LIMITED OR LIMITLESS

A discussion on the word "or", its uses, and its constraints.

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The word *or* is an extremely common word. Its lone speech category is that of a conjunction – a co-ordination between two clauses. A one syllable-word, basic in its etymology, and with little morphology to account for (*nor* is the only word to derive from *or),* its usage can be far more complex than a common English speaker would envisage. It is most commonly used to link two alternatives, but can also be used to introduce a synonym or as an explanation to a preceding phrase, as well as an indicator of consequence. One aspect of this discussion will be to show that these latter two usages are, in essence, identical to the first, most common, use, i.e. that its presence is always indicative of two alternatives.

Or is a binary operator in logic (hereafter referred to as OR, or V, when using it as a logical operator), meaning that it has two states: yes or no, true or false, etc. Binary operators are typically considered to be definite. The clause is either in state A or it is in state B. Its status as a binary operator means that it is strongly present in all areas of theoretical syntax and semantics, which are themselves based on stringent logical rules.

In this discussion, we will look at how *or* can be more ambiguous in semantics than other binary operators. Furthermore, this discussion will comprise of an analysis of the constraints of *or*, be they semantic, pragmatic, or syntactic, and how it differs these constraints differ from other binary operations.

As noted in the introduction, *or* is a binary operator. Drawing from Piagetian logic, Sinclair (1970) describes two "poles of knowledge": logical knowledge and physical knowledge. The properties of the "objects" in consideration pertain heavily to our physical knowledge, whereas they are almost irrelevant in logical knowledge. By this proposal, OR is very much an operator found at the logical "pole" of our knowledge. Taking (1)[1], for example, we can see that neither the order of the objects (2) nor the objects themselves (3) are inherent to our understanding of the operator:

1) *I saw [John] V [Mary] V [Bill] V [Jim].*
   "I saw [John] or [Mary] or [Bill] or [Jim]"
2) *I saw [Mary] V [Jim] V [Bill] V [John].*
   "I saw [Mary] or [Jim] or [Bill] or [John]"
3) *I saw [Alex] V [Sam] V [Andrew] V [Geoff].*
   "I saw [Alex] or [Sam] or [Andrew] or [Geoff]".

Each sentence is grammatical. Furthermore, the objects (in square brackets) do not affect our interpretation of the sentence. They are not what we "see". Rather, they are elements of the set of things which we can "see". We also encounter the potential ambiguity in interpretation of OR as a binary operator – in (1) through (3) we could have "seen" anywhere from only one of the objects to all four of the objects. This is one of the primary pragmatic constraints of OR as a logical operator, and the catalyst to the implementation of the "exclusive or" (XOR, or $\oplus$ in example sentences) logical operator in many disciplines, such as computer science (Comon-Lundh & Shmatikov, 2003). `

The usage of OR is an excellent illustration of the divide between semantics and pragmatics. In both (4) and (5), we shall take *[John]* as the lone direct object of the verb (i.e. the object who is "seen"). Both sentences are grammatical and (per the previous sentence) convey the same meaning. However, (5) takes a much more pragmatic approach. The OR operator is superfluous to conveying the meaning and as such could be omitted.

4) *I saw [John] V [Mary].*
   "I saw John or Mary."
5) *I saw [John].*

Moreover, the XOR operator can be more pragmatic in its usage. Although one of its primary functions is to link alternatives, the OR operator can, ironically, be unsatisfactory in conveying the meaning of "alternatives" and, instead, may need complementary arguments in order to accurately convey the meaning of the sentence. These complementary arguments transform the OR operator (6) into an XOR operator (7):

6) *I want [tea] V [coffee].*
   "I want tea or coffee".
7) *I want [tea] $\oplus$ [coffee].*

   "I want tea or coffee, but not both" or "I want either tea or coffee"

Although *or* is present in both sentences, its function as a logical operator differs between the two. When used in the XOR context, it is accompanied by an exclusivizer – most commonly "either". From a logical perspective, it is not incorrect to assume that the subject may want both tea and coffee. However, this may not be the case, and *or* does not distinguish this when used without an exclusivizer. This is one of its more glaring pragmatic constraints, especially when compared to other conjunctions, such as *and*, which never require exclusivizers.

