



Factive and counterfactive interpretation of embedded clauses in aphasia and its relationship with lexical, syntactic and general cognitive capacities



V.C. Zimmerer^{a,*}, R.A. Varley^a, F. Deamer^b, W. Hinzen^{c,d}

^a Department of Language and Cognition, University College London, UK

^b Department of Philosophy, Durham University, UK

^c Institute for Research and Advanced Studies (ICREA), Spain

^d Department of Translation and Language Sciences, Universitat Pompeu Fabra, UK

ARTICLE INFO

Keywords:

Aphasia
Grammar
Factives
Counterfactives
Propositions
Reasoning

ABSTRACT

In factive clausal embedding ([*He knows [that it is warm outside]*]), the embedded clause is presupposed to be true. In non-factive embedding ([*He thinks [that it is warm outside]*]) there is no presupposition, and in counterfactive embedding ([*It only seems [that it is warm outside]*]) the embedded clause is presupposed to be false. These constructions have been investigated as a window into the complexity of language and thought, and there are disputes as to the relative contributions of lexical, syntactic or non-verbal resources in their interpretation. We designed a sentence-picture matching task to test comprehension of these constructions in a group of aphasic participants and in non-brain-damaged controls. In particular, we tested the capacity to reach a factive or counterfactive interpretation. In factive interpretation trials, participants with aphasia performed nearly as well as controls, while in counterfactive interpretation trials they performed significantly worse. Accuracy in factive and counterfactive interpretation trials correlated with other syntactic and lexical measures. Only performances on counterfactive trials correlated with non-verbal reasoning measures. Exploratory regression models suggest that verbal and non-verbal scores were separate factors. Results indicate that a disruption of counterfactive interpretation in aphasia is linked to reduction of syntactic and/or conceptual-propositional capacities.

1. Introduction

You and your friend get ready for a day trip to the coast. You see your friend pack light clothing and sunscreen. “I know that it is sunny over there,” she says. You check the weather forecast. It is all clouds and rain. “No,” you say. “You just think that it is sunny.”

Lexically and syntactically, *She knows that it is sunny outside* and *She thinks that it is sunny outside* appear similar. Both sentences have the same argument structure, a tail-embedded copular clause, a high-frequency mental verb in the matrix clause and the same inflections. However, their propositional structures differ substantially (Kiparsky & Kiparsky, 1970; Sheehan & Hinzen, 2011). Without further context, the clause *It is sunny outside* is assumed to be true. This default interpretation is not affected in a factive sentence like *She knows that it is sunny outside*. For this reason, *She knows that it is sunny outside, but it is not sunny* is contradictory. The

* Corresponding author. Department of Language and Cognition, Division of Psychology and Language Sciences, UCL, Chandler House, 2 Wakefield Street, London, WC1N 1PF, UK.

E-mail address: v.zimmerer@ucl.ac.uk (V.C. Zimmerer).

<https://doi.org/10.1016/j.jneuroling.2018.08.002>

Received 6 October 2017; Received in revised form 15 August 2018; Accepted 15 August 2018
0911-6044/ Crown Copyright © 2018 Published by Elsevier Ltd. All rights reserved.

interpretation of the embedded clause as true is overridden in non-factive constructions. In a sentence like *She thinks that it is sunny outside*, the embedded clause can be false, and in counterfactuals (a subset of non-factives), such as *You just think that it is sunny outside*, the listener even expects it to be false. These types of clausal embedding appear across constructions (e.g., interrogatives: *Do you know there's juice in the fridge?* vs. *Do you think there's juice in the fridge?*). They communicate an individual's mental state and the reliability of information. They involve complex processing at several cognitive levels and have been investigated in order to determine how these levels might interact.

In this report we examine the capacity of people with aphasia and non-braindamaged (NBD) controls to generate the correct factive and counterfactual interpretation of embedded clauses based on the verb phrase in the matrix clause. Research in aphasia has informed theories of language processing (e.g., Gahl & Menn, 2016; Grodzinsky, 2000) and the relationship between language and thought (Apperly, Samson, Carroll, Hussain, & Humphreys, 2006; Baldo, Paulraj, Curran, & Dronkers, 2015; Blank, Balewski, Mahowald, & Fedorenko, 2016; Varley & Siegal, 2000; Varley, 2014; Varley, Klessinger, Romanowski, & Siegal, 2005). We investigated the nature of aphasic comprehension in trials that require either factive and counterfactual interpretations; the degree to which it is impaired, and how possible impairment relates to other aspects of cognition.

