Some Remarks on the Relationship between the Semantic and the Pragmatic Web

Jens Allwood
Department of Linguistics & SSKKII
Center for Cognitive Studies
University of Gothenburg
Box 200, Göteborg, Sweden
+46 31 7861876, incl. country code

jens@ling.gu.se

ABSTRACT

This paper discusses the relations between the semantic and the pragmatic web. After recapitulating some characterizations and definitions of the semantic and the pragmatic web two main tasks of pragmatics and of the pragmatic web are distinguished. The nature of the first of these tasks is then briefly discussed, leaving a further explication for future work. The paper ends by relating both tasks of the pragmatic web to the semantic web..

Categories and Subject Descriptors

H.5.3 [Web based interaction] , H5.2 [Natural language], I.2.1 Natural language interface], I2.7 [Language parsing and understanding], J.5 [Linguistics]

General Terms

Languages, Theory

Keywords

Semantic web, Pragmatic web, Semantics, Pragmatics, Context, Context dependence, Context use

1. PURPOSE

The notion of "semantic web" was introduced in 1998 by the originator of the world wide web, Tim Berners-Lee, as a way to overcome some of the shortcomings of what might be called a "surface-syntactic" way of utilizing the internet. The notion of the "pragmatic web" was introduced a little later by Schoop, de Moor and Dietz (2006), to overcome shortcomings and expand the usability of the (semantic) web.

In this paper, I would like to discuss the relationship between the two notions and to briefly (i) consider whether the distinction between "the semantic web" and "the pragmatic web" might not run into the same problems that the underlying distinction between "semantics" and "pragmatics" runs into (cf. Allwood, 1981, for a criticism of the stipulative nature of the distinction between semantics and pragmatics and the lack of tenable criteria to draw the line between tthem) and (ii) to discuss two main tasks that the "pragmtatic web" migh have in relation to the semantic web in light of this criticism

2. WHAT IS THE SEMANTIC WEB?

It is not easy to get a short and succinct definition of the semantic web. Using Google-search and the internet as a resource, I was able to find the following definitions, characterizations and exemplifications of the Semantic Web.

Table 1. Definitions, characterizations and exemplifications of the Semantic Web found by Google.

* The predicted evolution of the current HTML-based World Wide Web, in which information will be stored in machine-readable formats for easy.

www.bbn.com/glossary/S

* The Semantic Web is an extension of the current Web that will allow you to find, share, and combine information more easily. It relies on machine-readable information and metadata expressed in RDF.

www.noisebetweenstations.com/personal/essays/metadata_glossary/metadata_glossary.html

* The Semantic Web is a project that intends to create a universal medium for information exchange by putting documents with computer-processable meaning (semantics) on the World Wide Web. ...

www.infodiv.unimelb.edu.au/metadata/glossary.html

* separating presentation from content on the Internet in an effort to make the content more accessible and findable by people and machines.

www.sandynichols.net/blog/findability-vocabulary/

* project of the W3C in which automated methods based on quality metadata are envisaged to replace much human searching of the web. Relies on ontologies, XML and RDF.

www.webindexing.biz/Webbook2Ed/glossary.htm

* The unification of all scientific content by computer languages and technologies that permit the interrelationships between scientific concepts to be communicated between machines. The semantic web relies on ontology markup languages that enable knowledge

www.genpromag.com/Glossary.aspx

* HTML, as it is generally deployed, has limited ability to classify the blocks of text on a page, apart from the roles they play in a typical document's organization and in the desired visual layout. ...

www.thewebworks.bc.ca/netpedagogy/glossary.html

* The Semantic Web is an idea of WWW inventor Tim

Berners-Lee that the Web as a whole can be made more intelligent and perhaps even intuitive about how to serve a user's needs. ...

eec.lboro.ac.uk/learningtech/stoz.htm

* The semantic web is an evolving extension of the World Wide Web in which web content can be expressed not only in natural language, but also in a form that can be understood, interpreted and used by software agents, thus permitting them to find, share and integrate information more easily. ...

en.wikipedia.org/wiki/Semantic Web

Wikipedia also gives the following longer characterization of the semantic web:

"The Semantic Web is an evolving extension of the World Wide Web in which the semantics of information and services on the web is defined, making it possible for the web to understand and satisfy the requests of people and machines to use the web content. It derives from W3C director Tim Berners-Lee's vision of the Web as a universal medium for data, information, and knowledge exchange.