[1] Example drawn from (Gleitman, 1965, p. 276) with slight adaptation (substitution of applicable conjunction)

Or, much like other conjunctions, is also limited in syntactic scope – i.e. there are many syntactic constraints to its usage. Gleitman (1965) give an extensive analysis on many of the limitations encountered by coordinating conjunctions in English, some aspects of which we will look at in detail.

The first observation is one of the more common syntactic constraints of conjunctions: repetition. It is one that almost every English speaker will have faced in their progression through syntax, as teachers attempt to steer children's tendencies away from these drawn out, co-ordinated sentences (S1 and S2 and S3 and S4) in favour of short, simple, sentences where punctuation acts as the inter-sentence marker. These tendencies are not purely anecdotal – literature such as (Lust & Mervis, 1980) note that children acquire sentential co-ordination before they acquire phrasal co-ordination (i.e. co-ordination of phrases, such as nouns, verbs, adjectives, etc.). Furthermore, other studies (Friedmann & Costa, 2010) note the difficulty that children have where conjunctions convey clausal dependencies, as in (8):

8) *[The scientist$_i$ tested the boy] and [smiled$_i$.]*

This difficulty in linking clauses is a key contributor to the high frequency of sentential co-ordinations in speech among children, especially in cases where the subject (or object, as in other examples given by Friedmann & Costa) could be superfluous as it has already been introduced. As children mature and their language capabilities improve, they elect to use sentences such as (8), favouring the more concise result offered.

Gleitmann notes that *or* is more constrained syntactically than other conjunctions, e.g. *and*, declaring that *or*-repetition "usually" produces "awkward" resulting sentences (9), whereas *and*-repetition is more likely to produce a fluid sentence (10). This ceases to be the case for *or*-repetition *when* the repeated conjoining particles "have different syntactic status" in the sentence, as in (11):

9) *He walked out to the porch and he looked around and he jumped.*
10) *?He walked out to the porch or he looked around or he jumped.*
11) *The miners will accept the proposal or the company will turn to Federal or State arbitrators.*

Interestingly, I find *or* to be less syntactically constrained than other conjunctions, including *and*, in different contexts[2]. Both conjunctions are binary operators, with *or* linking two (per the word 'binary') alternatives. However, the following example (12 – identical *and*-version located at (13)), where the second *or* argument is omitted, will seek to challenge this theory.

12) *?[We go to the shop beforehand] or []?*
13) *?[We go to the shop beforehand] and []?*

Conventionally, we would reject both as being ungrammatical – the conjunctions are each lacking a second argument. However, one could argue that these conjunctions offer a different contextual usage - a usage with two arguments, similar to convention. However, the usage differs in that one argument (always the latter) is omitted, requiring the second party[3]in the speech situation (this can

[2] This discussion will analyse verbatim (anecdotal) usage of conjunctions at end-sentence position, in an attempt to analyse conjunctions from a more pragmatic point-of-view. An area not entirely well-covered in literature, as conventional syntax would (correctly) reject its results, we will seek to question whether this challenges English syntactic structure - other languages, such as Korean (Rhee, 2008) allow different sentential-endings, such as interrogatives.

[3] We will hereafter refer to the speaker of the sentence as X, and the other party (listener, recipient, etc.) as Y for simplicity.

be, but is not limited to, verbal speech) to choose or, rather, interpret what this second argument should be.

Pragmatically, this usage of *or* provides a much less constrained syntactic usage than conventional syntax. It almost acts as a substitute for a fronted auxiliary in an interrogative phrase:

14) Should [we go to the shop beforehand]?

15) [We go to the shop beforehand] or?

Furthermore, this idea of ellipting the second argument in interrogative phrases is pragmatically synonymous with the second argument being a negation of the first argument:

16) [Do you want coffee] or [not]?
17) ?[Do you want coffee] or [Ø]?

Again, conventional syntax would perceive (16) to be more grammatical than (17). However, the latter is more pragmatic in that it allows for Y to suggest a second alternative. If *Y* is to choose the negated argument, it is upon Y to then suggest an alternative to the argument. The above realization of *or* usage allows for Y to skip this initial negated argument and proceed directly to the suggestion. Thus, this is where pragmatism would see this syntactic restraint upon *or* lifted in favour of a more practical approach. Although (15) is drawn from a text conversation, it is also possible for this ellipsis to be realized in verbal speech situations – X would employ intonation to the *or* sentential ending to convey this open-ended alternative.

