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FROM THE SEMIOTIC TRIANGLE TO THE SEMANTIC WEB

INTRODUCTION

This paper evolved as part of a dialogue between researchers in the "East" and "West", specifically in response to the paper, "Some Basic Concepts of Terminology: Traditions and Innovations", in which S.D. Shelov and V.M. Lejchik have made a valuable contribution to our understanding of the history of terminology studies in the former Soviet Union in light of cognitive science, Languages for Special (or Specific) Purposes (LSP)[4], systems theory, and other developments in philosophy and linguistics over the past seventy years, with special emphasis on recent decades. This response briefly outlines a few significant differences between the Russian experience and trends in Western research. Where Shelov and Lejchik discuss basic concepts, this paper addresses issues involving both classic and developing models that integrate these concepts. This evolution culminates with the elaboration of models for data processing, management, and retrieval in distributed heterogeneous information systems, specifically the Semantic Web (SW).

The discussion begins with simpler, more familiar representations (Saussure (1974 [1916]; Frege 1892; Wüster 1985), classified by Myking as binary, triadic, and four-field models (Myking, 1997, 52). It then works forward to include a variety of more complex, less familiar models designed to reflect broader issues in the philosophy of language and the methodology of information management. These models have, of course, been most famously expressed in the familiar semantic (a.k.a. *semiotic*) triangle, but the inspiration to extrapolate on the model, or even to cast it aside, continues to inspire new variations. Reviews and analyses — both laudatory and condemnational — abound (Eco 1990, Budin 1997). It is not, however, within the scope of this paper to examine all representations, although reference is made to variants proposed by Peirce (late 19th, early 20th century; 1991), Ogden and Richards (1923/1930) and Morris (1938). The intent here is to project a kind of developmental trajectory that leads from the earlier binary and triadic representations to more complex treatments that reference or move beyond the triangle. Attention is paid to problems inherent in the translation of key terms for several seminal thinkers, which only tends to exacerbate the proliferation of confusing terminology that abounds in the vicinity of the triangle.

One overriding factor in any examination of models is the widely recognized observation that all models are false (e.g., Myking 1997: 52; Brekke 1997: 85). Sowa states that "*All models are wrong, but some are useful"* (Sowa 2000a: 384).

> "The main reason that all models are incomplete/false is that they are simplifications. But some are still useful. … There is no such thing as an intrinsically good or bad

[4] The choice of "special" or "specific" seems to be unresolved. A cursory search on the Web yields approximately 3,000,000 hits for each option.

model. A model is judged against the goal, and a model may be good for some purposes and bad for others" (Pease 1998).

The reason that models are false—aside, of course, from the fact that some of them may be simply misleading or not very useful—lies in the fact that the best models use simple visual images or sometimes mathematical functions to illustrate complex phenomena. Sowa (2000a: 383ff.) attempts to explain the relationship between theories, models, and reality by classifying models as bridges designed to fill the gap between abstract theory and the concrete world. The relative accuracy of any model (its ability to represent aspects of the world with some level of *truth*) depends not only on its ability to address the constraints of its intention, but also on the measuring instruments used to define the elements making up the model. Given these limitations, the inherent danger exists that if any model is presented or taught as gospel, it can inspire dogmatic loyalty—and equally passionate attacks. However, if one accepts the relativity and intention-related orientation of all models, then, when a need is perceived for a new model with a new objective, it will be more productive simply to draft the new model than to waste energy tilting theoretical windmills—compare, e.g., Deacon's reasoned departure from Frege and Peirce in comparison to Temmerman's quixotic attack on the Wüster/Felber standardization model (Deacon 1997; Temmerman 2000).

1 THE COMPONENTS IN THE MODEL

1.1 The concept

Shelov and Lejchik discuss in some detail the evolution of thinking concerning concepts and terms. They have introduced a discussion of *concept* and *notion* as they are used in Russian, which inspires an examination of these potentially false friends in English. The relationship between these near synonyms is almost precisely the opposite in English from in Russian, which may go unnoticed even in serious discussion. Many dictionaries list *concept* and *notion* as synonyms, and one will see the word "notion" used to mean an ordinary concept, even in scholarly discourse (indeed, at some points in this article), but treatment of serious concept-oriented terminology and ontology management systems generally only uses *concept* as a reference. The idea of *notion* in English is frequently deprecated in contrast to "concept" per se: notions are individual impressions that lack the strength of consensus-based conceptual structure. They are closer to German *Vorstellung* than to *Begriff*. The emphasis here is on personal, fairly unsubstantiated *theory and belief*, not on scientific evidence or proof. Collocates include, for instance, *he hasn't got a notion; he has a crazy notion; this is just some notion of his*, hence the synonym *whim*, an unfounded idea or motivation. WordNet equates *notion* with *a figment of the imagination*, *a misconception, (an incorrect conception)*, and the venerable (1950) Merriam Webster 2nd Edition cites *notional* as *given to foolishness or visionary fancies*. *Concept,* by contrast, is defined as "an idea … representing the meaning of a universal or logical species; now chiefly, an idea that includes all that is characteristically associated with a term." Consequently, *notion* in English would never be a candidate for serious terminological inquiry.

1.2 Termness

The concept of "termness" introduced by Shelov and Lejchik is an intriguing one when viewed from the perspective of English usage and practice. The equation of broadness and narrowness with respect to relative "termness" has never become a topic for debate in English. Terminologization is widely recognized as a function of term-concept assignment, and both highly formal and extremely informal term selection procedures recognize the standard methods for term creation based on the broad range of either existing terms or words from general language. Sager has made a significant contribution to a discussion of term formation, and Pinker evaluates what terms are and how they function from a cognitive perspective (Sager et al., 1980; Pinker 1999).

The rigor associated with English language term formation varies significantly across a range of applications. The most highly developed, systematic procedures are practiced by official standardizing bodies such as Chemical Abstracts, which assigns names to chemical compounds and complex new products and compounds, such as new polymers or new drugs, according to highly detailed taxonomic rules (Merritt and Bossenbroek, 1997). In biology, for instance, specialized research organizations and learned societies assign new names according to the idiosyncratic rules adopted for specific disciplines, ranging from the highly serious and systematic (nematodes, for instance, where different phenotypes are designated according to a strictly notational system), to the whimsical (fruit fly genes, which are named metaphorically, see Niku and Taipale 20025). The flippant, non-transparent designation of computer objects is a well-known headache for most localizers, and the quirky Anglo-Saxon metaphoric humor reflected in such term assignments as boot and mouse often angers or confuses non-native speakers of English, especially more serious scientists and language planners.

The designation of brand names is subject to legal concerns and is often determined by internationalization criteria and the need to localize products across a wide range of multilingual environments. Given the sheer size of the English language and the presence of numerous varieties, regional variants are unavoidable. While unification or harmonization of terms within companies and enterprises is a growing trend, mapping of concepts and the recognition of multiple synonyms prevails in many fields. Particularly in data management environments, little or no effort is made to enforce single data element names and preference is given to the mapping of local names to standardized data element concepts and names documented in data element registries (ISO 11179).

2 BASIC MODELS

2.1 Saussure

Reflection on the relation of language to the ideas underlying words, terms, or other designators is as old as Western philosophy, but Plato, Aristotle and the ancients did

[5] Typical names include *Ken and Barbie* (these flies have no external genitalia) and *Cleopatra* (which interacts with another gene called *asp* – one might conjecture with unfortunate results).