At its core, the semantic web comprises a set of design principles, collaborative working groups, and a variety of enabling technologies. Some elements of the semantic web are expressed as prospective future possibilities that are yet to be implemented or realized. Other elements of the semantic web are expressed in formal specifications. Some of these include Resource Description Framework (RDF), a variety of data interchange formats (e.g. RDF/XML, N3, Turtle, N-Triples), and notations such as RDF Schema (RDFS) and the Web Ontology Language (OWL), all of which are intended to provide a formal description of concepts, terms, and relationships within a given knowledge domain."

Summarizing the definitions and characterizations given in the table, we can see, that the semantic web has the following properties. It involves machine readable formats rather than Html. This means metadata in RDF (Resource Description Framework) and RDFS (RDF Schema) and ontology markup languages like OWL (ontology web language).

The basic idea seems to be that the semantic web, by giving web users direct access to machine readable content (which is available for automated processes by machine and software), can overcome the more shallow presentational differences which we find in presentation on web pages, based on use of Html and driven by differences between natural languages, communication styles and preferences of web design.

3. WHAT IS THE PRAGMATIC WEB?

It is only slightly easier to get a grasp of what the pragmatic web is. In Wikipedia, the pragmatic web is characterized as follow (the definition seems to be taken from Schoop, de Moor and Dietz (2006)).

Table 2. Definition of the pragmatic web found by Google

"The Pragmatic Web consists of the tools, practices and theories describing why and how people use information. In contrast to the Syntactic Web and Semantic Web the Pragmatic Web is not only about form or meaning of information, but about social interaction which brings about e.g. understanding or commitments.

The transformation of existing information into information relevant to a group of users or an individual user includes the support of how users locate, filter, access, process, synthesize and share information. Social book marking is an example of a group tool, end-user programmable agents are examples of individual tools."

The Pragmatic Web idea is rooted in the Language/action perspective"

We can see that the idea is that both the "syntactic" and the "semantic" web provide information which then forms the input to the "pragmatic web", which, in turn, provides support for use of the web leading to understanding, commitments and sharing of information.

If we continue our consideration of the characterizations and definitions given above, we can see that there is an overlap between the characterizations given of the semantic web and the one given of the pragmatic web. Both are supposed to serve user's needs by making web content more accessible and findable. In view of this overlap, I would therefore like to look a little more in detail at what the respective roles of the semantic and pragmatic web might be.

One of the ways to do this is to ask whether there is a dependence between the semantic and pragmatic web. Can there really be a successful semantic web without a pragmatic web and can there really be a successful pragmatic web without a semantic web? In other words, is there a mutual dependence between the semantic and pragmatic web? One reason to believe that such a dependence exists between semantic web and the pragmatic web is that it seems reasonable to believe that such a dependence already exists between semantics and pragmatics in Natural Language, cf Allwood (1981).

However, before attempting to answer this question, I would like to point out two possible roles for the pragmatic web in relation to the semantic web. Both roles are inherent in the classical definitions of semantics and pragmatics, (in the trichotomy of syntax, semantics and pragmatics suggested by Morris 1938, 1946 and reinforced by Carnap 1942). The term *pragmatics* was proposed by Morris in 1938 "to designate the study of signs and their relationship to interpreters". In 1946, Morris changed this slightly to make pragmatics the study of the origin, use and effect of signs. Here "use " is explicitly mentioned and both sender and receiver are included. In 1938, the term *semantics* was used to designate the more abstract study of the relationship between signs and the objects they signify (leaving out the interpreter). In 1946, this was changed to the study of signification in all modes of signifying.