This neo-syntactic approach is not, however, as applicable to interrogative phrases of other binary operators such as *and:*

18) [Do you want biscuits] and [coffee]?
*19) *[Do you want biscuits] and [Ø]?*

In (17), the ellipsis of the conjunction allows for an open interpretation of the argument, whereas in (19) it produces neither a syntactically acceptable nor a pragmatically acceptable result. This is due to the different nature of the two operators: *or* links two alternatives, whereas *and* links two words that are part of the same clause and are to be taken jointly. Thus, we can conclude that *or* is less restricted as a conjunction in this sense.

Thus far, we have discussed *or* solely in contexts where it is used as a link between two alternatives. *Or,* however, is not limited to these contexts, as noted in the introductory paragraph. It can also be used as an introduction to a synonym of a preceding phrase, or as an explanation to a preceding phrase. Furthermore, it can be used as an introduction of consequence. The following section of this discussion will aim to illustrate that these two contexts are, in essence, the same concept as the above-discussed context of linking two alternatives.

We can see a case of *or*'s second function in the introduction to *or* as a binary operator:

20) [hereafter referred to as OR,] or [V]

Once more, we see two alternative phrases linked by *or*. However, this usage of *or* is slightly more limited as neither the first nor the second argument can be altered without producing a nonsensical semantic reading of the sentence:

21) [hereafter referred to as OR,] or [∧]

Syntactically, this sentence is acceptable. We know, however, that ∧ refers to something completely different in logic, which leads to the meaning of the sentence being fundamentally incorrect. Semantic constraints apply to this usage of *or* – both arguments must be synonymous. This is a good illustration of why syntax is not the only factor to examine when discussing language.

This constraint can also, however, be applied to the usage of *or* as a link between two alternatives, which we have not, thus far, noted. Compare (6) with the following:

22) ?[do you want tea] or [a horse]?

Both sentences mirror each other in syntactic composition[4] and, thus, could be deemed equally acceptable. This, however, is not the case, as seen in (22). We can conclude that both usages of *or* are semantically constrained. In cases similar to (6) and (22), the arguments must be similar objects. They need not be of the same type, as (18) shows, nor need they be synonymous, as all three examples show. In cases such as (21), the two arguments must be synonymous.

The final usage of *or* that will be discussed here occurs when the conjunction is used as an indication of consequence:

23) [Let me win], or [you will owe me fifty euro.]

We are once more faced with the notion of *or* as a link between two alternatives. Unlike previous usage, however, only one argument is mentioned, with the second implied, or ellipted, argument being the negation of the first. This form always follows the imperative tense in English. *Or* links the two alternative consequences, one of which occurs if the order is followed and one of which occurs if the order is not followed. We will logically transcribe this relationship as follows:

A. $\forall A, B, C \in$ *English Language,* $C = \neg B, (A \rightarrow B)\ V\ (\neg A \rightarrow C)$
Where B and C are the two arguments of the conjunction *or.*

This usage of *or,* where only one argument is mentioned, could give credence to the notion of the second alternative of *or* being ellipted in other uses of the conjunction, as in (17).

[4] The fact that horse is preceded by a determiner, whereas coffee/tea are or, rather, could be preceded by a quantifier (some), is irrelevant and is not the defining attribute in deciding whether *or* is semantically acceptable. We could take the concept of honesty, for example, which is not preceded by any determiner or a word of similar function, and the same problem would arise.

Throughout this discussion, we have examined certain constraints on *or* as a conjunction, as well as a binary operation, in English. We have alluded to possibilities of the word to escape certain restraints, be they semantic or syntactic, as well as discussing more rigid constraints which are not as easily challenged.

Or is a very interesting word, and is a perfect example of how something that is so seemingly simple, and used in our every-day lexicon, can be far more nuanced in its usage than even the most proficient speaker of English would imagine. Only through thorough examination, and significant research, does one begin to even touch on the subtleties that are present. Furthermore, its presence as a binary operator in logic, which forms the basis of almost all theoretical semantics, e.g. generalized quantifier theory, means that it is an imperative understanding for any analysis in the area of semantics, as well as related disciplines such as syntax.

Although I have only touched upon the uses and constraints of the word *or*, I certainly feel like this discussion provides visible evidence that many of these factors are more nuanced than they appear, and that even the sturdiest of rules across syntax and semantics can struggle to constrain the conjunction *or*. Furthermore, I have hypothesized certain areas which I believe challenge these rules, areas that could provide base to interesting research on a larger scale.

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