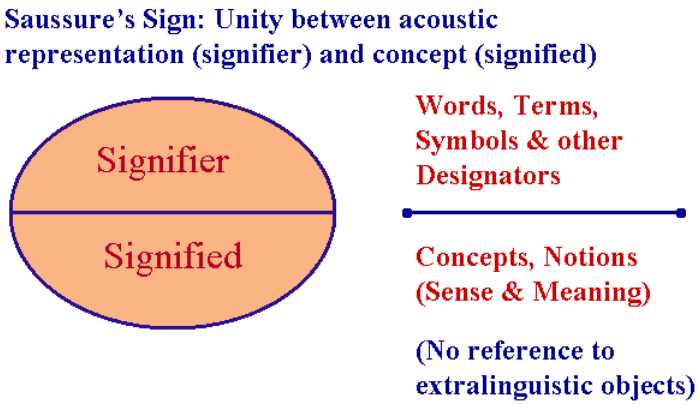

Figure: The semantic (semiotic) sign

not have the last word on the subject. In the twentieth century, Ferdinand de Saussure (1974 [1916]) introduced his binary graphic model based on a simple circle used to express the unity of the linguistic sign, made up of the signifier and the signified. In order to represent the communicative function of language, he defines the nature of the sign as the unity between acoustic representation (the signifier) and the concept (the signified). The signifier can be a spoken word, phrase, etc., a written word, or as some other visual or even tactile (e.g., Braille) representation, not to omit a wide range of various designators, including not only words and terms, but also formulae, symbols, icons, and the like. Important to the Saussurian view is the apparent exclusion, at least in the model, of objects in the external world, implying a skepticism (well founded as early as Aristotle) toward any fixed or natural link between language and objects in the real world. Of further interest is his introduction of his notion of a division of language into three levels:

- *langage*, the human capacity to evolve structured communication systems;
- *langue*, human language, such as English or French, as embodied in rules, grammar, and manuals of style;
- *parole*, any individual speaker's particular use of the language, either in spoken or written discourse.

The "rightness" of the Saussurian view seems to be more apparent in French, where the critical terms form a tight etymological field, whereas their equivalents in English (if one abandons the use of the loan words from French that have become the current norm in English linguistics), are less obviously convincing. Although care must be taken not to overgeneralize on the basis of his later followers, Saussure is associated with the evolution of the structuralist school in linguistics, anthropology, sociology, and philosophy. It is not the purpose of this article to document the many influences of Saussure or the attacks of his detractors, aside from a brief reference to deconstructionist views (see section 4.2). The primary reason for detailing this familiar model here is to plot its influence on later model makers and to introduce English language Saussurian terminology, which has played an important role in the translation of other theorists into English.

2.2 Frege

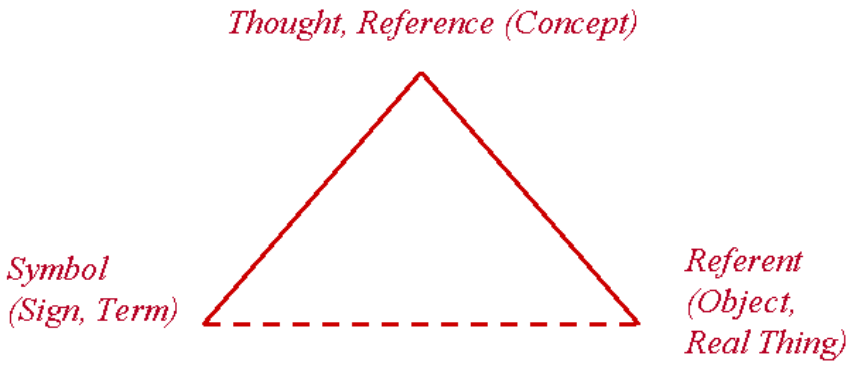

Figure: The basic semiotic / semantic triangle

In contrast to Saussure's omission of any link to extralinguistic objects, the German philosopher Frege, writing in the second half of the 19th century, had articulated the necessity of this dimension, thus establishing a triadic model as shown in figure 2. Although Wüster (followed by Felber) attributes the triangle to Gomperz (Wüster 1985: 76; Felber 1984:100), most modern writers associate it with Frege. Its origins lie in Aristotle6, and the terms used in figure 2 reflect Felber, Saussure, and Ogden and Richards. As Budin has pointed out, any effort to document all the names that have been used to designate the nodes of the triangle by the different writers and former geometry students who have redrawn it is likely to founder under the weight of their proliferation (Budin 1997).

Frege observed that even in instances where there appears to be a monosemic reference between a designation and its concept, situations can exist where the reference still remains unclear. In illustrating his position with the now famous example of the *morning star* and the *evening star*, which are obviously different terms and different experiential concepts or points of view, but the referent involved in both cases is the same *object*, e.g., the planet Venus. The *morning star* and the *evening star* are *senses* (*Sinne*) associated with the *referent (object, significance)* which is the planet Venus, and which Frege characterizes as the *Bedeutung* of the concept in question. Later classification specialists sought to solve this puzzle by speaking of the *facets* associated with a concept (Dahlberg 1993).

The dilemma posed by Frege's *Sinn und Bedeutung* is further compounded by the fact that his English translators chose to borrow the notion of *reference* from Ogden and Richards (symbol, sense, reference) to translate Frege's terms *Zeichen, Sinn, Bedeutung*. This is not wrong, but it can lead to confusion because *Bedeutung* is also quite correctly translated as *significance*. This varied usage easily implies Frege to be closer to Ogden and Richards than to Saussure in his intent. Certainly, the word *meaning,* which is another option for *Bedeutung*, is focused on the conceptual level, and does not adequately serve as a link to either

[6] In *De Interpretatione* "Aristotle sets out his 'semantic triangle' [wherein he] claims that words signify thoughts, which in turn are likenesses of things. This passage is traditionally interpreted as providing the genesis of a semantic theory according to which words signify concepts primarily and things only secondarily (i.e., only *through* the mediation of such concepts)" (Brower-Toland 2003).

Sinn or *Bedeutung*. Readers of Seleskovitch, for instance, are aware of the confusion that can be sown if the terms *sense* and *meaning* are bandied about without precision, especially within a single body of work (see Wright, 1994/5). Nor does *meaning* adequately reflect the intimate etymological relation between the *sign* and the act of *designation* that is critical to either Saussure or Frege.[7] Finally, English usage in lexicography co-opts the terms *meaning* and *sense* with regard to the lexicographical entry, attributing to *meaning* all the various connotations (concepts associated with a word in a dictionary entry), whereas *sense* indicates the specific significance of a word in a given context. Of course, it is an individual *sense* of a term that becomes the subject of the terminological entry.

2. 3 Wüster and Felber

With his engineering perspective, Wüster valued the triangle as a graphic model for use in explaining linguistic relationships to subject-area specialists in order to facilitate domain-specific communication through terminology management. In light of the zeal with which some of his adherents have promoted a rather rigid, solid-line model, it is important to point out that Wüster's view of the triangle was more circumspect. *"Die Grundlinie"* he wrote, *"sollte eigentlich fehlen. Und der rechte Schenkel sollte nur gestrichelt sein, denn unmittelbare Zuordnung gibt es nur zwischen dem Zeichen (links unten) und dem Begriff (an der Spitze)."* [*"The bottom line should not be there at all, and the right side should only be a broken line, because there is only an indirect link between the sign (lower left) and the concept (at the apex of the triangle)."* (Wüster 1984: 76; translation by the author.)] Wüster's representation of the triangle places the *Zeichen* at the lower left and *Sinn* and *Bedeutung* together at the apex of the triangle, which may reflect his unfamiliarity with Frege's distinction between the two or a conscious desire to create a variation on the theme. He does not indicate an awareness of the difference.

