

Veridicity

Lauri Karttunen and Annie Zaenen

Palo Alto Research Center
3333 Coyote Hill Road
Palo Alto, California 94304, USA
karttunen@parc.com
zaenen@parc.com

Abstract. This paper¹ addresses the problem of assessing the veridicity of textual content. Has an event mentioned in the text really occurred? Who is the source of the information? What is the stance of the author of the text? Does the author indicate whether he believes the source? We will survey some of linguistic conventions that indicate the author's commitment, or the lack thereof, to the propositions contained in her text. In particular we discuss phenomena that have been studied as presuppositions or conventional implicatures in previous literature. Some of those, such as factive and non-factive verbs, have received extensive attention in the past. Some others, such as supplemental expressions (e.g. appositives, parentheticals), have not received much previous attention, although they are very common and a rich source of textual inferences. A recent study by Christopher Potts classifies supplemental expressions as conventional implicatures. We agree with Potts on the label but not on what it means. In contrast to Potts, we claim that supplemental expressions cannot always be treated as the author's direct commitments and argue that they do not constitute a basis for a distinction between presuppositions and conventional implicatures. We illustrate some cases of conventional implicature and show how they indicate an author's commitment to the truth of his statements and briefly state the importance of these distinctions for Information Extraction (IE).

Keywords. veridicity, commitment, entailment, presupposition, conventional implicature, supplemental expression

1 Introduction

When text is exploited for question-answering or other information extraction tasks, it is important to distinguish between material that corresponds to entities or situations that exist in the real world and material that doesn't. Ultimately, the correspondence of a linguistic object to an object in the real world goes

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beyond what can be learned from the text itself. When somebody says or writes *The earth is flat* or *The king of France is bald* because (s)he is a liar or ill-informed, nothing in these linguistic expressions in themselves alerts us to the fact that they do not correspond to situations in the real world. But a text does give us information about the stance its author takes vis-à-vis the events or states described. When somebody says *Bill acknowledges that the earth is round*, we know something about the author's as well as Bill's beliefs in the matter.

It is thus useful to distinguish between two ingredients that go into determining the truth value of utterance, one is the trustworthiness of the utterer and the other is the stance of the utterer vis-à-vis the truth of the content. The latter we will call the veridicity of the content and veridicity is the topic of this paper.

In what follows, we will refer to the person who creates a text (or makes a spoken utterance) as the AUTHOR. When an author is trustworthy, i.e. well-informed and honest, veridical assertions are true. But apart from making assertions an author will often conventionally implicate certain things. These implications are not considered to be part of what determines the truth value of the sentence, even when the author is trustworthy. We, however, consider them to be veridical, and we will say that the author is COMMITTED to them. We think it is reasonable, for IE purposes, to assume that material that is conventionally implicated can be used together with assertions to provide answers to questions.

We concentrate on how we as readers or hearers assess the facts, events, etc. related in the text under the hypothesis of a trustworthy author: how authors signal their commitment (or lack thereof) to the reality of the situations they report on. In what follows we will survey some linguistic devices that help determine what an author's commitments are, i.e. which propositions are veridical. In the types of text that are used in IE tasks, we will often find that authors report opinions of others, as in the last example above. We will refer to these others as the SOURCE of the opinion, statement, etc.

2 Conventional Implicature

The term *conventional implicature* is first found in Grice[1] but, as Kent Bach[2] points out, the basic idea is due to Gottlob Frege. In his 1918 article *The Thought*[3], Frege wrote:

With the sentence 'Alfred has still not come' one really says 'Alfred has not come' and, at the same time, hints that his arrival is expected, but it is only hinted. It cannot be said that, since Alfred's arrival is not expected, the sense of the sentence is therefore false.

The crucial distinction, popularized by Grice, is between ASSERTION and IMPLICATURE. Strictly speaking, the truth or falsity of a sentence depends on what is being asserted, not on the truth of the implicature. Grice discusses two kinds of implicatures: CONVERSATIONAL and CONVENTIONAL. Conversational implicatures arise from principles of social interaction such as cooperativeness.

Conventional implicatures arise from individual words such as *still*, *too*, *even*, and particular syntactic constructions.

Sentences with *manage* and *fail* provide good examples of conventional implicatures.

