Inferences from semifactual 'even if' conditionals

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Abstract

We report three experiments on semifactual conditionals such as 'even if he had worn his seatbelt he would have been injured'. Semifactuals contain a counterfactual antecedent (the presupposed fact is, he did not wear a seatbelt) and a true consequent (the fact is, he was injured). The experiments show that from the denial of the antecedent, 'he did not wear his seatbelt', reasoners do not infer the standard conclusion 'he was not injured' but instead they infer the asymmetric conclusion, 'he was injured'. From the affirmation of the consequent, 'he was injured', they do not infer the standard conclusion 'he wore his seatbelt' but instead they infer that there is no valid conclusion. The first experiment shows this pattern for 'even if' subjunctive conditionals compared to 'if' indicative conditionals, the second extends it to 'even if' subjunctive conditionals compared to 'even though' indicative concessives, and the third extends it to 'if . . . also/still' subjunctive conditionals. The results suggest that people think about two possibilities to understand a semifactual: the conjecture, he wore his seatbelt and he was injured, and the presupposed facts, he did not wear his seatbelt and he was injured.
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1. Introduction

We aim to examine 'even if' conditionals, such as 'even if he had worn his seatbelt he would have been injured'. What does someone uttering this sort of conditional mean to imply? On our analysis, a person making such an assertion has suggested something about at least two possibilities, one in which he wore his seatbelt and he was injured, and another in which he did not wear his seatbelt and he was injured. The speaker has also conveyed that the first possibility is a conjecture whereas the second corresponds to the presupposed facts. These conditionals are sometimes called semifactuals by philosophers (e.g., Chisholm, 1946) because they seem to convey that their antecedents are false, he did not wear his seatbelt, yet their consequents are true, he was injured. Semifactual conditionals can serve to deny a causal link between the antecedent, to wear a seatbelt, and the consequent, to be safe, and so the speaker may cancel an assumption of the hearer's that wearing a seatbelt would prevent injury (see Byrne, 2005 for a review). We report the results of three experiments that examine the inferences that reasoners make from semifactual conditionals.

1.1. Indicative conditionals

Most psychological studies of conditional inference focus on the meaning and use of 'if' in the indicative mood,[1] such as 'if the lever was pressed the platform

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[1] Linguistic 'mood' is the grammatical term to refer to the form of the verb to indicate whether it expresses a fact, command, wish (indicative, imperative, subjunctive, respectively). It is sometimes referred to less technically as 'mode'.

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stopped'. Hypothetical inference is central to understanding human rationality, and 'if' remains one of the most intriguing and possibly most theoretically challenging of linguistic connectives, as the hundreds of experiments on it testify (e.g., Manktelow, 1999). Studies of 'if' often examine the situations in which people judge conditionals to be true and false, and the inferences that they make from them (e.g., Evans & Newstead, 1993).

When people understand a conditional in the indicative mood, such as, 'if the lever was pressed the platform stopped', they can make some inferences readily, such as the modus ponens (MP) inference, from 'the lever was pressed' to 'the platform stopped' (see Table 1). But they find it difficult to make other inferences such as the modus tollens (MT) one from 'the platform did not stop' to 'the lever was not pressed'. The difference in difficulty has been explained by several different theories and the one that we test here is that people understand conditionals by keeping in mind possibilities (Johnson-Laird & Byrne, 1991). To understand a conditional in the indicative mood, people keep in mind just a single true possibility at the outset, 'the lever was pressed and the platform stopped'. They may be aware that there are alternatives to this possibility (what we will call a "implicit model") but they have not thought through what these alternatives may be, perhaps because of the constraints of working memory (Johnson-Laird, Byrne, & Schaeken, 1992). As a result they make the MP inference readily. But to make the MT inference, they must think explicitly about the alternatives to the initial possibility. They must appreciate that the conditional is consistent with the possibility 'the lever was not pressed and the platform did not stop'. Reasoners do not think about false possibilities, e.g., 'the lever was pressed and the platform did not stop' (Johnson-Laird & Byrne, 2002), except to understand certain sorts of possibilities such as obligations (Quelhas & Byrne, 2003).

Two further inferences are crucial for our experiments: the denial of the antecedent (DA) inference, from 'the lever was not pressed' to 'the platform did not stop' and the affirmation of the consequent (AC) inference, from 'the platform stopped' to 'the lever was pressed'. Reasoners make these inferences from indicative 'if' when they consider the conditional to be consistent with just the two possibilities already outlined, 'the lever was pressed and the plat-

form stopped' and 'the lever was not pressed and the platform did not stop' (a 'biconditional' interpretation). They resist the two inferences as fallacies when they consider a third possibility to be consistent, 'the lever was not pressed and the platform stopped'. This third possibility is consistent with a 'conditional' interpretation of indicative 'if'. On our account, this third possibility is especially salient for semifactual conditionals and so it predicts that reasoners should readily resist the DA and AC inferences from them.

1.2. Subjunctive conditionals

People envisage initially a single possibility to understand indicative 'if' but they envisage more than one possibility from the outset for some conditionals, such as those in the subjunctive mood, e.g., 'if the lever had been pressed, the platform would have stopped' (Johnson-Laird & Byrne, 1991). The counterfactual conditional leads people to envisage not only the conjectured possibility, 'the lever was pressed and the platform stopped', but also the presupposed facts, 'the lever was not pressed and the platform did not stop' (Carpenter, 1973; Fillenbaum, 1974), as Table 2 illustrates. They keep track of the epistemic status of the possibilities as corresponding to the facts or an imagined possibility. Reasoners judge that someone uttering a counterfactual means to imply these facts, i.e., 'the lever was not pressed' and 'the platform did not stop' (Thompson & Byrne, 2002). They readily make inferences that require access to these facts, such as the otherwise difficult MT inference, from 'the platform did not stop' to 'the lever was not pressed'. They also frequently make the DA inference from 'the lever was not pressed' to 'the platform did not stop' (Byrne & Tasso, 1999). These data support the view that counterfactual conditionals are understood by keeping in mind two possibilities (Byrne, 2005).

Table 1
Four inferences for a conditional

If the lever was pressed the platform stopped

MP	AC
The lever was pressed	The platform stopped
The platform stopped	The lever was pressed
DA	MT
The lever was not pressed	The platform did not stop
The platform did not stop	The lever was not pressed

Key: MP = modus ponens, AC = affirmation of the consequent, MT = modus tollens, DA = denial of the antecedent.

Table 2
The initial true possibilities people keep in mind for different sorts of conditionals

Indicative: If the lever was pressed the platform stopped
  Initial possibilities
  The lever was pressed and the platform stopped
                     . . .
Counterfactual: If the lever had been pressed the platform would have
  stopped
  Initial possibilities
  Facts: The lever was not pressed and the platform did not stop
  Conjecture: The lever was pressed and the platform stopped
                     . . .
Semifactual: Even if the lever had been pressed the platform would
  have stopped
  Initial possibilities
  Facts: The lever was not pressed and the platform stopped
  Conjecture: The lever was pressed and the platform stopped
                     . . .

The ellipsis represents an implicit model of other true possibilities that can be accessed subsequently for example: "The lever was not pressed and the platform stopped" or "The lever was not pressed and the platform did not stop".