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[7] „Die *Bedeutung* eines Eigennamens ist der Gegenstand selbst, den wir damit bezeichnen; die Vorstellung, welche wir dabei haben, ist ganz subjektiv; dazwischen liegt der Sinn, der zwar nicht mehr subjektiv wie die Vorstellung, aber doch auch nicht der Gegenstand selbst ist. … Ein Eigenname (Wort, Zeichen, Zeichenverbindung, Ausdruck) drückt aus seinen Sinn, bedeutet oder bezeichnet seine Bedeutung. Wir drücken mit einem Zeichen dessen Sinn aus und bezeichnen mit ihm dessen Bedeutung." (The significance of a designation is the object itself that we are designating; the notion that we have in this process is totally subjective; somewhere in between lies the sense, which is, to be sure, no longer subjective like the notion, but nevertheless is still not the object itself. A designation (word, sign, compound sign, expression) expresses its sense, but it signifies or designates its significance. We use a sign to express its sense and to designate its significance). (Frege, "Sinn und Bedeutung", 1892; variant translation by the author using Saussurian rather than Richardian terminology; an *Eigenname* is actually a proper name, but here the context would indicate that he is concerned with broader designations.)

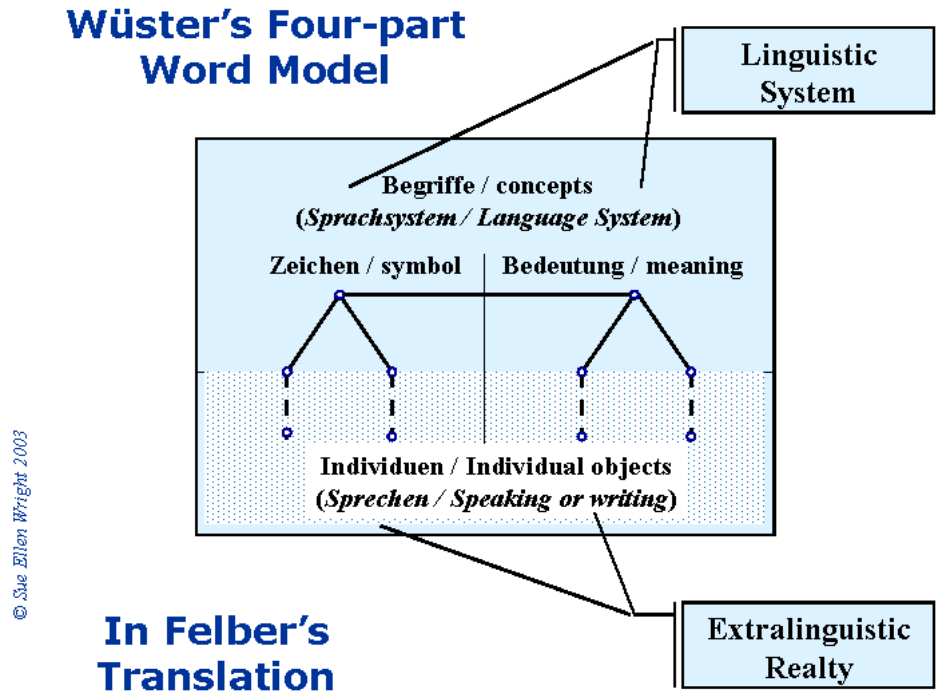

Figure: Wüster's four-part model in Felber's translation

Again, the English equivalents for the German terms Zeichen, Sinn, and Bedeutung present a problem, especially for the more complex four-part model (figure 3) that Wüster proposed for superimposing the elements of the triangle on the Saussurian model of language levels. Although Felber clearly acknowledges Wüster's debt to Saussure (see also Brekke 1997: 85 ff.), in presenting Wüster's ideas from The General Theory of Terminology to an international audience in his Terminology Manual (Felber 1985: 100), he either failed to use or possibly eschewed the customary English equivalents for the Saussurian elements. In any event, the result is that monolingual English readers who do not know the original German frequently fail to grasp the direct connection and find the Wüsterian model difficult to comprehend. Interpreting the Zeichen, which is essentially the sign, as a symbol can become confusing in light of the fact that symbols in terminology management are just one of the signs or designators that can be used to represent a concept (along with terms, formulae, etc.). Felber gives the nod to Ogden and Richards' terminology, no doubt in deference to Wüster's citation of their work. Objections to meaning in this context have been cited in the previous section of this paper and recur with respect to Benjamin. In this light, I prefer the interpretation in figure 4. Although "language system" and "speaking" (Felber's original translations) may seem clear, the unambiguous "English" loan words langue and parole actually clarify the provenance of the model for any reader with a sound linguistic background. In this particular case, it is not inappropriate for the author to be associated with the terminology of another author, but the problem is that the author (Wüster) expresses an affinity for both Saussure and for Ogden and Richards, which makes the choice of terminology doubly difficult due to the divergence of terms used to translate these authors.

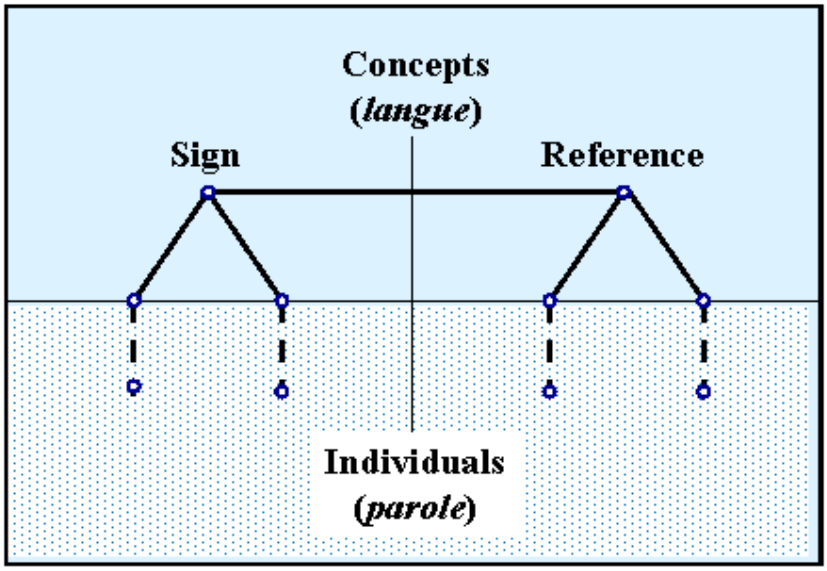

Figure: A retranslation using Saussurian terms

Aside from the conjecture that he did not know or acknowledge Frege, Wüster's preference for Sinn und Bedeutung placed together at the apex of the triangle can be interpreted as an assertion that, even if we recognize a distinction between the two, both reside properly at the conceptual level. Indeed, both avatars (the morning star and the evening star, two senses), and Venus (single significance or reference) are nonetheless concepts, for which the real object (the actual star in the sky) alone occupies the right-hand position in the triad. Sowa's stacking model (figure 10) suggests a possibility for representing this added complexity posed by the famous puzzle (see figure 5).

