

# ON COUNTERFACTUAL METAPHORS AND PARADOX

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## **1. Introduction**

The problem of paradox presents a problem for current theories of linguistic semantics. A paradoxical statement represents a self contradictory or impossible situation and therefore should not make sense. However, it is clear that paradoxes are often used in natural language. In this paper two types of linguistic paradox will be discussed: metaphorical paradoxes and counterfactual paradoxes. The central claims of this paper are that in the understanding of metaphors and counterfactuals the same cognitive processes involving the creation and mapping of mental spaces are involved and that understanding is driven by the avoidance of paradox.

A novel approach to metaphorical and counterfactual reasoning which avoids issues of paradox by treating both as mappings between conceptual spaces to localized logical spaces will be described. This approach has been successfully computationally implemented within a larger Artificial Intelligence reasoning system and builds on recent work investigating the relationship between metaphor, counterfactual reasoning and truth (Lee (forthcoming)).

There is a theory of language which argues that the syntax of an utterance acts as an input to a context-free, truth-conditional semantic representation (e.g. see Lewis (1972)) which may be extended by additional reasoning to capture its pragmatic (or intended) meaning (e.g. Grice (1975)). Henceforth, this view will be referred to as the “classical” view of meaning. Both metaphors and counterfactuals are troublesome to this theory. Metaphorical utterances present a problem since the theory cannot explain neither the systematic nature or pervasiveness of metaphorical language. Similarly, truth-conditional views of counterfactuals have failed to match our intuitions since truth-conditionally, all counterfactuals are literally true yet this does not accord with our intuitions as to what is an acceptable or unacceptable counterfactual expression. Accounts which have attempted to provide a truth-conditional account of acceptability have encountered further logical problems as will be reviewed in Section 3.

Metaphors and counterfactuals present further problems for the classical truth-conditional view of meaning since both are often apparently paradoxical. For example, consider the metaphorical expression:

- (1) “Deep down, he was very shallow.”

Treated literally, this is paradoxical since a person cannot be both “deep” and “shallow” at the same time. Furthermore, despite this kind of metaphor being relatively common when discussing personalities or emotions, such things themselves do not literally have any physical depth. Despite these complexities, most hearers would not have any problem in understanding such an expression since they would be able to separate out two different mappings from the source domain of physical space to the target domain of emotions. Thus the paradox of being both “deep” and “shallow” is avoided in the target domain by the mapping of these concepts into non-paradoxical terms.

Paradox is also apparent in counterfactual expressions since to understand a counterfactual one must imagine a world where the counterfactual’s antecedent is true despite the known facts suggesting otherwise. For example, consider the counterfactual:

- (2) “If I was my bother, I’d have gone home.”

Such a counterfactual asks the hearer to verify that if the antecedent were true then the consequent would follow. This must involve the hearer imagining a world where the antecedent is true, and any fact contrary to the antecedent is false so as to avoid paradox and then, once this is done, verifying that the consequent follows.

It is not sufficient to just pretend that the negation of the antecedent is false since any proposition which entails the negation of the antecedent must also be removed and this step must be repeated till the set of true propositions is consistent. Clearly this is non-trivial given a counterfactual such as the above which itself asks the hearer to contemplate an apparent paradox involving the identity of the speaker. Several truth-conditional accounts of counterfactual reasoning have been proposed, most notably Lewis (1973) (see Brée (1982) for an overview). I will argue that such accounts are misguided since rather than being truth conditional, counterfactual meaning is essentially analogical and involves the mapping of concepts from source domains to some counterfactual space from which an analogy can be drawn between it and the topic of conversation. This is similar to the above sketch of metaphorical reasoning and I will show how the two kinds of reasoning can be combined in a single approach.

The similarity between metaphors and counterfactuals has also been pointed out by Cohen (1998) who argues that there are two main types of philosophical argument: metaphorical and counterfactual. For example, a philosopher might describe one concept in terms of another in a metaphorical argument or ask a “what if” question and then a conclusion based on its answer in a counterfactual argument. Cohen summarizes this by stating that “metaphors ask us to imagine the world in a new way, while conditionals may ask to imagine a new world” (*ibid*).

Cohen also argues that many philosophical misunderstandings are due to philosophers mixing metaphorical and counterfactual arguments. Because counterfactual reasoning requires reasoning about a novel world (one where the antecedent is true, unlike the real world), the content of the counterfactual must be semantically unambiguous so that the hearer can imagine the correct world within which to interpret the counterfactual. Therefore, because metaphors are “semantically loose” Cohen argues that an argument which mixes metaphors and counterfactuals is likely to be philosophically nonsensical.