Over the years, the distinction between semantics and pragmatics has often been interpreted as saying that semantics concerns the study of the inherent meaning of signs independent of use and context, while pragmatics concerns the study of the use of signs in context. Even though this distinction might seem fairly clear cut, I would like to claim that it has given rise to two distinct tasks for pragmatics, which are partly, but not completely, related to each other. The two tasks are:

(i) pragmatics as the study of the use and context dependent meaning of signs and

(ii) pragmatics as the study of the use and the context of signs

The objective of the former, but not necessarily of the latter task,

is to study how meaning is constituted through use in context. The objective of the latter task, in contrast, is directed to studying significant features of the use of signs (language), even if they are only indirectly related to the determination of meaning in context. Below, I will now briefly discuss the two tasks one by one.

4. PRAGMATICS AS THE STUDY OF THE CONTEXT AND USE DEPENDENT MEANING OF SIGNS

As I have already mentioned (following the definitions of semantics and pragmatics suggested by Morris and Carnap), it has long been assumed that semantics concerns the study of the inherent meaning of signs independent of use and context, while pragmatics concerns the study of the use of signs in context. Even if, in general, this much is clear in, the question now arises as to what criteria and concepts can be used to separate context independent (semantical) from context dependent (pragmatical) aspects of meaning. At least the following concepts have been proposed as candidates for explicating the difference between semantics and pragmatics.

Table 3. Candidates for separating semantics from pragmatics

Semantics: context independent meaning	Pragmatics: context dependent meaning
Truth conditions / logical form Extension / reference	Implicature, presupposition
Conventional meaning	Natural meaning
Literal meaning as - Gesamtbedeutung/Intension or - Grundbedeutung / prototypes	Metaphor, metonymy Connotative emotion, Associative attitude Associations
Normative, stipulative	Descriptive

Let us now briefly consider whether the concepts in the left column really can be used to capture meaning in a context independent way. In Allwood, (1981; 2003), I argued that they cannot and that all meaning, in fact, is context dependent, involving interaction between linguistically and contextually activated meaning. A brief recapitulation of the argument goes as follows: Language has evolved as an instrument for activation of context dependent information. Linguistic meaning need not be totally specific, since activation of information in context can make it specific. This makes language into a more flexible and usable instrument for communication from one context to another. The flexibility and versatility of language would have been lost if meanings always would have had to be fully specified.

Returning to the list in Table 1, the flexible nature of language means that reference and truth conditions (intentions and extension) can often not be determined without contextual information. For example, this is very clear for so called deictic terms, like *I, you, me, here* and *there*. For a similar argument, see Bar-Hillel (1957), Montague (1968, 1970) and Lewis (1970). A further consequence of this is that the logical form of specific utterances also becomes context dependent.

Besides reference and truth conditions, the other main candidate for characterization of context independent meaning is convention. Conventional meaning as opposed to natural meaning is supposed to be context independent. However, conventions are often sensitive to context, e.g. a *yes* in English uttered by speaker 2 after a *yes* has been uttered by speaker 1 expresses agreement, while a *yes,* uttered by speaker 2 after speaker 1 has said *no* expresses disagreement. This is a context sensitive convention for English, which is different for the use of equivalents of *yes* and *no* in other languages, (e.g. in Russian, where a *yes* uttered after a *no* expresses agreement, not disagreement, with the negation.

A third candidate is the notion of "literal meaning", which (in contrast to metaphorical and metonymic meaning) is suggested as a way to capture context independent information. The problem is that the notion of "literal meaning" in itself is in need of analysis. When such an analysis is given, the three main alternatives for an explication of "literal meaning" have been (i) literal meaning as the greatest common denominator of all uses of a word (this approach is also known as "Gesamtbedeutung" or "necessary and sufficient conditions") , or (ii) literal meaning as a prototypical representative of the meaning, or (iii) literal meaning as conventional meaning. Turning first to the third alternative (conventional meaning), this does not really work, since both metaphors and metonymies often become conventionalized (e.g. *the foot of the mountain* or *the head of an organization*, where both *foot* and *head* have metaphorical, yet conventionalized meanings) and literal meaning is supposed to be non-metaphorical and non-metonymic.