- (1) a. Bush managed to read the report.
 b. Bush failed to read the report.

(1a) asserts that Bush read the report and suggests/hints that it was in some way difficult for him to do. (1b) asserts that Bush did not read the report and suggests that he had an opportunity and tried, or should have tried, to read it.

If we negate the sentences in (1), the assertions switch polarity but the implicatures remain the same:

- (2) a. Bush didn't manage to read the report.
 b. Bush didn't fail to read the report.

Of course, the sentences in (2) could be uttered, with a special intonation, to explicitly contradict the implicature of the corresponding sentence in (1):

- (3) Bush didn't "fail" to read the report. He never received it.

Example (3) does not claim that Bush read the report, it is a denial of the suggestion that his not doing so can be characterized as a failure. (3) is a response provoked by a statement like (1b); it requires a particular discourse situation. In this respect, conventional implicatures associated with words like *fail* and *manage* are similar to the so-called 'existential presuppositions' associated with definite descriptions such as *the present king of France*. The pair of sentences in (4) is not a normal way of saying that France is not a monarchy. In the prior discourse, someone must have introduced the proposition that the present king of France is bald.

- (4) The present king of France is NOT bald. There is no king of France.

There is an enormous literature on presuppositions,² much of it focused on the technical question of whether the truth value of the first sentence of (4) is FALSE, UNDEFINED, or something else in the case there is no such king. We take no position on that issue here.

As Karttunen and Peters[5] point out, the phenomena discussed under the label of PRESUPPOSITION have much in common with conventional implicatures arising from words such as *still*, *too*, *even*, *manage*, and *fail*. They conclude that presuppositions are best viewed as conventional implicatures. This is a controversial issue. Potts[6] argues that conventional implicatures are not presuppositions, Bach[2] denies the existence of conventional implicatures altogether. We have a lot to say on this topic but not in this paper.

Here we limit ourselves to classifying the phenomena that go under the name 'presupposition' or 'conventional implicatures' according to the following three

² For a recent survey, see Beaver[4]

diagnostics, discussed in Karttunen and Peters (ref). These diagnostics identify the environments in which the author is or is not committed to the truth of the content of the the presupposition/implicature.

- The author is committed to presuppositions and conventional implicatures. Examples such as (3) and (4) are incoherent except as rejections of another speaker’s assertion (it could be him/herself in another role or at another time).³ We do not expect to find such examples in written monologues or narratives written from a single perspective.
- Interrogative sentences carry the same conventional implicatures/presuppositions as their declarative counterparts. *Did Bush manage to read the report?* suggests that it was difficult in some way. *Is the king of France bald?* makes sense only on the assumption that France has a king. There might be a difference between these two cases in that the latter question builds on the view that the king exists whereas in the case of *manage* the implicature and the questioned proposition are parallel, independent of each other.
- Conditional sentences generally seem to inherit the conventional implicatures of the consequent. For example, *If the report is correct, Nixon is guilty too* suggests that there is some guilty person other than Nixon. However, in a case such as *If Haldeman is guilty, Nixon is guilty too*, the antecedent provides another guilty person and the conditional as a whole seems not inherit the implicature of the consequent.⁴ Definite descriptions behave similarly. *If France has a king, the king of France lives in the Elysée Palace.* does not ‘presuppose’ the existence of a king.

3 Supplemental Expressions

The term SUPPLEMENTAL EXPRESSIONS, introduced by Huddleston and Pullum[8], includes a variety of constructions that have not attracted much attention lately, although they are very common and a rich source of textual inferences. They include AS-CLAUSES, NON-RESTRICTIVE RELATIVE CLAUSES, NOMINAL APPOSITIVES, PARENTHETICAL ADVERBS, and EPITHETS.

Some examples, mostly from Potts[6], are given in (5).

- (5) a. Ames was, *as the press reported*, a successful spy.
 b. Ames, *who stole from the FBI*, is now behind bars.
 c. Lance Armstrong, *an Arkansan*, has won the 2002 Tour de France.
 d. *Luckily*, Beck survived the descent.

³ Karttunen and Peters define a special CONTRADICTION NEGATION operator for such cases that scopes over the conjunction of the assertion and the implicature.