While this argument may hold some force in philosophy, it is apparent that counterfactuals in mundane discourse are often metaphorical. For example consider the folk saying:

(3) “If wishes were horses then beggars would ride”

Such an example presents a novel metaphor which can only be understood by reasoning about the counterfactual as a whole, forcing a rich interaction between the two types of reasoning. This should be of no surprise if the account to be detailed in this paper is correct since both phenomena require the same cognitive mechanisms in their interpretation and therefore can be easily mixed. I will provide further examples of corpus-attested metaphorical counterfactuals and provide an analysis of the various ways metaphors can function within a counterfactual expression in Section 6.

The remainder of this paper is structured as follows. Sections 2 and 3 will briefly review previous work on metaphor and counterfactuals and more specifically introduce Conceptual Metaphor Theory and a classical account of counterfactual reasoning. In Section 4 a novel approach to reasoning about metaphors will be described which though based on Conceptual Metaphor Theory has various elaborations which have allowed the approach to be implemented within a computational reasoning system. In Section 5 this approach will be developed further to deal with counterfactual expressions. Sections 6 and 7 will then discuss cases where the two types of expression are mixed. Finally Section 8 will make some final comments on the relationship of paradox to figurative meaning.

## 2. Conceptual Metaphor

Conceptual Metaphor Theory (CMT) (Lakoff and Johnson, 1980; Lakoff, 1993) argues that metaphor operates at a conceptual rather than linguistic level. That is to say, a metaphorical expression specifies a mapping between two different conceptual domains and that the same metaphor can be manifested in different linguistically realized expressions. For example, expressions like “They reached an agreement not to discuss this any further”, “We were once in love but now we’re no longer close” can be analyzed as examples of the same metaphor STATES AS LOCATIONS<sup>1</sup>.

The majority of metaphors found in mundane discourse are conventionalized (Kovecses, 2002; Deignan, 2005). and therefore, the mappings they involve between conceptual domains are also conventionalized so that for a given metaphor there are a finite number of mappings between the source and the target.

This allows for metaphors to be systematic. For example, assuming there is a mapping between emotional intensity and temperature we can analyze expressions such as “he cooled down” or “his blood ran cold” as manifestations of the same metaphor but expressing an opposite connotation (see Kovecses (2003) for further discussion).

This allows for metaphors to be systematic so that different manifestations of the same conceptual metaphor are related and involve the same set of mappings. For example, in the conceptual metaphor STATES AS LOCATIONS reaching a location is mapped to becoming a state, while leaving a location is mapped to ceasing to be in a state. Therefore, manifestations involving opposite connotations can be analyzed as involving the same metaphor.

The degree to which mappings between source concept and target concept are fixed depends on the relative novelty of the metaphor so that dead metaphors feature fixed mappings which provide very rigid interpretations while active metaphors allow for a degree of interpretation and uncertainty.

Metaphorical mappings typically involve the mapping of some more abstract concept to a concrete concept. For example, an abstract concept such as a particular emotion might be described in the more concrete terms of temperature. It has been claimed (for example by Lakoff and Johnson (1980)) that this is one of the one of the main functions of metaphor: to describe less-familiar abstract concepts in more familiar concrete terms.

It is further claimed that there is a principle that by default concrete information in the target domain overrides abstract information in the source domain. This avoids paradox. For example, consider the following metaphorical expression:

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<sup>1</sup> For clarity I’ll follow the convention of work in cognitive linguistics of using uppercase to denote conceptual metaphor.

- (4) “John was so angry that steam came out of his ears.”

This metaphor can be analysed as involving the conventional metaphor emotions – as-heat so that the concept of anger is mapped to concept of heat creating steam. However, it is clear that the metaphor does not suggest any of the real world implications that such a scene might suggest such as John being scalded. Therefore, by default, target domain information concerning emotions overrules any such unbelievable or fantastical scene being created.

However, while it is intuitive that target domain information should override source domain information by default, it is clear that this is not always the case. For example consider the metaphorical expression:

- (5) “The company nursed its competitors back to health.”

In this example, source domain information does indeed appear to overrule target domain information since companies do not usually help their competitors and so there is a semantic disparity in the expression. This disparity however is not paradoxical, the company could be helping its competitors unintentionally<sup>2</sup>. What is clear, however, is that a more sophisticated method of mapping and combining information from different conceptual domains is required. Such a method will be sketched in Section 4.