Using alternative (i), "the greatest common denominator" approach has the drawback that since most, if not all, words from a descriptive point of view are polysemous, the literal meanings often become too abstract and require context to become more specific. Alternatively, very many words become homonymous (cf. Allwood, 2003) and context has to be used to choose the right "word" or "meaning".

The ubiquitousness of polysemy is also the problem for alternative (ii), i.e. the proposals identifying literal meanings with prototypes. Context is required to select the appropriate prototype. In the end, therefore, none of the three main proposals for characterizing context independent meaning mentioned in table 3 are sufficient and the conclusion based on using these concepts is that determination of linguistic meaning is always context dependent.

The situation is a little different for alternative (iv) the pair normative (stipulative) – descriptive. This alternative was created by Rudolf Carnap (1942), who made use of the trichotomy proposed by Morris and introduced a distinction of his own, between a "pure" and a "descriptive" way of pursuing the three types of study (i.e. syntax, semantics and pragmatics). A pure study uses normative regimentation and stipulative definitions in order to clarify concepts which are thought to be fundamental to an area. In semantics, for example, such concepts are truth and reference. A descriptive study, on the other hand tries to capture empirical data in their fullness, thereby describing also

phenomena which can be given no clear explications or definitions. For Carnap a pure study was possible both with regard to syntax and semantics but not with regard to pragmatics which seemed to him only open to description. In fact, Carnap, at this stage of his thinking, regarded all descriptive studies as pragmatical since they all in some sense involve interpretation, origin, use or effect of signs. Following Carnap's ideas of meaning postulates (later also used by Montague, 1968 and 1970), context independent meanings can be created by stipulation, which, in fact, encapsulate contextual information. This is, of course, completely acceptable in the construction of a formal language and, in a sense, is what is being done in the semantic web project through metalinguistic descriptions, which encapsulate as much relevant (often pragmatic) web page information as possible and which through the use of tools like RDF and OWL is being coded in machine readable form.

However, the question is whether context dependence can really be gotten rid of in this way or if it will always remain present and, for example, show up when assignment of metadescriptors is to be done by automatic processing. The argument put forth here is that context dependence is an inherent feature of human language and communication, which cannot be made to totally disappear by semantic stipulation. A consequence of this for the distinction between the semantic and pragmatic web is that one of the main tasks for work on the pragmatic web is to provide relevant contextual support for the semantic web in the form of relevant contextual information and to formulate relevant rules for the contextual interpretation of the information which is to be handled by the semantic web.

5. PRAGMATICS AS THE STUDY OF THE CONTEXT AND USE OF SIGNS

Let me now briefly turn to the second task of pragmatics pointed out above (pragmatics as the study of the use and context of signs).

Besides contributions to the first task (contextual determination of meaning) through concepts such as "presuppositions" and "implicature" (cf. Levinson, 1983) and Grice (1975), pragmatics has, in its second task, made major contribution towards clarifying the nature of language use through such concepts as "speech acts" (Austin, 1962 and Searle, 1969), "language games" (Wittgenstein, 1953), "social activities" (Allwood, 2001, 2007) or "politeness" (Brown and Levinson, 1987). Investigating the nature of and consequences related to the four latter concepts has in many ways increased our understanding of language use.

If in its first role pragmatics has a close relation to logic and semantics, in its second role it has an overlap with disciplines such as psycholinguistics, sociolinguistics, informatics and ethnography in increasing our understanding of how human beings use language and other signs to communicate and create social structure.

Just as an analysis of the first task of pragmatics has implications for the "semantic web", an analysis of the second task of pragmatics has implications for the "pragmatic web". The pragmatic web is needed to increase the range of uses of the semantic web. It is not just a question of contextually interpreting information, but also of enabling the use of certain communicative acts which carry with them typical commitments and obligations,

and of enabling specific types of activity bound communication or specific modes of interaction in those activities,

The development of the pragmatic web can in this way help to construct new contexts of use of the semantic web, which, in turn, also will help in the task first discussed, of providing contextually relevant information. However, a more detailed discussion of the development of the second task will have to be the topic of another paper.