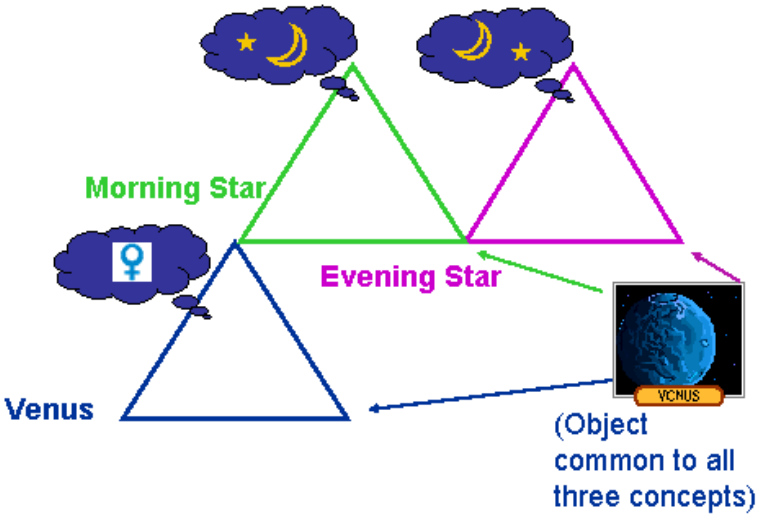

Figure: Modeling conceptual facets

3. THE TRIANGLE AND TRANSLATION

3.1 St. Jerome's dictum

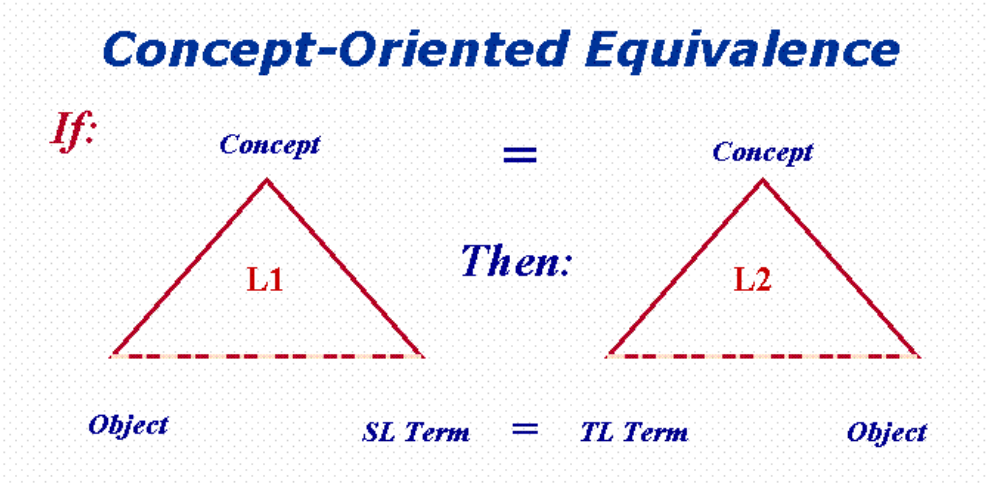

Figure: Combating the term-equivalence fallacy

Wüster introduced the triangle as a practical tool for standardizers, but it has also been used in the training of translators. According to the conventional wisdom of Cicero and St. Jerome (non verbum e verbo sed sensum exprimere de sensu [Hoppe 1996]), the model in figure 6 exemplifies the ancient dictum that translators should not translate word for word, but rather according to a sense derived from a sense. In translation-oriented terminology management, as well as in data management environments where synonyms, equivalents, or synonymic data elements, for instance, are mapped to one another for purposes of translation or data exchange, the paired triangles (rightly or misleadingly) have been used as a symbol for accurate equivalence or transfer.

The critical issue here is that apparently equivalent terms (based on such factors as translingual cognates) or apparently synonymous data category names should not be used to establish equivalence or to match up data categories. Similar or even identical forms (e.g., en control, fr contrôle) can be notoriously misleading because of subtle shifts in conceptual reference, and directional issues such as diversification (broader meaning in the ST than in the TT, accompanied by conceptual splitting to accommodate the divided senses) and neutralization (the opposite phenomenon, where two or more concepts in the ST merge to form a broader TT term-concept pair). Although widely accepted, particularly by communicative, skopos-oriented translators, the implication of the triangle was rejected by Walter Benjamin, who advises against the translation of the sense of texts at the cost of faithfulness to the sign. This position has exerted considerable influence on the anti-structuralist, deconstructionist literary translators in France and North America.

3.2 Walter Benjamin

In the "Task of the Translator", Benjamin (1923, 1969) diverges from the received wisdom of Jerome with an extended discussion of *Sinn* (sense) and *Bedeutung* (which I will here

translate as *significance* because this is closer to his other English translators than is the *reference* used by English translators of Frege), while at the same time taking on the structuralists with a barrage of their own vocabulary. In so doing, he indulges in an exercise of terminological variation that may be lost on many who read him in the English translation because of the apparent disregard for (or perhaps just frustration with) this particular semantic field on the part of his various English translators. Rendall in particular recognizes Benjamin's debt to Frege, but nonetheless chooses to vacillate between *meaning* and *significance* in his choice of renderings for *Bedeutung*, then compounds the confusion by also assigning *meaning* to *Sinn* as well. Despite his citation of Frege, he avoids using *reference* at all (Rendall 1997; Benjamin 1997).

The problem inherent in the translation of Benjamin is partly one of situationality and syntax. It can be difficult to reconcile all inflectional forms with a single interpretation of *bedeuten* viewed from its perspective as a lemma. In ¶ 3 of the essay (*Übersetzung ist eine Form. ...*), Benjamin writes: *"...Übersetzung ... ist doppel**sinn**ig. Es kann **bedeuten** ..."* and speaks of the *"**Bedeutung** dieser Form"*, contrasting *Bedeutung* to *"den selbständigen **Sinn**"*. In this paragraph, Rendall's solution for *es kann bedeuten*, is entirely natural: "it can mean …" in the sense that a word or term *can mean*, which leads Rendall perforce to equate *Sinn* with sense and *Bedeutung* with *meaning*. In the next paragraph, however, he reverts to equating *Bedeutung* to *significance*, which brings us (at least in the context of English conventions for naming parts of the triangle) back to Saussurian usage in English and ignores the standard equivalents for Fregian *Bedeutung*. Thus Rendall's failure to observe the "regularities of the text", here a highly purposeful regularity in vocabulary usage, destroys the link between the introductory discussion in ¶ 3 and Benjamin's development of his thesis in ¶ 4. Furthermore, the variation between the terms used for the English translation of Frege and the Saussurian (and yet equally accurate) terms used for *Bedeutung* is very likely to mask Benjamin's contentious invocation of Frege, which is very clear in the original German.

This anomaly might not be so disturbing if 1) Rendall had not taken it upon himself specifically to correct lapses and losses in previous translations and 2) he were able to maintain consistent usage throughout the rest of the translation. Unfortunately, in ¶ 11, where Benjamin continues his discussion of the translator's role in conveying the significance of the text, Rendall indulges in a terminological switch worthy of Seleskowitch. Where Benjamin writes *"Denn worauf bezieht Freiheit sich, wenn nicht auf die Wiedergabe des **Sinnes**, ... allein wenn der **Sinn** eines Sprachgebildes identisch gesetzt werden darf mit dem seiner Mitteilung ...",* Rendall offers: *"For what can the point of freedom be, if not the reproduction of **meaning** ... only if it can be posited that the **meaning** of a linguistic construction is identical with the **meaning** of its communication ..."* (Rendall 162). Hence a close reading of Rendall's English version will not enlighten the reader with regard to Benjamin's careful delineation of his position with regard to *Sinn und Bedeutung*. I will not argue the question of Saussurian vs. Fregian terms at the moment, but I do propose that if *Sinn* is to be *sense*, it should always be *sense*, and that *Bedeutung* should be consistently *significance*. This consistency yields "*it can signify"* for "*es kann bedeuten"* and *significance* for *Bedeutung* in ¶ 3 and *the reproduction of sense* and *the sense of the linguistic construction* for *Sinn* in ¶ 11.