### 3. Counterfactual reasoning

As an aid to discussion, consider the counterfactual:

- (6) “If everybody had left the conference early then I’d be talking to an empty room.”

Notice that both the antecedent and the consequent are implied to be false (e.g. not everybody had left the conference early and the speaker was not talking to an empty room). Traditionally, the falseness of the antecedent is implied as a presupposition of the counterfactual since it satisfies Strawson’s test [1952] in that if the antecedent were actually true then the counterfactual could not be assigned a truth value and would therefore be meaningless. The falseness of the consequent is a conversational implicature. For example, it could be cancelled by then uttering:

- (7) “... but I am anyway.”

The presupposed falseness of the antecedent presents a problem for truth-conditional account. Since any conditional with a false antecedent is trivially

<sup>2</sup> This example is discussed in more detail in Barnden and Lee (1999).

true, then according to classical logic, all counterfactuals are tautological. This does not match our intuitions since we clearly distinguish between reasonable and non-reasonable counterfactuals. More specifically, there must be a plausible story imaginable which causally links the truth of the antecedent to the truth of the consequent. This is termed the problem of verification: verifying that if the antecedent were true, then it would be reasonable to assume the consequent would also be true. Many approaches to the verifying counterfactuals have been suggested. The majority follow the spirit of

Given: if A then B

- i. set up a pretence space where A is true.
- ii. remove any proposition which contradicts A.
- iii. construct meaning of the counterfactual by verifying that A entails B within the pretence space. (Brée, 1982)

Step ii is essential since if the antecedent is added to the set of true propositions then a contradiction will arise (since the negation of the antecedent is present). Furthermore, it is not sufficient to remove just the negation of the antecedent: in addition, any proposition which entails the negation of the antecedent must also be removed. This step must be repeated till the set of true propositions is consistent. An obvious answer would be to remove any proposition which would be false if the antecedent was true. However, as Goodman (1947) points out, this process can be expressed as another counterfactual and so a circularity is introduced. Goodman termed this the *contentability problem* i.e. the problem of specifying which propositions were contentable with the counterfactual. Goodman proposes that a counterfactual is acceptable “if and only if the antecedent conjoined with relevant true statements about the attendant circumstances leads by way of true general principle to the consequent.” (page 37)

The contentability problem therefore is the problem of finding the correct set of relevant true statements which do not contradict the antecedent but support the entailment of the consequent.

Many formal semantic solutions have been suggested to the contentability problem, a representative solution being Lewis’ (1972) possible-world semantics approach. Given a counterfactual all the possible worlds where the antecedent is true are ordered by their similarity to the real world. A counterfactual is reasonable by Lewis’ account just in case all of the possible worlds where the antecedent is true which are close to the real world, also feature the consequent being true. Lewis’ account of similarity is based on ranking the importance of the difference between two possible worlds based on whether the difference between the worlds involves the widespread violation of laws of nature, a factual difference over a large region of space/time, a minor violation of a law of nature or a difference in some particular fact respectively.

There are several obvious problems with such a notion. First, similarity judgements are inherently contextual. Any two (distinct) worlds will share many different properties and fail to share many other different properties. Therefore, rather than a general notion of similarity, what is required is a notion of specifying “similar in what way” i.e. what is a relevant similarity and what is a relevant difference. It could be argued that relevance is specified by the requirements of the causal relationship between the antecedent and the consequent. However, this is also not a satisfactory solution due to its circularity. The set of propositions true in the counterfactual world must be specified before the causal relationship is examined

The second problem is related to the first: counterfactuals and the contexts in which they are uttered often do not provide the necessary detail to specify the counterfactual world they refer to. This can due to the often figurative aspect of counterfactuals, e.g. consider Quine’s example:

- (8) “If Julius Caesar was in charge of the Korean War then he’d have used the atom bomb.” (Quine, quoted by Lewis, (1973))

Example 3 is a blend of two different domains: the “Roman empire” and the “Korean war.” However, the counterfactual does not explicitly specify which aspects of each domain should be considered when verifying the counterfactual. Instead, the hearer must imagine a possible causal relationship between the antecedent and the consequent in the counterfactual world and then supply the details of what is mapped from the respective domains (i.e. Caesar’s ruthlessness blended with modern day war technology). However, consider the possible counterfactual reply:

- (9) “.... no he would of used slings and arrows.”

