The conjunction commutativity law does not hold in natural language: Difficulties in the search for syntactic support

Miguel López-Astorga

University of Talca, Chile

milopez@utalca.cl

Abstract

Orenes and Johnson-Laird gave arguments to show that the conjunction commutativity law, that is, the principle providing that the order of the conjuncts has no influence on a coordinating conjunction such as 'and', is not respected by natural language. Their point was that both semantics and pragmatics are more important than syntax, and that, for that reason, semantic and pragmatic factors can change the sense of a sentence with 'and' if the order of its conjuncts is reversed. This paper keeps following this direction and tries to argue that it is really hard to find syntactic characteristics in sentences that can explain changes such as those ones.

Keywords: and, conjunction, pragmatics, semantics, syntax.

Introduction

Based upon the mental model theory (e.g., Khemlani, Hinterecker, & Johnson-Laird, 2017), Orenes & Johnson-Laird (2012) showed that 'and' is a coordinating conjunction whose behavior in everyday language is very different from the one of the logical conjunctions. In their view, this is so because the role played by semantics and pragmatics in language is more primary than that of syntax. In particular, their idea is that, when a conjunction such as 'and' is used, beyond the formal elements in the sentence, semantics and pragmatics can cause the sentence to have a different meaning depending on the order of its conjunctions, which is inadmissible in standard logic.

There are works, such as the one of López-Astorga (2018) that have looked for formal resources, like temporal logic, to try to find the real logical forms corresponding to different kinds of conjunctions. However, any approach in this way

has to acknowledge that such logical forms can only be assigned after considering what semantics and pragmatics provide, which continues to make it evident that syntax is secondary (see, e.g., Johnson-Laird, 2010; López-Astorga, 2015).

Leaving aside some of the arguments about tense raised from the idea of a universal grammar (e.g., Hornstein, 1990), this paper will try to delve into Orenes & Johnson-Laird's (2012) perspective. Its main aim is hence to give further support to the thesis that semantics and pragmatics are more relevant in a language than syntax. To do that, it begins by better explaining Orenes & Johnson-Laird's theoretical position. After that, it proposes some possible syntactic accounts pointing out particular elements or properties that could be used to argue against their general framework and their different interpretations for conjunctions. Lastly, it presents some concrete examples revealing that the previous syntactic accounts are not correct and can be challenged. The general conclusion will be, therefore, that, if it is wished to continue to advocate an important role for syntax in the case dealt with in this paper, in particular, and in language in general, it is necessary to research into a larger extent phenomenon such as the one addressed below and try to offer more compelling arguments regarding them.

Conjunction from Orenes & Johnson-Laird's perspective

As indicated by López-Astorga (2018), Orenes & Johnson-Laird (2012) query the idea that natural language is linked to logic. They show this, in the specific case of conjunction, by means of an example that violates the conjunction commutativity law. As it is well-known, that law establishes that:

    (1) A & B = B & A

It cannot be said that (1) is a problem in sentences such as this one:

    (2) "Pat is tall and Viv is short" (Orenes & Johnson-Laird, 2012: p.357; see also, e.g., López-Astorga, 2018: p.13).

Indeed, the conjuncts in (2) can be reversed without modifying its sense. In fact, it can be stated that the meaning of (2) is the same as the one of (3).

    (3) "Viv is short and Pat is tall" (Orenes & Johnson-Laird, 2012: p.357; see also, e.g., López-Astorga, 2018: p.14).

Nevertheless, the situation is different in the case of sentences such as the following:

(4) "Pat pushed Viv and Viv fell over" (Orenes & Johnson-Laird, 2012: p.357; see also, e.g., López-Astorga, 2018: p.14).

There is no doubt that in (4) the first conjunct happens before the second one. However, if their order is changed, the temporal order is changed too:

(5) "Viv fell over and Pat pushed her" (Orenes & Johnson-Laird, 2012: p.357; see also, e.g., López-Astorga, 2018: p.15).

Certainly, by altering their position, the order in which the facts occurred is modified as well. In (5), the first conjunct keeps being the one that happens before in time. Nonetheless, now it refers to 'Viv fell over', and not to 'Pat pushed her', as it does in (4). This argumentation, as also indicated in papers such as that of López-Astorga (2018), it is a problem for the approaches upholding a dominance of syntax in language (e.g., Braine & O'Brien, 1998; Henlé, 1962; or Rips, 1994), since, ultimately, the logical formal structure of (4) is identical to the one of (5). However, one could think about certain syntactic characteristics distinguishing (4) and (5), and that perhaps those characteristics could explain their differences. Some of such possible characteristics are considered in the next section.

Some possible arguments on syntactic differences between (4) and (5)

Of course, (4) and (5) reveal that classical logic is not directly related to natural language. If that were so, the phenomenon described in the previous section would not exist, and the conjunction commutativity law would be always respected. Nevertheless, it is possible to detect certain formal differences that could be assumed as the causes of the changes in the temporal order of the conjuncts when they are reversed in some conjunctive sentences.