Such a reading returns coherence to the target text and does justice to Benjamin's own plaidoyer for respect for the *Zeichen*.

As noted, the choice of *significance* here (as opposed perhaps to *reference, denotation,* or other possible options) reflects a bias for Saussurian terminology. Although it is by no means certain whether Benjamin consciously drew on Saussure, his debt to Frege is quite apparent in terms of his usage and cadence. Reference to the *Zeichen*, which is made up of the *Bezeichnende* and the *Bezeichnete,* is a clear invocation of German equivalents for the *sign / signifier / signified* relation, but this affinity is already present in Frege, as is the discussion of *das Meinende / das Gemeinte* (*that which intends, the intention*). The necessity to make a choice from among various options underscores the dilemma of the translator: in opting for one solution over another, the translator places the source in a context with respect to the history of ideas, a context which may or may not be appropriate to the situationality of the original. It can be argued, however, that Rendall's preference for Saussurian terminology (albeit inconsistently applied) is more appropriate to his skopos, for his readers are mostly translator-linguists.

The importance of the translational problem described here is central because the distinction between *sense* and *significance* is the core thesis of Benjamin's essay. Where Saussure focused on the sign (comprised of the *signifier* and the *signified*, the designator and the concept designated, i.e., the left side of the triangle), and Frege concerns himself with the relationship between the *sense* (the conceptual level) and the *significance / reference* (the object level, i.e., the right side of the triangle), Benjamin reverts to a pre-Aristotelian view that true equivalence can be found only between the *sign* and the *significance*, e.g., between words and objects, as manifested in pure language (the nodes at the base of the triangle). His citation of Mallarmé (*Les langues imparfaites en cela que plusieurs... languages imperfect on account that they are many*—as noted by Rendall, no English rendering can do justice to the syntactic rupture of Mallarmé's original) conjures up the image of the *confusion* of Babel. His introduction of pure language implies the perfect language of Adam before the Fall, when the relation between word and object was univocal and unambiguous. This Cabbalistic turn is widely recognized in the Benjamin literature and reflects a long tradition leading across the rough terrain of perfect language, universal language, magic language, and universal classification schemes, linking the Cabbalists to Benjamin, Porphyry to Piaget, Leibniz to the Cycorp Universal Upper Ontology (Cyc 1997), and polygraphies to the *interlingua* of the more visionary proponents of machine translation (Eco 1995, Melby 1995).

Amidst the mystical abstraction of his argument, Benjamin proposes an example that is conceived perhaps as a pendant to Frege's discussion of the object Venus and that is concrete enough to be called a model in its own right (figure 7). The figure illustrates Benjamin's argument concerning the *mode of intention* and the *intended object* with the example of bread—postulating that translation from *Brot* to *pain* comprises an almost mystical act that somehow links these disparate items together in an act of pure language. My rendering here adds English *bread* and Armenian *lavash*, and multicultural options such as Ethiopian *injira / enjeera* would further illustrate the variations in connotation and denotation existing between the conceptual intension [sic!] of *bread* and its extension, e.g., the many kinds of objects associated with this concept. In Benjamin's view, it is not the convergence of sense as

a whole that determines equivalence, as implied in figure 6, but rather a single point of the *sense* (alas, Rendall is still using *meaning* here—thus leaving the English reader in the dark as to whether Benjamin posits *meaning* in *Sinn* or *Bedeutung*). This *sense* is positioned tangential to pure language that is enabled or released by the act of translation, and which, in the fulfillment of messianic time, has the potential to overcome the foreignness and confusion imposed by the event of Babel.

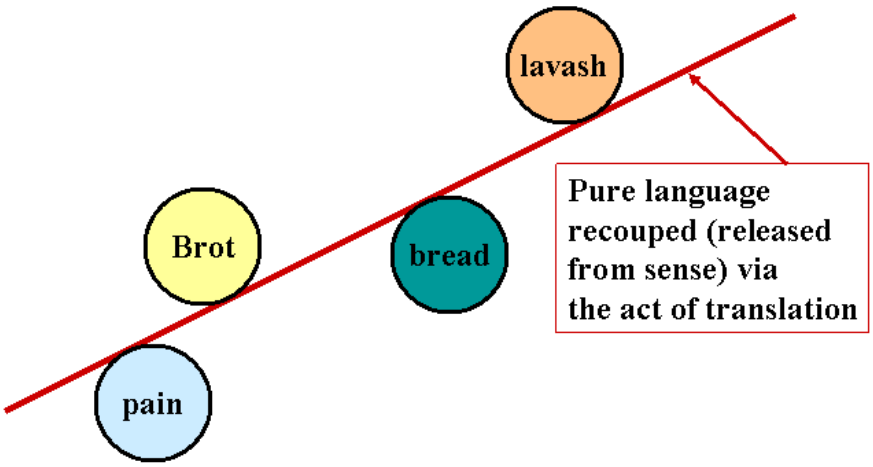

Figure: Significance and its tangential relationship to pure language

Benjamin's argument is designed to counter the structuralist view that equivalence is somehow addressable in terms of the commonality of characteristics comprising the sense of concepts in multiple languages. Interestingly, however, Wright (1993) uses a similar comparison to underscore the value of the terminological method based on Wüster's declaration that the "content of a concept is understood to be the totality of all its characteristics" (1984: 7). Sowa, in contrast, cites Wittgenstein as saying that "the common concepts of ordinary life can only be characterized by a loose set of family resemblances, not by a definitive set of necessary and sufficient conditions." (Sowa, 2000a: 350)

Sowa's position is probably closer to the truth value associated with general language in natural discourse, and yet the fact remains that in practice experts write definitions of special language terms based on the enumeration of significant (if not essential) characteristics. Certainly, the four varieties of "bread" cited in figure 7 are substantially different, and yet it is quite possible to write a viable definition that links them all on the basis of a small set of common characteristics: Merriam Webster certainly covers all the examples in figure 7: *a usually baked and leavened food made of a mixture whose basic constituent is flour or meal*. The variety of flour used, the presence of water or possibly milk, the degree of rising, miscellaneous secondary ingredients, all these other properties of different sorts of bread, are quite irrelevant in light of the essential *characteristics* of flour and leaven as the primary ingredients. Ironically then, Benjamins anti-structuralist graphic image can serve as a viable argument for a structuralist representation of common characteristics classifying even the pancake-like *injira* under the concept of *bread.* This is not to say, however, that Wüster is

right and Benjamin wrong, but rather that the model itself can be applied in diverse environments depending on the intention required by a given situationality.