In this counterfactual, Caesar’s lack of knowledge of military war technology is imported into the counterfactual world to deny the verification of the first counterfactual. Notice though that the validity of either counterfactual is not affected since both construct novel (and therefore separate) worlds. also there is no intuitive way to order such counterfactual worlds by their similarity to the real world since both are highly figurative and fantastical worlds.

#### **4. Metaphorical Reasoning**

What follows is a brief outline of a model of metaphorical reasoning which has been computationally implemented in a more general account of reasoning. However, the precise details are not required for the present purposes of this paper (but see Barnden & Lee (1999) for further information).

Metaphorical reasoning proceeds as follows. Given a metaphorical expression, a space is created within which the propositional content of the expression is treated as literally true. For the remainder of this paper, such spaces will be referred to as metaphorical spaces. Within this space, reasoning is performed in terms of the source domain of the metaphor until a connotation can be mapped over to the target domain via the conceptual mapping.

A simple example using the metaphor introduced above will illustrate this,

(10) “John’s anger boiled over.”

A metaphorical space is constructed within which the utterance is treated as literally true. This metaphorical space contains domain-specific knowledge about temperature and that things that are boiling are hot. Therefore, it can be inferred that if anger is boiling then it is hot. Given that there is a conceptual mapping between temperate and emotional intensity, the result of this inference can be mapped over to the target domain to suggest that John’s anger increased. This is represented in Figure 1.

Restricting all metaphorical reasoning to a localized space means that an expression can be reasoned about in terms of its truth within the conceptual metaphor regardless of whether it is literally true. In addition the mapping between the two spaces provides an elegant way to deal with the uncertainty of many metaphors since any transfer of information can be treated as an uncertain inference which can be overruled by more certain information in either space.

As we shall see, such methods for dealing with the importation of uncertain information can also be applied to the problem of counterfactual reasoning.

## 5. Counterfactual Reasoning

What follows is a brief sketch of an account of counterfactual reasoning which has been implemented within the same general reasoning framework used above for metaphorical reasoning. A more detailed computational exposition of counterfactual reasoning is given in (Lee, 2001).

Following Fauconnier (1997) a counterfactual of the form:

If antecedent then consequent

constructs a mental space within which the counterfactual is reasoned about. For rest of this paper such spaces will be referred to as counterfactual spaces. Like a metaphorical space, a counterfactual space need only be internally logically consistent and therefore there is no requirement for a counterfactual space to be true to the real world. In particular, within the counterfactual space, the antecedent is assumed to be true. Verifying the counterfactual involves reasoning

about whether the consequent is entailed by the antecedent. Since initially, the counterfactual space is empty of any other proposition this involves the selective importation of true statements from the real world and any conceptual domain referred to by the counterfactual. Inconsistency is avoided by insisting that the only statement which is certainly true within the counterfactual space is the truth of the antecedent. Therefore, any statement which contradicts the antecedent is denied. Such an approach avoids the contenability problem since it builds a sketch of a counterfactual world within which the counterfactual is true rather than attempting to reason about a possible world where any contradictory statement must be first removed. Such a sketch also only specifies the counterfactual world in enough detail to verify the counterfactual and therefore allows for the under specification of any counterfactual.

Once a counterfactual has been verified, its connotation to the target domain (i.e. the subject of conversation) can be determined by drawing an analogy between the counterfactual space and the target domain. This is done by finding an inference chain analogous to an inference in the counterfactual space which can be made in the target domain.

This approach to counterfactual can be illustrated by a simple example. Given the conditional,

(11) “If John had sold his shares, he would have made a profit.”

and assuming the following facts are known to be true

F1 John has shares to sell.

F2 John has not sold his shares.

F3 The value of his shares has increased since he bought them.

F4 Selling shares results in gaining the current value of the shares.

The conditional is counterfactual since F2 contradicts the antecedent. Therefore, counterfactual reasoning proceeds as follows: A counterfactual space is constructed and linked to the conceptual space of John’s finance. Within the counterfactual space, the antecedent is treated as true:

C1 John sold his shares

For the counterfactual to be verified, the consequent must follow. Therefore, an attempt is made to prove the consequent within the counterfactual space:

C2 John made a profit.

Since the space only contains the antecedent, further information must be imported from the source domain via an importation rule.

**Importation:** Import any fact from any connected source domain into the counterfactual space as required but at a lower level of certainty.

