Cross-linguistic variations and similarities: an ERP study of Mandarin wh-constructions

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Wh-Dependencies Without Overt Displacement

警察 让 约翰 保护 哪个人？
police officer asked John protect which man?
"Which man did the police officer ask John to protect?"

A covert dependency

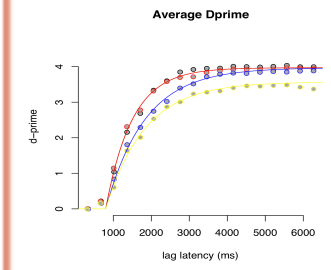
☞ *LF movement* (Huang 1982)
[$_{CP}$ which man [the police officer asked John to protect e]]

☞ *Unselective binding* (Aoun & Li 1993; Tsai 1994)
[$_{CP}$ Op_{wh} [the police officer asked John to protect which man]]

Wh-in-situ questions also involve long distance dependencies between the wh-in-situ position and the clause initial position.

How are covert wh-dependencies established in real-time?

What processes are shared with overt dependency formation?



Xiang, Dillon, Wagers, Liu & Guo (2010), using SAT method:

- For matrix wh-Q, longer wh-Qs did not slow down the speed of the dependency building, reflecting the same content addressable search mechanism as in English wh-Qs (McElree et al. 2003)
- Longer wh-Qs decreased the judgment accuracy of the sentence

P600 for overt wh-dependencies:

- Kaan et al. 2000: wh-dependencies showed a larger P600 relative to the non-wh counterpart
- Fiebach et al. 2002: length of the wh-dependencies had no effect on P600 amplitude
- Phillips et al. 2005: length of the wh-dependencies affected the onset latency of the P600, but not the amplitude
- These studies also found a sustained anterior negativity that reflects the cost of holding a "filler" in working memory (also see King&Kutas 1995)

References: Kaan, Harris, Gibson& Holcomb (2000) The P600 as an index of syntactic integration difficulty, Language and Cognitive Processes 15,159– 201.; Huang (1982). Logical relations in Chinese and the theory of grammar.Doctoral dissertation, MIT, Cambridge, Massachusetts. Distributed by MIT Working Papers in Linguistics.; Fiebach, C.; Schlesewsky,M.; Friederici, A. (2002) Separating syntactic memory costs and syntactic integration costs during parsing: the processing of German wh questions, *Journal of Memory and Language* 47, 250–272.; King, J.& Kutas, M.(1995) Who did what and when? Using word- and clause level ERPs to monitor working memory usage in reading, Journal of Cognitive Neuroscience 7, 376– 395.; McElree,Foraker & Dyer(2003). Memory structures that subserve sentence comprehension. Journal of Memory and Language, 48,67-91;Phillips, C., Kazanina, N., & Abada, S. (2005). ERP Effects of the Processing of Syntactic Long-distance Dependencies. *Cognitive Brain Research, 22* (3), 407-428.; Xiang, Dillon, Wagers, Liu &Guo (2010) Processing wh-movement dependencies in a language without wh-movements, poster presented at CUNY 2010.

ERP Experiment (n=24)

Declarative controls (**short/long**)

a/b 老师 劝说 约翰 (为了 实现 自己的 理想) 报考 那所学校.
teacher persuaded John (for realize own dream) apply to that school.
"The teacher persuaded John to apply to that school (to realize his own dreams)."

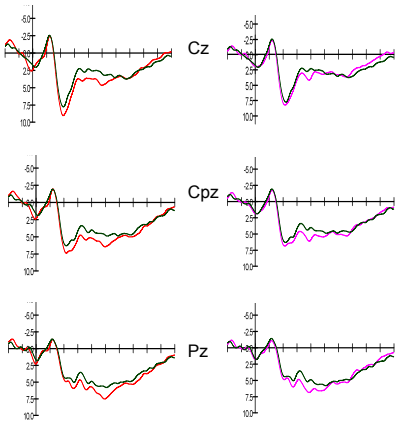
Matrix wh-Q (short/long)

c/d 老师 劝说 约翰 (为了 实现 自己的 理想) 报考 哪所学校?
teacher persuaded John (for realize own dream) apply to which school?
"Which school did the teacher persuade John to apply to (to realize his own dreams)?"

Embedded Wh-Q (short/long)

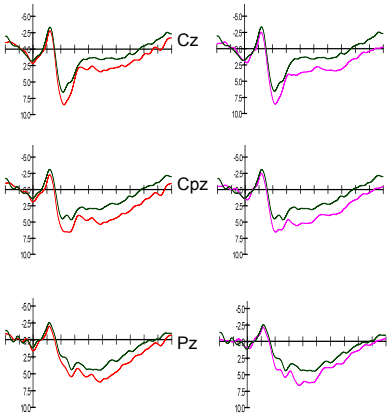
e/f 老师 四处打听 约翰 (为了 实现 自己的 理想) 报考了 哪所学校.
teacher asked around John (for realize own dream) apply to which school.
"The teacher asked which school John applied to (to realize his own dreams)."

short condition:



declarative
matrix wh-Q
declarative
embedded wh-Q

Long condition:



declarative
matrix wh-Q
declarative
embedded wh-Q

Conclusions

- Both matrix and embedded wh-in-situ questions showed a larger positivity compared to the declarative controls
- longer length of the wh-in-situ dependency increased the amplitude of this positivity
- Considered together with Xiang et al. 2010, the sensitivity to length suggests that this positivity is NOT indexing the the initial stage in which the dependency was just being established (cf. the constant rate in the SAT function). It is more likely that it is reflecting the integration over the whole dependency.