4 NEW MODELS

4.1 Damasio

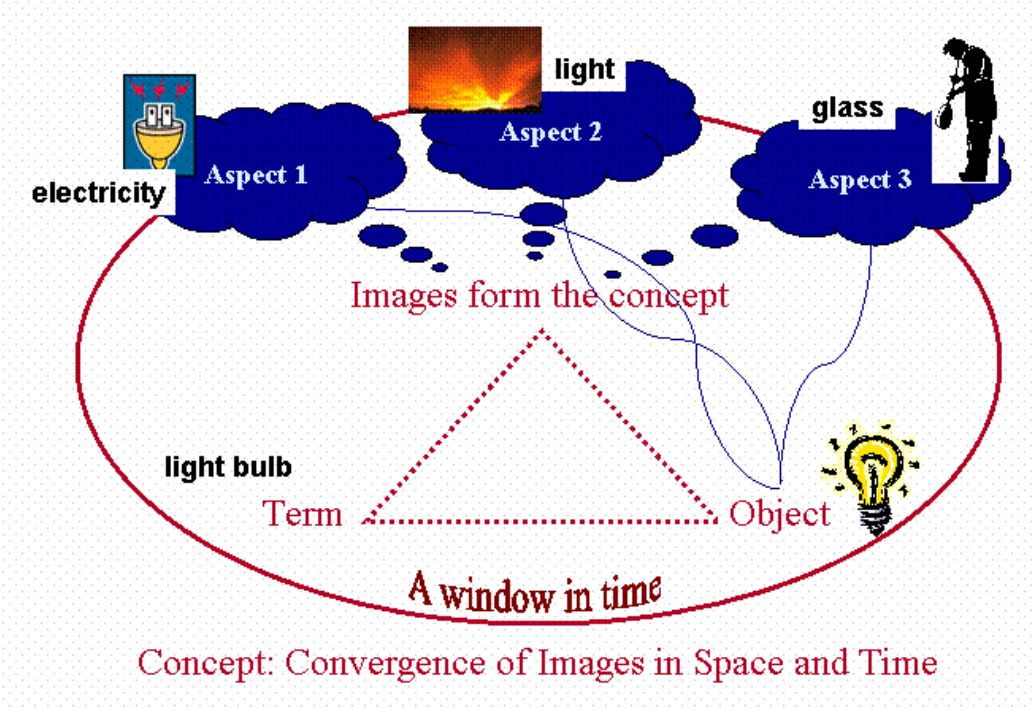

Figure: Damasio's dynamic concept formation

Sowa asserts that Wittgenstein declined to speculate on mental processes because the nature of meaning does not depend on their nature (Sowa 2000a: 195), but Antonio Damasio, a Portuguese-American neuroscientist with a strong philosophical bent, delves into mental processes with the implied premise that the formation of concepts is a function of these processes and does indeed inform the organization of meaning in the human mind. As opposed to relying on introspection, however, with its potential for dubious observation, his analysis of mental processes is supported by such methodologies as functional imaging, psychophysiology, and experimental neuroanatomy.

The models presented so far appear to document concepts as permanent constructs in the mind, which one would have to assume, if communication is to be at all effective, are somehow stable, at least in a single individual over time, if not also across individuals in a given speech community. Psychology and neuroscience have entertained the hypothesis that concepts are formed in language communities and remain in the mind as consistent prototypes. Damasio maintains, however, that based on empirical studies involving aphasics, concepts do not comprise permanent prototypes that are ever-ready for repeated reference, but rather constitute instantaneous convergences of aspects that combine during a window in time and space. It is this instant of convergence that generates quasi-recollected constructs that we

perceive as concepts to which we have already assigned words or terms, provided, of course, we have previously encountered the object.

The images that evoke these concepts "are *not* stored as facsimile pictures of things, or events, or words, or sentences. The brain does not file Polaroid pictures of people, objects, landscapes; nor does it store audiotapes of music and speech… In brief, there seem to be no permanently held pictures of anything. … Memory is essentially reconstructive" (Damasio 1994: 100). According to this analysis, thought is grounded in these fleeting perceived images, certainly not in words, and it is on the basis of these images that we organize signals coming into the sensory centers in the brain, aggregate them into meaningful groupings, and categorize the results. Damasio states that "dispositional representations exist as potential patterns of neuron activity in small ensembles of neurons", which he calls "convergence zones" (102). The dynamic variability of Damasio's analysis supports Picht's preference for Felber's conclusion that "the concept is therefore an element of ***thinking***" (German: *Denkeinheit*; Picht1997; Felber 1984: 115; emphasis by the author) as opposed to "unit of ***thought***".

Damasio's view does not necessarily rule out the image of something like prototypes, but it does negate any notion that they can exist in any sort of a priori way. The upshot of these iterative processing events is that concepts are in constant flux even in the brain of a single individual. In Damasio's model, as in Piaget, the brain is predisposed to categorize the critical aspects (characteristics) associated with a single cognitive event and to classify the resulting concept (Piaget 1952). The classification function itself is innately human, but any given ordering system is purely arbitrary from the individual's standpoint, and even so-called "scientific" classifications are based on arbitrary cultural convention.

4.2 Kuhn and Feyerabend

Damasio does not carry this view of the human mind into any sort of conclusions concerning the possibilities for interpersonal communication. As a scientist and a physician, he implies a certain norm, where communication is at least "as good as it gets", and focuses his attention on pathological inabilities to verbalize on the part of individuals with serious brain lesions. His interest is in the real-time linkage between perceived concepts and their linguistic embodiment via the identification of associated words. Nevertheless, it is not difficult to use his theory to support the notion of incommensurability postulated by Kuhn and others, such that it becomes impossible to compare two paradigms or their parts because of essential differences that are fundamental to the very nature of the human mind. This train of thought has led translation theorists, among others, to support the seasonally discounted, seasonally resurrected Whorf-Sapir hypothesis that translation (i.e., the mapping of concepts across language boundaries to facilitate interlingual communication) is impossible (Sapir 1929). If individuals have different visions of the world, then any marginal commonality in vision is held together by the local conventions of cultures, disciplines, or sub-disciplines, ethnic groupings, etc., resulting in "different logics, different visions of the world and man" (Gernet cited by Ronan 1998; see also Hart1999). Skepticism regarding meaning is common to the same deconstructionist schools that valorize Benjamin.

4.3 Deacon and Pinker

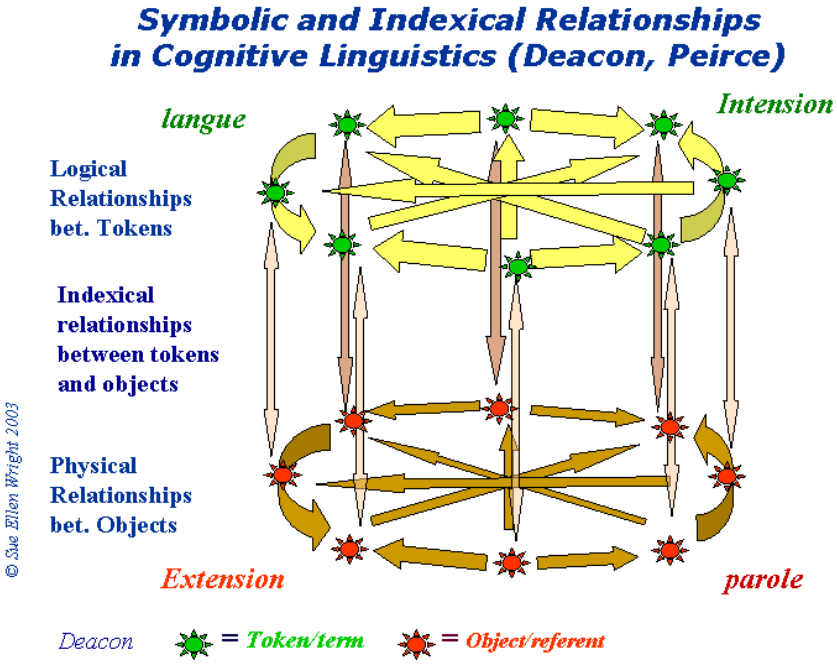

Figure: Logical, indexical, and physical term-object relations

Another American neuroscientist, Terrance Deacon, considers the Saussurian and the triangular semiotic models (in this case citing Frege), and notes that "the correspondence between words and objects is a secondary relationship, subordinate to a web of associative relationships" (Deacon 1997: 70). In attempting to describe these relationships in more detail, he relies heavily on Peirce's terminology of tokens and objects, equated here to terms and referents (objects in the real world). The implied elemental relation between the signifier and the signified, between the word/term and the referent, is overly simplistic. In its place, Deacon proposes a model designed to approximate the complexity of real-world experience by noting the logical and associative relationships that exist between tokens (conceptual references) on the one hand, and the physical, perceived relationships that may exist between objects in the real world on the other. Indexical (as well as iconic and symbolic, to cite Peirce's discussion of conceptual relations) links are formed between conceptual tokens and perceived objects. Echoing Damasio, these relations are not static or permanently recurring phenomena, but rather diachronically invoked "combinatorial possibilities and co-occurrences … [reflecting] the probability of correlations between things" (Deacon, 483).