This allows for the facts F1, F3, and F4 to be imported into the counterfactual space at a lower level of certainty and thus verify the counterfactual. However, F2, if imported, is denied by the stronger certainty rating of the antecedent C1. This is shown in Figure 2. The consequent follows from the antecedent together with the set of imported facts thus verifying the counterfactual.

One possible connotation can be drawn from the counterfactual by considering the analogy between the inference chain of John selling his shares and thereby making a profit in the counterfactual space and John not selling his shares and therefore presumably not making a profit in the real world and thus implying that John should of sold his shares.

There is an important difference between the approach sketched above and classical accounts of counterfactual reasoning. In the classical view, counterfactual reasoning is a case of reasoning about the truth conditions of a counterfactual over possible worlds. Such worlds though imaginary are fully specified (i.e. the set of truthful propositions within a possible world are specified). However, in the approach argued above, counterfactual reasoning involves the mapping for propositions into a space which is not fully specified and therefore there is no constraint on whether there is indeed a fully specified possible world within which the counterfactual could be true. Therefore, truth within the counterfactual space is subjective rather than objective in that further specification of the space could invalid the verification of the counterfactual.

## 6. Metaphorical Counterfactuals

The proceeding two sections have sketched accounts of metaphorical and counterfactual reasoning based on the same notion of mapping conceptual information between domains. In addition both accounts have involved the mapping of information from the real world to some fictional world where the content of the statement is treated as literally true and then the inference resulting is mapped back to the real world as a connotation of the expression.

It is worthwhile considering what happens when both tropes are mixed. i.e. metaphorical counterfactuals where either or both the antecedent or consequent is a metaphor. As previously noted in the introduction Cohen (1998) argues that the mixing of metaphors and counterfactuals creates serious problems of interpretation in philosophical argument. This is because metaphors are “semantically loose,” that is to say their interpretation is highly contextually dependent and so if a metaphor occurs within a counterfactual then because of its under determined

semantic content there are too many possible counterfactual worlds for which it refers to for it to be objectively interpreted. However, the account above suggests that indeterminacy is a central aspect of both tropes and therefore cannot be avoided.

Cohen's work is prescriptive in that he argues that philosophers should attempt to avoid metaphorical counterfactuals. However, counterfactuals have no special status in mundane discourse, and so feature metaphorical language as often as any other type of expression. However, as we shall see, the degree of metaphoricity depends on the construction of the counterfactual. In particular, we can distinguish between two types: one-sided metaphorical and double-sided metaphorical counterfactuals.

### ***6.1. One-sided metaphorical counterfactuals***

One-sided metaphorical counterfactuals are counterfactuals where either the antecedent or the consequent is metaphorical. For example, consider the following two counterfactuals

- (12) "If John had put that idea to one side, then he would have been happy"
- (13) "If Bill had been late again, Sheryl would have blown her top"

In 12 the antecedent is metaphorical whilst in 13, the consequent is. From an initial analysis of counterfactuals from the Bank of English corpus, it appears that one-sided metaphorical counterfactuals almost always involve highly conventionalized conceptual metaphors. The only exceptions to this are where a metaphor is previously introduced in the discourse and then re-used by the counterfactual. This accords with Cohen's analysis since if an one-sided counterfactual involves a highly conventionalized metaphor then the conceptual mappings between source and target will be relatively fixed and therefore allow for the hearer to construct the correct counterfactual world.

### ***6.2. Double-sided Metaphorical Counterfactuals***

Double-sided metaphorical counterfactuals feature a metaphor in both the antecedent and consequent. Typically, the antecedent and the consequent employ the same conceptual metaphor. In such cases there is a strong interaction between the two metaphor usages. Such interactions perform a specific function within the counterfactual. As an example, three functions are described below.

### Denying the metaphor

Often the metaphorical expression in the consequent is used to deny the conceptual metaphor introduced by the antecedent. This typically occurs when the antecedent is either highly conventionalized or idiomatic. For example,

(14) “If time was money then the poor would be rich.”

The antecedent expresses a highly familiar conceptual metaphor TIME IS MONEY in a paraphrase of the idiomatic expression. However, the consequent employs the same conceptual metaphor but with a less familiar mapping (that of the “poor” being owners of “time/money”) to suggest a counterexample to the metaphor since the poor being rich is a contradiction.

Denying the overall metaphorical is a common function of double-sided metaphorical counterfactuals. Typically, the antecedent involves an idiomatic expression while the consequent shows a novel mapping which provides the counter example. Typically such counterfactuals are used to connote that a particular metaphorical view is not appropriate for a given situation.