⁴ For further discussion, see Karttunen[7] and Karttunen and Peters[5]. In their system, the conventional implicatures of the consequent clause are inherited as conditional propositions by the conditional sentence: *If Haldeman is guilty, then someone other than Nixon is guilty*. The effect in this case is that the implicature becomes vacuous.

- e. The heiress married Bill and *the lucky man* became a millionaire.

As Potts points out, these constructions clearly give rise to conventional implicatures. For example, (5c) commits the author to the mistaken opinion that Lance Armstrong is an Arkansan. But the assertion in the main clause is nevertheless true.

Potts develops a logic that separates the truth-conditional aspect of meaning from conventional implicatures. As Potts himself points out, the basic idea is similar to the two-dimensional semantics of Karttunen and Peters[5], inspired by Herzberger [9]. In Potts's logic, conventional implicatures that arise in an embedded clause are always present in the resulting semantic tree and represent the author's commitments. Potts believes that the phenomena he is focusing on are fundamentally different from the cases treated by Karttunen and Peters. We believe that this view is not correct and will briefly explain the reasons.

Consider the example (5e). It commits the author to the view that *Bill is a lucky man*. But the corresponding conditional in (6) does not carry the same commitment. The characterization of Bill as *the lucky man* in (6) can be conditional on whether the heiress really married him.

- (6) If the heiress married Bill, *the lucky man* became a millionaire.

The same point can be made with respect to appositives. The example in (7a) does not commit the author to the view that Lance Armstrong is a Frenchman but (7b) does.

- (7) a. If Lance takes up French citizenship, *as a Frenchman* he will win the Tour easily.
 b. If Lance decides to participate, *as a Frenchman* he will win the Tour easily.

As in the Nixon examples above, the antecedent has an effect on what the conditional as a whole conventionally implicates.

Similar examples are more difficult to construct for other types of supplemental expressions Potts discusses. Nominal appositives (8) and non-restrictive relative clauses (9) seem to be rather resistant to cancellation as the following examples show.

- (8) If Rader really is the BTK killer, then the murder of Miss Davis, *Rader's last victim*, has finally been solved.
 (9) If the charges against him are true, Hanssen, *who sold FBI secrets to the Russians*, could face the death penalty.

There are of course many other linguistic means besides the *if*-clause to introduce a hypothetical context. The author of (10) is not committed to the

appositive *a third time offender* if Gonzales is found not guilty. But he is committed to Gonzales having been convicted at least twice before.⁵

- (10) The jury is very likely to convict Gonzales. In that case, as *a third time offender*, he will never get out of jail.

In summary, we agree with Potts that supplemental expressions give rise to conventional implicatures but we observe that their interpretation as speaker commitments is by and large sensitive to the same contextual factors as presuppositions. We propose to treat presuppositions and conventional implicatures as one general class as further possible subdivisions based on other criteria are not relevant to the issue of veridicity.

4 Some Examples relevant for Information Extraction

As can be understood from what precedes, conventional implicatures are important for veridicity judgments: they represent author commitments except in the contexts discussed in the previous sections. In what follows we will give some examples that illustrate their importance for the understanding and attribution of that-complements

4.1 Factive and non-factive that-complements

In sentences such as (11) the author relates a source to a statement.

- (11) Bush said that Iraq had aided al Qaida.

The choice of the verb indicates the relationship, or lack thereof, between the source and the statement but it also indicates the stance of the author with respect to the truth of the statement. In example (11), the author attributes the statement *Iraq has aided al Qaida* to Bush and does not take a stance with regard to its truth. In example (12), the author attributes the statement *Iraq has not aided al Qaida* to the source without taking a stance. In (13), however, the author indicates that she is in agreement with the source about the statement.

- (12) Bush denied that Iraq had aided al Qaida.

- (13) Bush acknowledged that Iraq had aided al Qaida.

Verbs that indicate that the author and the source are in agreement are called ‘factive’ [10]. Some examples are *acknowledge, avow, admit, concede, confess, regret, ...* whereas non-factives are, e.g. *deny, claim, say, announce, report, suggest, ...*

⁵ If the author believes that Gonzales has exactly two previous convictions, in the second sentence of (10), Gonzales could be referred to as *the two-time offender* (his present status) or as *the three-time offender* (his status, if convicted again).

