

Disentangling responses to Wh-questions: TOM and syntactic abilities*

NOGA BALABAN, NAAMA FRIEDMANN

Tel Aviv University



Dearest אדריאנה, with thanks for collaboration that we both enjoyed and learned from, and hope for continued collaboration, and friendship. אין כמור!

Several different abilities are involved in answering a Wh question like "Which linguist did the conference attendees celebrate birthday for?". Among them are the syntactic ability to understand who did what to whom in a sentence that involves Wh-movement and intervention, and the ability to convey the response in a way that the person who asked the question would be able to identify the reference of the answer.

Correspondingly, the answer "Adriana Belletti" would be correct, but an answer that reveals that the hearer thought that the linguist is celebrating a birthday to the conference attendees would be incorrect for syntactic reasons: the Wh dependency caused confusion as to the agent and theme in the question. A different type of response – "she" or "the linguist who draws syntactic trees" would also be inappropriate, but for other reasons: such response reflects a ToM (Theory of Mind) difficulty, causing inability to provide an answer that would allow the person who asked the question to identify the person referred to in the response.

Thus, answering a Wh question involves, among other abilities, the syntactic ability to understand who did what to whom in a sentence that involves Wh-movement and intervention (Friedmann, Belletti, & Rizzi, 2009; Belletti & Rizzi, 2009; Belletti & Contemori, 2010), and the ability to convey the response in a way that the person who asked the question would be able to identify the reference of the answer.

Difficulty in comprehending and producing object Wh-questions (in which the object crosses the subject) is characteristic of syntactic impairment in various populations: children with Syntactic-SLI (Specific Language Impairment), children with hearing

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impairment and patients with agrammatic aphasia (see, Friedmann, 2001; Friedmann, & Haddad-Hanna, 2014; Friedmann, & Novogrodsky, 2011; Friedmann, & Szterman, 2011).

The same kind of *Wh*-questions place a different kind of demand on the ToM ability of the replier. The ToM task that these *Wh*-questions pose is the need to tailor an answer that meets the informational requirement of the hearer (Ariel, 1990; Sperber & Wilson, 1986). ToM impairment occurs in various populations, one prominent group is people after right hemisphere brain damage (Apperly, 2011).

The question we ask in the current study is whether patients that were identified as having ToM impairment, as speakers, show a reduced ability to represent their hearers' mind in answering *Wh*-questions. The ToM difficulty was expected to be expressed in a difficulty in choosing the appropriate differentiating feature in accordance to its accessibility in the mind of their hearer. We did not expect these participants will show any syntactic difficulty in answering these questions.

This approach was tailored to the aim of disentangling the grammatical aspects from the TOM related aspects of *Wh*-question understanding (for more on this disentangling approach see Balaban, Friedmann, Belletti, & Rizzi, submitted).

Seventeen right hemisphere brain damaged (RBD) patients took part in the study. Their mean age was 49;1 years (ranging between 25-64 years SD = 10.9) and a control group of 6 non brain damaged adults was also tested. Their mean age was 51;3 years (ranging between 27-66 years SD = 15.8. The aTOMic battery (Balaban, Friedmann, 2010; Balaban, Friedmann, Ariel, & Ziv, submitted), a comprehensive test of Theory of Mind, was administered to all the participants. Ten of the right-hemisphere damaged participants had a severe aTOMia (ToM deficit).

The three groups of participants (RBD patients with aToMia, RBD patients without aToMia and a control group) were presented a sentence-picture matching task. Each picture included three figures. The first figure in each picture was performing an action on the second, and the second figure was performing the same action on the third figure, which was of the same type as the first one (for example, a red haired boy was feeding a clown with a spoon while the clown was feeding another boy with a spoon). We asked two *which* questions about each picture, a subject and an object question.

The answers were coded twice: an answer was coded syntactically correct if the participant chose the appropriate figure in answer to the *Wh*-question. The same answer was also coded as ToM-appropriate if the participant mentioned a feature that differentiated between the characters.

The results showed that the three groups demonstrated good performance in the syntactic aspects of the *Wh*-questions task. Importantly, the aToMic participants often failed to provide a differential description that would allow their hearer to pick the right reference. For example, when shown the picture with a clown and two boys, described above, one of the RBD aToMic participants replied "the disappointed boy", where both boys seemed with a similar facial expression.

Using t-test for correlated samples we found the TOMic group performed significantly better in producing syntactically appropriate answers than producing appropriate differentiating description in answer to the *wh*-questions ($t(9) = 2.42, p = .002$). The non-aTOMic brain damaged patients and the age matched control group performed close to

100% correct on both aspects and no difference was found in either groups (non aTOMic: $t(6) = 0.42, p = 0.35$; controls: $t(5) = 0.5, p = .50$).

The findings support a disentangling approach to Wh-questions responses. The results show that the ability to correctly assess the conversational partner's informational needs and her point of view regarding the situation is a distinct crucial component in the ability to produce appropriate answers to wh-questions. These findings join a wider disentangling approach, led by Adriana Belletti, suggesting that syntactic and TOM abilities interact in various language domains, but can be disentangled, for example, in cases of aTOMia.

References

- Apperly, I. A. (2011) *Mindreaders: The cognitive basis of "Theory of Mind"*. Hove: Psychology Press.
- Balaban, N., and Friedmann N. (2010). Right Brain damage, theory of mind, and the use of reference terms. *Procedia Social and Behavioral Sciences*, 6, 61-62.
- Balaban, N., Friedmann, N., Ariel, A., & M. Ziv (submitted A) *The effect of theory of mind impairment on language: Referring after right hemisphere damage*. Manuscript submitted for publication.
- Balaban, N., Friedmann, N., Belletti, A., & L. Rizzi (submitted B). *Disentangling principle C: A contribution from individuals with brain damage*. Manuscript submitted for publication.
- Belletti, A., and Rizzi L. (2009) Moving verbal chunks. In L. Brugè, A. Cardinaletti, G. Giusti, N. Munaro, ND C. Poletto (Eds.) *Functional Heads*, Oxford University Press.
- Belletti, A., and Contemori C. (2010) Intervention and attraction. *On the production of Subject and object relatives by Italian (young) children and adults*. Proceedings of GALA 2009, University of Lisbon.
- Friedmann, N. (2001) Agrammatism and the psychological reality of the syntactic tree. *Journal of Psycholinguistic Research*, 30(1), 71-90. doi: 10.1023/A:1005256224207
- Friedmann, N., Belletti, A., & L. Rizzi (2009) Relativized relatives: Types of intervention in the acquisition of A-bar dependencies. *Lingua*, 119, 67-88.
- Friedmann, N., & M. Haddad-Hanna (2014) The comprehension of sentences derived by syntactic movement in Palestine Arabic-speaking children with hearing impairment. *Applied Psycholinguistics*, 35, 473-513.
- Friedmann, N., and Novogrodsky R. (2011) Which questions are most difficult to understand? The comprehension of Wh questions in three subtypes of SLI. *Lingua*, 121, 367-382. doi: 10.1016/j.lingua.2010.10.004
- Friedmann, N., and Szterman R. (2011) The comprehension and production of Wh questions in children with hearing impairment. *Journal of Deaf Studies and Deaf Education*, 16(2), 212-235. doi: 10.1093/deafed/ENQ052.
- Sperber, D., and D. Wilson (1986/1995) *Relevance: Communication and cognition*. Oxford: Blackwell.