[A] First possibility

One thesis could be that (1) may not be valid only when the verbs in the conjuncts are different. When the verb is the same, it must be fulfilled. Thus, it could be claimed that the meaning is not modified in the cases of (2) and (3) because, in both, the verb in the two conjuncts is 'to be.' And that is something that does not occur with (4) and (5), since, in them, the verb of one of the conjuncts is 'to push' and the verb of the other one is 'to fall over.'

[B] Second possibility

But the argument can be even more restrictive. It could be stated that the condition to fulfill (1) is not just that the two conjuncts have the same verb, but exactly the verb 'to be.' As said, that is the verb of the two conjuncts in (2) and (3). So, it can also be thought that the real requirement is that that very verb is the only one that is used, and that, whenever it is used, the order of the conjuncts does not matter.

[C] Third possibility

And another possibility can be to raise that (1) is violated, and hence temporal relations are established between the conjuncts, when these can be linked by means of sub-indices in a way similar as it is done in works such as the one of Hornstein (1987). This is exactly the case in (4) and (5). In particular, a sub-index i pointing out that the person indicated is the same can be added to (4) in this manner:

(6) Pat pushed Vivi and Vivi fell over.

On the other hand, something similar can be made with (5):

(7) Vivi fell over and Pat pushed her$i$.

Thus, it can be proposed that the reference of i to the same person is what causes the temporal relation to be provided, and one to have to interpret that, both in (4) and in (5), or, if preferred, both in (6) and in (7), the first conjunct happens before the second one.

Nevertheless, it is not difficult to counter arguments such as [A], [B], and [C]. And that is so because is very easy to find counterexamples.

Counterexamples for [A], [B], and [C]

As far as [A] is concerned, there are cases of conjunctions with the same verb in their conjuncts and providing, at once, that one of the conjuncts occurs after the other one. For example,

(8) I came first and you came then

The first conjunct in (8) happens before the second one, and the verb is the same in both cases: 'to come.' Furthermore, there are also conjunctions with different verbs in their conjuncts and in which, however, one of the conjuncts does not necessarily occur after the other one. For instance,

(9) I swim and you skate

The two actions in (9), to swim and to skate, can happen at the same time. So, it seems that [A] does not hold.

The verb 'to be' restriction in [B] does not appear to work either. This example shows that:

> (10) I was the first one and you were the second one

A sentence such as (10) does not need a very specific pragmatic context to understand that what is said in the first conjunct takes place in a moment before what is stated in the second conjunct. And both conjuncts include the verb 'to be.' In addition, as indicated, (9) reveals that a synchronous temporal relation is possible without that verb too.

Finally, regarding [C], sub-indices do not guarantee diachronic relations either. That is clear in (11).

> (11) She$_i$ loves me$_j$ and I$_j$ love someone else$_k$

In this last sentence, sub-index j refers to the same person. Nevertheless, the actions described by its two conjuncts are simultaneous. Besides, it can also be thought that (8) and (10) are also counterexamples here. They do not admit a same sub-index in the two conjuncts. Nonetheless, both have conjuncts happening in different temporal moments.

Conclusion

Therefore, it is hard to find syntactic elements which are able to explain the phenomenon pointed out by Orenes & Johnson-Laird (2012). This is not surprising, since the relevance of semantics and pragmatics has been highlighted by several general frameworks, from Cognitive Linguistics (e.g., Geeraerts & Cuyckens, 2007) to the mental model theory (see also, e.g., Bucciarelli & Johnson-Laird, 2019; Khemlani, Byrne, & Johnson-Laird, 2018), which is, as indicated, the approach that Orenes & Johnson-Laird (2012) assume. However, the point here is that, as also said, it is not easy at all to identify basically syntactic characteristics for the examples given by Orenes & Johnson-Laird (2012) that can account for the linguistic fact they reveal.

This does not mean that it is not possible to assign different formal structures to, for example, sentences such as (2) and (4). As mentioned, the specialized literature shows that this can be done (see, e.g., López-Astorga, 2015, 2018). So, it can be claimed that logical form is an important factor in natural language too (even though it does not

have the same role attributed to it from perspectives such as the one of Chomsky, 1981). Nevertheless, the conclusion that can be drawn from exactly the same literature is that the methods and resources to find the hidden real logical structure of sentences such those ones depend first, as also pointed out, upon semantic and pragmatic analyses (see, e.g., Johnson-Laird, 2010; López-Astorga, 2015).

Accordingly, considering that facts studied above, what seems to be undoubtedly true is that, without ignoring syntax, there is a need for further research about the influence of particular ways of semantics and pragmatics on the human communicative processes. And it should also be reminded that arguments such as those of Orenes & Johnson-Laird (2012) are often accompanied by experiments with clear empirical results supporting them.

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