Factives conventionally implicate that the author is committed to the truth of the statement made in the complement clause. As explained in the previous section, this entails that the negation of a factive means that the author remains committed to the truth of the statement although, of course, it signals that the source itself is not committed to the statement. This is illustrated in (14)

(14) The spokesman did not acknowledge that Bush had been mistaken.

Observations similar to those made about verbs of saying can be made with regard to cognitive verbs such as *believe*, *realize*, Here we can say that the verb establishes a relation between a proposition, an experiencer, who can be considered to be a type of source, and the author. As with verbs of saying, the choice of the verb indicates the stance of the author with respect to the veridicity of the proposition. To give just one example

- (15) a. Bush realized that the US Army had to be transformed to meet new threats.
 b. Bush didn't realize that Afghanistan is land-locked.

Other factives of this type are *discover*, *find out*, *forget*, *know*, *learn*, *recognize*, *foresee*, *notice*, ..., whereas *assume*, *believe*, *think*, *suspect*, *imagine*, *hope*, ... are non-factive.

The distinction between factives and non-factives is not only relevant for verbs that indicate a relation between SOURCES, propositions or statements and authors. Sometimes the author expresses her stance vis-à-vis a proposition without there being a source mentioned. We list here some of these expressions. The expressions in (16) contrast with those in (17).

- (16) a. It does/doesn't matter to me that Kerry lost.
make sense, suffice, bother, amuse, irritate, ...
 b. It is/isn't amazing that Bush won.
unfortunate, known, sad, good, great, lucky, important, ...
 c. It is/isn't an accident that Rumsfeld was not informed.
coincidence, disaster, miracle, blessing, ...

- (17) a. It is unlikely that Ossama has been captured.
likely, probable, possible, ...
 b. There is a rumor that the U.S. will invade Syria.
claim, rumor, belief, suspicion, hypothesis, idea, ..

Again when the factive predicates in (16) are negated, the author's commitment remains.

4.2 AUTHOR commitments in that-complements

When the source differs from the author, the linguistic construction does not always clearly indicate which statements are to be attributed to the source and

which ones to the author. For instance, in the following example, the source could have made the statement *The US has invaded Iraq again* or the statement *The US has invaded Iraq with again* as a contribution of the author. In this case we have an ambiguity.

(18) CNN announced that the US has invaded Iraq again.

In section 3 we discussed several syntactic constructions that lead to conventional implicatures. As discussed above, the multi-dimensional treatment that Karttunen and Peters and Potts give to these sentences, separates the true assertion from the conventional implicatures. When they are part of that-complements, the conventional implicatures remain part of the author's commitment. We illustrate this here with a couple of examples.

(19) a. CNN just announced that Ames, *who stole from the CIA*, is now behind bars.
 b. Bill denied that Lance Armstrong, *an Arkansan*, has won the 2002 Tour de France.

As it happens the proposition *Ames stole from the CIA* is true whereas *Lance Armstrong is an Arkansan* is false. But in both cases we are justified in concluding that the author is committed to the conventional implicatures.

5 Conclusions: Truth, Author Commitment and Information Extraction

For purposes of IE, it is reasonable to consider as veridical both the assertions of the author and the conventional implicatures she is committed to, except when they occur in the contexts discussed in sections 3 and 2. In the previous section we gave some examples of how conventional implicatures interact with author commitment. This discussion is far from complete but we hope it makes clear that to assess the veridicity of what is reported in a text one has to take into account what is asserted and what is conventionally implicated. Based on that distinction one can start to calculate the author's commitment to the truth of what is reported. The examples in subsection 4.1 show that the way a that-complement is introduced plays an important role in this calculation. We have limited our examples to that type of complement but, as show in section 2, infinitival complements lead to similar distinctions. In fact, not only verbal complements are important but also unfortunately understudied adverbial expressions, such as *according to x*.

As the examples of supplemental expressions show, it is not enough to look at the matrix verb to evaluate the contribution of the that-complement. Some syntactic constructions signal that embedded material is part of the author's commitment and can thus be considered veridical in most circumstances.

Whether ultimately one considers any of the veridical propositions as true will then of course depend on the trustworthiness of the author but as we said in the introduction that is something that cannot be determined on purely linguistic grounds.

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