Because comprehension of these constructions has not been tested in aphasia, we looked at explanations from the child development literature as well as related findings from aphasia to establish a theoretical framework. Comprehension of factives, non- and counterfactuals in embedding has been studied extensively in child language (e.g., see Dudley, Orita, Hacquard, & Lidz, 2015, for a review) in order to learn how maturation of different cognitive mechanisms contributes to eventual understanding of these constructions. The age at which full comprehension is achieved is not clear. Some studies suggest that successful differentiation starts at year 3 or 4 (e.g., Dudley et al., 2015; Johnson & Maratsos, 1977; Lewis, Hacquard, & Lidz, 2012), but Léger (2007) indicates that full insight into factivity is not complete until age 11. Results depend much on the methods employed. Dudley et al. (2015) criticize tests of factivity comprehension for often relying on metalinguistic reasoning, such as judging the appropriateness of sentences given a verbally presented context (e.g., Falmagne, Gonsalves, & Bennett-Lau, 1994; Harris, 1975) or adding additional cognitive demands by simultaneously assigning multiple mental states to different characters (Léger, 2007).

Dudley et al. (2015), in their review of the literature, list four explanations for this phenomenon: (1) Conceptual demands, including Theory of Mind (ToM), i.e. the requirement to attribute to an individual thoughts that may be different from one's own. (2) Syntactic demands, as the embedded clause must be integrated within the matrix clause. (3) Interpretation of the pragmatic context within which the construction is produced (for example, *think* is often used parenthetically instead of referring to a [possibly] false belief); (4) Lexical knowledge of the role the matrix verb plays in assigning (non-)factivity. These hypotheses concern different aspects of language processing and do not have to be mutually exclusive.

Hypotheses with much explanatory power in child development may be less powerful for adult aphasia, and vice versa, given that individuals with aphasia experience impairment to matured language networks. Reviewing the aphasia literature, syntactic and lexical accounts appear more likely than those which concern social reasoning and context. Clause integration is often disrupted in aphasia, with extensive evidence of difficulties in processing subject and object relatives (Caramazza & Zurif, 1976; Friedmann & Gvion, 2003; Swinney & Zurif, 1995). Lexical-semantic processing, of both nouns and verbs, is also impaired (Druks, 2002; Sloan Berndt, Mitchum, Haendiges, & Sandson, 1997). By contrast, there is evidence for retained social reasoning in aphasia. A series of studies with severely aphasic individuals (chance performance in sentence comprehension tasks and almost no connected language output) have shown good performances on tests designed to test non-verbal ToM and communication (Varley & Siegal, 2000; Varley, Siegal, & Want, 2001; Willems, Benn, Hagoort, Toni, & Varley, 2011; Zimmerer & Varley, 2010). Apperly et al. (2006) reported good performance of PH, a man with syntactic impairment who showed retained capacity in non-verbal first- and second-order ToM tasks. However, he also succeeded in a verbal test in which he had to answer questions with non-factive constructions such as *Where does Jeremy think the bag is?*, and counterfactual questions like *What if the waitress had not noticed the bag?* It could therefore be argued that PH had at least some access to linguistic resources, which he could have used in the non-verbal tasks.

Bánreti, Hoffman and Vincze (2016) had participants verbally report mental states represented in pictured situations. They found that participants with aphasia successfully communicated mental states. However, instead of producing utterances with embedded clauses, they tended to report them in first person direct speech, as if quoting the person in the picture. People with a diagnosis of Alzheimer's disease on the other hand had more clause embedding in their output, but more often failed to convey relevant ToM content. In a discussion of previous studies and their own data the authors argue for a double dissociation between clause embedding and ToM processing. However, there have been no investigations of the question to what degree aphasic social cognition involves full representations of others' mental states, as opposed to more perceptual or action-oriented cognition (Butterfill & Apperly, 2013; Rubio-Fernandez & Geurts, 2013).

Beyond ToM, cognitive demands may also include the general ability to maintain complex propositional representations. As mentioned earlier, a listener would be biased to interpret an utterance like *It is sunny outside* as true. As an embedded clause in a non-factive or counterfactual context, this bias competes with the correct interpretation. In addition to common lexical and syntactic processing demands across factives and non- or counterfactuals, the latter demand inhibition and manipulation of propositional content. Duman, Altnok, and Maviş (2016) suggest that an impairment of a "general cognitive capacity" can occur in aphasia, with particular disruption of executive function, resulting in impaired comprehension of counterfactual if-clauses in Turkish compared to comprehension of factual if-clauses. This proposal is based on Duman et al.'s claim that their factual and counterfactual stimuli are equivalent with regards to morphological and syntactic complexity, which would rule out linguistic impairment as the reason for this dissociation. General cognitive impairment has been associated with aphasia (Baldo et al., 2015; Peristeri & Tsimpli, 2013), though there are reported cases of people with very severe aphasia and strong non-verbal reasoning skills (Varley et al., 2005; Zimmerer, Cowell, & Varley, 2014).

Download English Version:

<https://daneshyari.com/en/article/8942249>

Download Persian Version:

<https://daneshyari.com/article/8942249>

[Daneshyari.com](https://daneshyari.com)