This particular model does not, as it might seem at first glance, link the sign world directly with the object world, for the moment of triangulation achieved in the traditional semiotic model is embodied in the mediation performed by the relational interaction between tokens and objects. Deacon's view supports the idea that in addition to the basic relationships portrayed in different versions of the triangle, words (tokens) interact with other words and the subtle conceptual deviations can occur because of historical, cultural, and etymological

word-bound distractions that affect our thinking (misinterpretations, puns, other word plays, etc.). Given the potential for different word/term systems in different languages, it is possible to see how different "logical" systems in one language may not make a great deal of sense to another linguistic community. For instance, the cited problem that the sign / signifier / signified / significance set so confidently promulgated by the Saussurian structuralists threatens to fall apart in English if one tries to translate the basic doctrine without retaining the French loan words.

Deacon's model also introduces relations between things in the apparently real world, proximities and juxtapositions that affect the way that we formulate concepts in any given situational context. Viewed on the printed page, the model fails to explicitate the constantly changing configuration of these various features, which results in different faceted views of the same objects or the assignment of similar or different terms, depending on 1) changes in situation, 2) changes in viewpoint, 3) changes in language over time, but Deacon's insistence on iterative co-occurrences is consonant with Damasio's ever-changing conceptual landscape. Furthermore, the notion of both conceptual reference and language itself varying over time is addressed in Pinker's analysis of the evolution of language from generation to generation, based on the premise that each successive cohort of first-language learners is faced with many of the same challenges experienced by second-language learners, with the result that no child ever truly learns the tongue of their mothers (and fathers), despite universal valorization of the mythic mother tongue, but rather, that each generation reinvents language to fit its own needs and experience (Pinker 1995). Generational change and migration of semantic content are also a crucial element for Benjamin.

4.4 Sowa and the spinners of the Semantic Web

Sowa deals with knowledge representation, focusing on the principles and history of logic as expressed throughout the western tradition from Plato and Aristotle to the modern day. He addresses the formal rules of inference and of inheritance as expressed in predicate logic, harkening back to Frege and Peirce as the originators of predicate calculus, which provides a means for representing the granularity reflected in predicate logic (Sowa 2000a). The avowed purpose for applying predicate calculus in artificial intelligence is to provide machine-parsable "statements" that can be used to support inferences by automatic agents. In electronic information resources, these statements are most frequently expressed in the form of axioms and rules embedded in ontological systems. As such, they participate in the *metalanguage* associated with those systems. The presence of rules and metalanguage introduces a new dimension of complexity, allowing models to encompass many layers of semantic content.

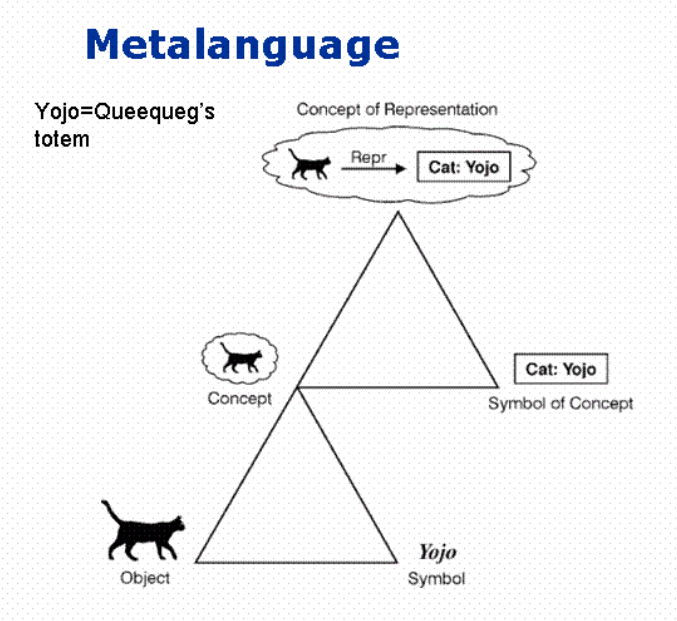

Figure: Sowa's representation of metalanguage (Sowa 2000b)

In order to position metalanguage with respect to language relations per se, Sowa expands the model by stacking the familiar triangle. The object of his somewhat tongue-in-cheek exposition in (Sowa 2000b) is his black cat Yojo, whom he introduces without mentioning any intertextual reference to Melville's Yojo, the equally black wooden totem who serves as a mystical companion to the Maori Queequeg. Sowa's description of the concept harkens back to Damasio's notion of the instantaneous perception of an image, "The cloud on the top [of the bottom triangle] gives an impression of the neural excitation induced by light rays bouncing off Yojo and his surroundings. That excitation, called a *concept*, is the *mediator* that relates the symbol to its object" (Sowa 2000b).

The stacked triangles are intended to represent the fact that the black cat in the model is, of course, not indeed a black cat in-the-flesh, but rather an iconic representation of a black cat, hence an element of metalanguage, yet another level of sign used as a placeholder for the actual object, Yojo the cat, who presumably is disinclined to sit still long enough to be actually embodied in an image of this nature. Indeed, everything about the image has a sign character at the metalinguistic level. It is only by the use of conventions (such as Sowa's carefully explained "cloud") that we can entertain the useful fiction that the model effectively portrays at least three different levels of semiotic interaction. *Metalanguage* according to Sowa, "consists of signs that signify something about other signs, but what they signify depends on what relationships those signs have to each other, to the entities they represent, and to the agents who use those signs to communicate with other agents" (Sowa 2000b).

At its broadest, Sowa defines this sort of *agent* as a "software system that automatically performs useful tasks" (Sowa 2000a: 330). His treatment of agents demonstrates the varying views and definitions offered in the information technology community for different kinds of inferential and functional programs and routines that perform decision-making or quasi-

decision-making actions in computerized environments such as the World Wide Web or enterprise-specific Intranets. *Whatis.com* defines an intelligent software agent as a "*program* that gathers information or performs some other service without your immediate presence and on some regular schedule". A less restrictive view of the intelligent agent might allow for a modification: "... performs a service without direct human intervention," but would eliminate the schedule element because an agent could also perform a one-time, non-recurring function in response to a specific request. Sowa relates the functions of agents to the performance of controllers in automatic feedback systems, thus orienting the function of the agent to long-standing engineering practice as well as to the behavior of natural systems in nature.

Terminology theory has traditionally stressed the importance of orienting terminology management to the creation of concept systems (Wüster 1985; Felber 1986; Arntz and Picht 1989, among others), an approach widely adopted by ISO TC 37 and by many terminology standards committees working in carefully defined, delimited subject fields. Without discounting or rejecting the potential value of systematic terminology management, Wright and Wright (1997) emphasized the utility of ad hoc terminology management (*terminologie ponctuelle*), e.g., terminology management outside the semantic ordering environment afforded by closed concept systems. They stressed pragmatic approaches imposed by the time-constraints and methodological limitations of text-centered, translation-oriented terminology management in industrial and commercial environments. Theoretical and philosophical concerns (Cabré 1998, Temmerman 2000), as well as pragmatic considerations (the tendency in modern software globalization environments toward ad hoc, sometimes "throw-away," terminology practices) have even stridently rejected systematic terminology management as overly prescriptive or impractical within the framework of production processes involving just-in-time delivery of terminology products to authors, translators, and localizers. Some theorists and corpus linguists are disturbed by the fact that they see objectivist models as false—not necessarily an original observation if we assume that *all* models are false. They perceive closed systems as out of sync with the real world and incompatible with the creation of terminological resources within dynamic, corpus-oriented environments. Other practitioners simply find it impractical to deal with systematic ordering in the context of ever changing, constantly expanding, terminological and semantic values in document-related knowledge networks such as those that prevail in the localization industry. Finally, small linguistic communities and language planners seem to have more luck achieving consensus with respect to conceptual relationships than is the case with terminologists working with sprawling world languages like English and Spanish.