### Extending the metaphor

Double-sided counterfactual metaphors also allow less familiar (but not novel) conceptual metaphors to be extended by introducing a metaphor in the antecedent and then providing a novel mapping in the consequent. For example,

(15) “If war was a market place then the soldiers would be coins.”

The metaphor WAR AS MARKETPLACE is a less familiar metaphor but is not novel: it is often used in new paper reports of the economics of military conflict. The metaphor is introduced first in the antecedent and then the consequent extends the metaphor by introducing a novel mapping between soldiers in the source domain and currency in the target domain.

### Specifying the metaphor

Double-sided metaphorical counterfactuals can also be used to introduce and novel metaphors. For example,

(16) “If wishes were horses then beggars would ride.”

The metaphor expressed in the antecedent is clearly novel. Furthermore, without any context, it cannot be sensibly interpreted. However, by introducing a second mapping of the novel metaphor in the consequent, the correct interpretation can be found by attempting to verify the counterfactual using the suggested mappings. This is detailed further in the next section.

## 7. Understanding Metaphorical Counterfactuals

The approaches to metaphorical and counterfactual reasoning can also be combined to deal with metaphorical counterfactuals such as described above. To illustrate this, re-consider example 11. As before, the counterfactual prompts the creation of a counterfactual space. However, since both the antecedent and the consequent are metaphorical, a metaphorical space is nested within this space. Within the metaphorical space the two metaphorical expressions are treated as being valid mappings between the source domain (the counterfactual space) and the target (the metaphorical space) i.e.

wishes = horses  
 beggars = riders

Let us assume that it is common knowledge that riders possess horses and this fact is imported into the counterfactual space.

possess (riders, horses)

According to the mapping expressed in the antecedent, horses can be substituted with wishes so that riders possess wishes. Since the consequent identifies beggars as riders then the counterfactual can be verified by making the inference within the counterfactual space that:

possess (beggars, wishes)

This inference can then be transferred back to the real world as a connotation of the counterfactual. This reasoning process is shown in Figure 3.

## 8. Further Discussion

The sections above have described a model of reasoning about both metaphors and counterfactuals and mixes of the two tropes. As previously discussed, the treatment of metaphors and counterfactuals have each posed problems for the classical view of meaning where literal truth is primary to figurative meaning since they both ask the hearer to reason about impossible, paradoxical situations.

Central to both is the notion of truth. Metaphors are often literally false yet can communicate rich and truthful information about the real world. Furthermore metaphors are often false in ways which, if treated as literally true in the real world, would be paradoxical. Any approach therefore which attempts to reason about a metaphor by taking the metaphor at its face value and then reasoning about the consequence of this in the real world will inevitably have to reason about real world paradox. The account proposed in this chapter takes a different approach.

The metaphor is taken as literally true but only in an alternative localised logical space. Further information is imported into this space from the source and target domains as required. Therefore paradox is avoided by refusing to fully map out the space or reason about all the consequences of the metaphor and instead just sketching the logical space in sufficient detail to understand the communicative intent of the metaphor.

Counterfactuals on the other hand, are always trivially true since any conditional with a false antecedent is tautological. However, this clearly does not match our intuitions concerning reasonable and unreasonable counterfactuals. Instead, counterfactuals are treated as reasonable if they can be verified i.e. by showing that if the antecedent was indeed true then the consequent would follow. Verification however also runs the danger of reasoning about paradox since the verification of any counterfactual requires that the antecedent, which is presupposed to be false, must be treated as if it is true and therefore contradictory to what is known about the world.

The approach described in this paper however avoids paradox by constructing a logical space - where the false antecedent is treated as true and then constructing a sketch of a counterfactual world where the consequent follows. After the verification of the counterfactual, its connotation is then derived by drawing an analogy between the counterfactual space and the topic of discourse. As in the case of metaphorical reasoning, the logical space is just a sketch of a complete world which is built up as required and so avoids any potential contradiction between the various sources of information.

There is an important distinction between metaphorical and counterfactual reasoning. Metaphorical reasoning often involves treating a statement which is literally false as true and then drawing conclusions about its implications while counterfactual reasoning involves understanding the connotation of a trivially true statement though one which has as its components two false statements and then drawing a conclusion from its verification. However, in both cases, the concept of truth is contextually dependent on the particular conceptual space within which reasoning proceeds.

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