a slowdown in the [ungrammatical-mismatch] condition at spillover 3 (SO3). At this position, we find a main effect of grammaticality and a grammaticality x match interaction (Table 1): the [ungrammatical-match] condition with *who-that* is read as quickly as the two [grammatical] conditions (facilitatory interference), while the [ungrammatical-no match] condition is slower. Thus, we see a facilitatory effect in ungrammatical conditions but no such facilitation in grammatical conditions. This grammatical asymmetry has also also found in other studies on similarity-based interference (e.g. [3,2]). Given that the Vietnamese Q-particle is optional, this dependency differs from those tested in prior work on other languages. The results might point to a new kind of dependency, where one of the two components is not required but still necessary to resolve an ambiguity.

In sum. We provide evidence for similarity-based interference in a new dependency between optional Q-particles and wh-phrases in Vietnamese, furthering understanding of dependency formation in in-situ languages. Our future work will test locality effects in this dependency.

Table 1. Sample item illustrating the 4 conditions.

Condition	Sentence
[grammatical match]	"Linh biết **cái gì** đã được ai đó chuyển ra khỏi căn phòng **thế**?" "Linh know **what** PST PASS who that move of the room **Q**?" 'What was the thing moved out of the room by someone that An knew?',
[grammatical mismatch]	"Linh biết **cái gì** đã được tổ trưởng chuyển ra khỏi căn phòng **thế**?" "Linh know **what** PST PASS manager move out of the room **Q**?" 'What was the thing moved out of the room by the manager that An knew?',
[ungrammatical match]	"Linh biết cái bàn đã được ai đó chuyển ra khỏi căn phòng **thế**?" "Linh know table PST PASS who that move out of the room **Q**?" *'An knew the table was moved out of the room by someone?',
[ungrammatical mismatch]	"Linh biết cái bàn đã được tổ trưởng chuyển ra khỏi căn phòng **thế**?" "Linh know table PST PASS manager move out of the room **Q**?" *'An knew the table was moved out of the room by the manager?'
Spill-over	….., whispered the boy.

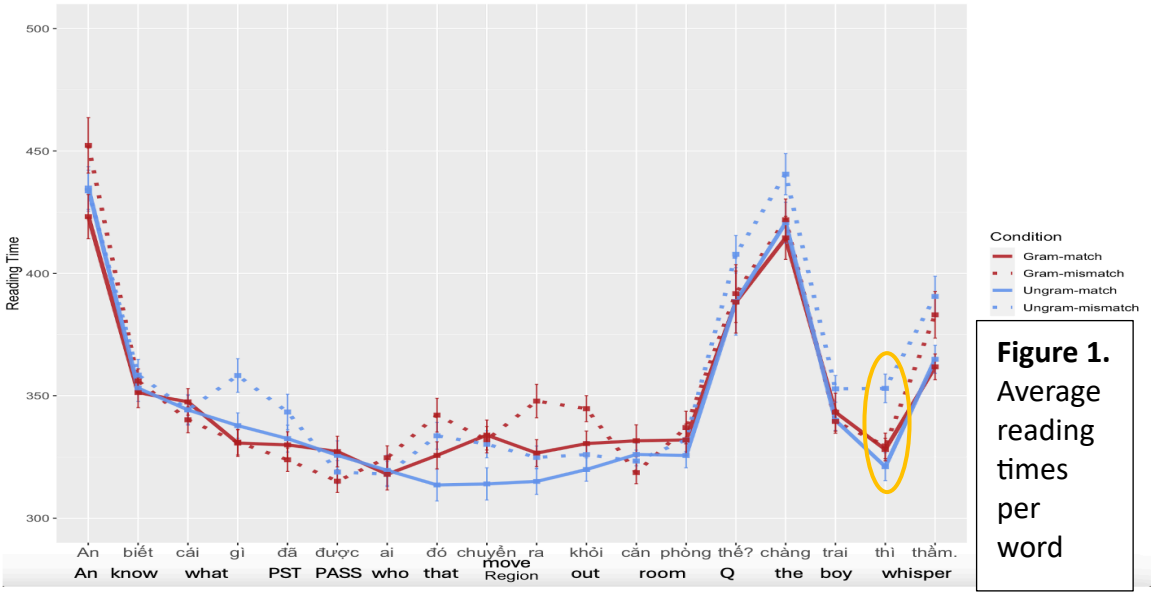

Figure 1. Average reading times per word

Table 2. *Linear mixed-effects model fit to log-transformed RTs for spillover region 3.*

Fixed effects	Estimate	Std. Error	Df	t value	p
Intercept	5.72	0.03	83.89	185.38	<.0001
Grammaticality	-0.02	0.01	2566.74	-1.99	0.05 *
Attractor	-0.02	0.01	2573.09	-1.58	0.11
Grammaticality :Attractor	0.05	0.02	2566.53	2.07	0.039 *

References [1] Gordon et al 2001. *Memory interference during language processing*. JEP [2] Jäger et al 2020. Interference patterns in subject-verb agreement and reflexives revisited: A large-sample study. JML. [3] Laurinavichyute et al 2017. *Retrieval and encoding interference: Cross-linguistic evidence from anaphor processing*. FP. [4] Lewis et al 2005. *An activation-based model of sentence processing as skilled memory retrieval*. CS. [5] Miyamoto et al 2002. The processing of wh-phrases in Japanese. || Patil et al 2016. *Retrieval interference in syntactic processing: The case of reflexive binding in English*. FP. [7] Schlueter et al 2018. *Exploring the abstractness of number retrieval cues in the computation of subject-verb agreement in comprehension*. JML. [8] Xiang et al 2015. Constructing covert dependencies. JML.