Resistance to systematic terminology management notwithstanding, the evolving Semantic Web (SW) and the development of so-called universal or "upper" ontologies have given rise to the notion that terminologies, even uncontrolled, rapidly expanding collections, can be linked to upper ontologies (Ortiz 2000) that provide systematic reference while maintaining open systems. More and more companies are defining and maintaining complex synchronically dynamic thesauri, taxonomies, and ontological resources for objects and functions in their information environments. The challenge is for terminologists to integrate terminological and lexical (e.g., machine translation lexicons), into interoperable, multi-level systems where lexico-semantic information can move back and forth between applications and

information systems, and even across enterprise boundaries, with relatively little loss. Such transfers are rarely totally lossless, but given a certain calculated loss, they are nonetheless not incommensurable.

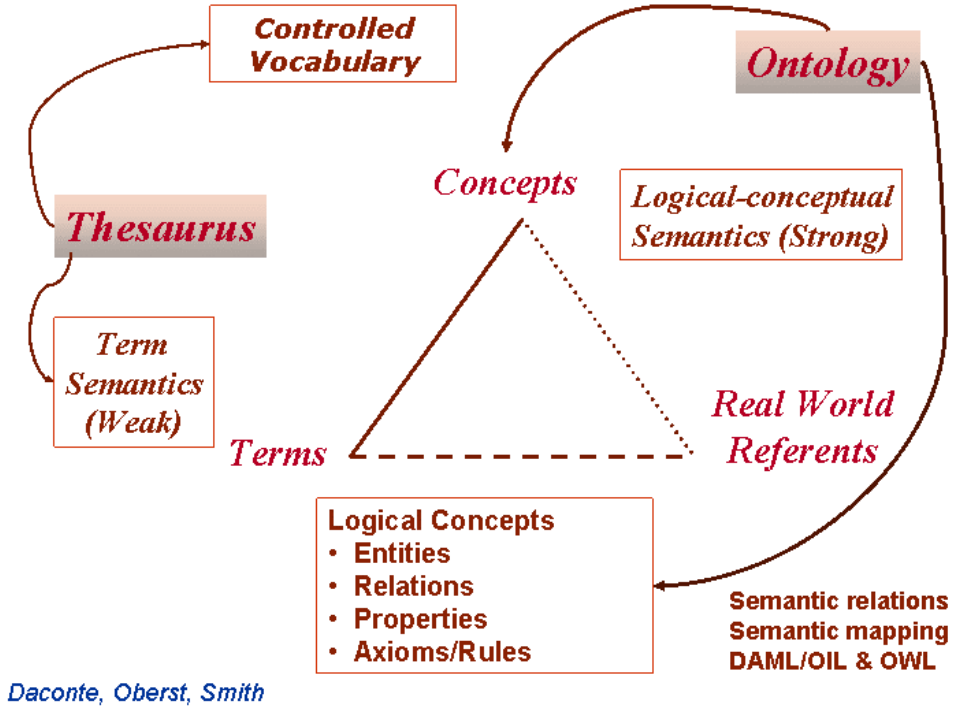

Figure: Thesaurus resources compared to ontology resources

Daconte, Obrst, and Smith plot taxonomies, thesauri, conceptual models, and ontologies along a cline demonstrating a gradual increase in semantic content toward the ontological side of the figure, where they note that one can "express arbitrarily complex meaning" (Daconte et al., 2003: 157). They refer back to ISO 704:2000 (*Basic Principles of Terminology Work*) and to the semiotic triangle to explain the principles of thesaurus and ontology management for articulating the structures of axiom-driven ontologies designed for use by agents in the Semantic Web (op cit., 2003: 208 ff).[8] Their representation is rendered visually much more complex than the image shown in figure 11 by the inclusion of detailed examples illustrating the specification of entities, relations, properties, and axioms. The unadorned triangle provides a kind of visual metamodel that the architects of the evolving Se-

[8]Thesauri comprise essentially term-based systems (the left hand side of the triangle) and are used for information search and retrieval. "Therefore the semantics of the classification space can remain relatively weak …" depending on broader than and narrower than relations. (Daconte et al., 2003: 210) "An ontology, however, does try to represent the complex semantics of concepts and the relations among concepts, their properties, attributes, values, constraints, and rules." Ontologies are intended for use by software applications (e.g., or perhaps, among others, by "agents" in Sowa's sense. Thus ontologies work on the concept/real world side of the triangle. "Unlike the thesaurus, an ontology tries to express precise, complex, consistent, and rich semantics" (op cit.: 211).

mantic Web can decorate with semantic detail in the form of an unlimited number of individual data categories, relations, and links to other semantic nodes. Not just words or terms, as illustrated on the thesaurus side of the image, but rather fully defined rules enable inferential linkage and action on the part of intelligent agents on the Web.

In many cases, the objects defined in ontologies are at the same time data elements (data categories) used in metadata registries designed to facilitate the interoperability of knowledge resources on the SW. Current efforts in ISO TC 37 involve the coordination of all data categories used in linguistic resources produced in a number of thematic domains (terminology, lexicography, electronic lexicons, NLP lexicons, morpho-syntactic markup systems, etc.). The objective is to create a global metadata registry (a family of standards under the banner of ISO 12620 for data categories) that will enable data exchange, access, and interoperability in heterogeneous environments. The ultimate goal is to be able to leverage data across resources and resource types in order to take full advantage of existing data collections, such as in mixed environments involving controlled authoring, human, and machine translation. But on a broader scale, the anchoring of local, even ad hoc terminological or lexical information into layered ontologies brings the model back full circle to the systematic approach: the creation of computer-supported ontological systems that provide for dynamic, open-ended concept mapping eliminates the limitations posed by closed concept systems and allows the ongoing construction of evolving views. Furthermore, the richness afforded by large models facilitates multi-faceted perspectives.

5. CONCLUSION

This article began with a discussion of the contradictory falseness and utility of models with respect to theory and the representation of truth. Models are most useful when they are drafted for the purpose of designing something we are going to build or make work. The architect's model, for instance, exemplifies the future finished building. In digital environments, models expressed in Universal Modeling Language (UML) provide a skeleton that we can decorate with our choice of data categories and styles in order to design a data architecture. Starting with the simple Saussurian model, admittedly an oversimplification, yet useful for the expression of a particular theory of language, we progress to a highly complex model made possible by the ability to manipulate both data and images within a multilayered electronic knowledge system. The utility of the model is not simply that it represents a view of truth (e.g., of extralinguistic reality), but rather that it *functions*, it performs tasks in an agent-driven semantic network. It is not necessary that the model reflect the way that language works in the human mind because computers function entirely differently from the human mind. The critical factor is simply that the model be capable of performing useful work in the form of information access, retrieval, and manipulation. In fact, as Daconte et al. point out, the crucial issue in the adoption of any model in this environment is that the most widely used model will be the most useful, and that even highly elegant models will be ineffective if they are not widely accepted.

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