6. CONCLUDING REMARKS

This paper has pointed out two tasks of pragmatics and the pragmatic web:

(i)   providing contextually relevant information
(ii)   providing more relevant, adequate ways of using the web.

The pragmatic web can, in this way, be related to the semantic web in two ways by, firstly, helping to reduce the probably inherent context dependence of the semantic web and, secondly, by helping to make the web a more natural and flexible medium for human communication.

7. REFERENCES

[1] Allwood, J. 1981. On The Distinctions between Semantics and pragmatics. In W. Klein and W. Levelt (eds.), *Crossing the Boundaries in Linguistics*, p. 177 -189. D. Reidel Publishing Company.

[2] Allwood, J. 2000. An Activity Based Approach to Pragmatics. In Bunt, H., & Black, B. (Eds.) Abduction, Belief and Context in Dialogue: Studies in Computational Pragmatics. Amsterdam, John Benjamins, pp. 47-80.

[3] Allwood, J. 2003. Meaning Potential and Context. Some Consequences for the Analysis of Variation in Meaning. In Cuyckens, Hubert, Dirven, René & Taylor, John R. (eds). Cognitive Approaches to Lexical Semantics. Moulton de Gruyter, pp. 29-65.

[4] Allwood, J. 2007. Activity Based Studies of Linguistic Interaction. Gothenburg Papers in Theoretical Linguistics, 93. Göteborg University, Dept. of Linguistics.

[5] Austin, J. 1982. *How to do Things with Words*. Oxford, Oxford University Press.

[6] Brown, P. & Levinson, S. (1987*). Politeness: Some Universals in Language Usage*. Cambridge, Cambridge University

[7] Carnap, R.: 1956, *Meaning and Necessity,* 2nd Edition, Chicago, University of Chicago Press.

[8] Bar-Hillel, Y. 1954.. Indexical expressions. *Mind 63,* 359 - 76.

[9] Berners-Lee, T & Fischetti, M. (1997). Weaving the Web. Harper San Francisco; Paperback: ISBN:006251587X, Abridged audio cassette ISBN:0694521256).

[10] Google search. Definitions of semantic web on the web http://www.google.com/search?hl=en&client=firefox-a&rls=org.mozilla:sv-SE:official&hs=DaL&defl=en&q=define:Semantic+Web&sa=X&oi=glossary_definition&ct=title

[11] Grice, H. P. 1975. Logic and conversation. In P. Cole & J. J. Morgan (eds) *Syntax and Semantics* Vol 3: Speech acts. New York: Seminar Press, 41-58.

[12] Levinson, S.1983. *Pragmatics*. Cambridge, Cambridge University Press.

[13] Lewis, D. 1970. General semantics. *Syntheses* 22, 18-67.

[14] Montague, R. 1968. Pragmatics. In Thomason, R. H. (ed.), *Formal Philosophy,* Yale University Press, (1974).

[15] Montague, R. 1970. Pragmatics and intensional logic. In Thomason, R. H. (ed.), *Formal Philosophy,* Yale University Press, (1974).

[16] Morris, C. (ed.) 1938. *Foundations of the Theory of Signs*. Chicago and London, University of Chicago Press.

[17] Morris, C. 1946, *Signs, Language and Behavior,* Englewood Cliffs, N. L, Prentice Hall.

[18] Palmer, S. B. definition of the semantic web

hthttp://www.stylusstudio.com/xmldev/200011/post50220.html

[19] Schoop, M., de Moor, A & Dietz, J. L. G. 2006. The pragmatic web: a manifesto in *Communications of the ACM*. SPECIAL ISSUE: Two decades of the language-action perspective Volume 49 , Issue 5 : table of contents. Pages: 75 - 76

[20] Searle, J. R. 1969. *Speech acts: An Essay in the Philosophy of Language*. Cambridge. Cambridge University Press.

[21] Wittgenstein, L. (1953*). Philosophical Investigations*. Oxford, Blackwell.

ACKNOWLEDGMENTS