Can Whorfianism be modernized?*

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0. Introduction: intellectual triage

> I find it gratuitous to assume that a Hopi who knows only the Hopi language and the cultural ideas of his own society has the same notions, often supposed to be intuitions, of time and space as we have, and that are generally assumed to be universal. In particular, he has no general notion or intuition of TIME as a smooth flowing continuum in which everything in the universe proceeds at an equal rate, out of a future, through a present, into a past. (1956: 56)
>
> Hence, the Hopi language contains no reference to 'time', either explicit or implicit. (1956: 58)

1. Language and cognition: some open questions

Are there viable questions in cognitive science which a Whorfian theory could answer?

1.1 Model-theoretic semantics (analytic philosophy)

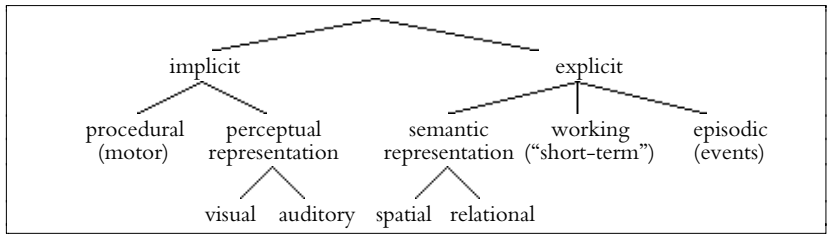
Natural language metaphysics."What do people talk as if there is?"(Bach 1986). Montague's view of interpreted formal systems ([lexical semantics + constructional semantics] + metaphysics) separates grammar and ontology by mapping from syntactic categories to logical types. Montague's model structure is first-order logic (individuals and truth values) plus possible worlds and ordered times.

Problems: temporal asymmetry (if future and past are symmetric, time travel is logically possible); underintensionality (bought ≠ sold); aspect (*Aktionsart* is modified in syntax, Verkuyl 1972, 1993).

Conclusion: metaphysics is not grammar-free (nor the reverse). Open questions: how much can grammars differ, and do these differences include parts of grammar with metaphysical consequences?

1.2 Cognitive psychology

Knowledge representation, whether propositional ('declarative') or procedural, is not necessarily linguistic. Early theories of 'faculty psychology' (dispersed, mandatory, fast, "stupid", domain-specific processors or brain modules, cf. Fodor 1983) were committed to the existence of one slow processor for central representations. Recent taxonomies of memory suggest that representations themselves are dispersed into a handful of nested types, e.g. (from Schacter and Tulving 1994: 26):



In Jackendoff's "intermediate-level theory" of consciousness (1987), since the contents of short term memory (STM) can be reported verbally, as objects of awareness, a sufficient condition for appearance in STM is a phonological form, i.e. a pronounceable term (lexical item). The set of lexical items (open-class form/meaning pairs), both actual and possible, varies across languages, therefore processing in STM proceeds to some extent language-specifically (as already stated by Boas 1911). Long term memory (LTM) in turn is facilitated and stabilized by these available forms. For their part, morphosyntax and lexical semantics potentially affect cognition insofar as semantic representations depend on syntactic and lexical categories. Pinker (1994 81) insists that Mentalese is not English or any other natural language, but it is an open question whether semantic structure differs across languages. If not, then universal grammar may affect cognition, but particular languages don't.

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1.3 Universal grammar

It is not obvious from inspection how languages differ. The extent to which syntactic differences are superficial, and localized in list-like storage, is impressive. For example. Some logical relationships between propositions are uniformly possible in natural languages, e.g. the inchoative↔causative alternation in (1), while others are never expressible in the same way, e.g. there is no corresponding relationship between a 'creation verb' and a causative), cf. (2), (Hale 1985a, Hale et. al. 1994).

	English	Ìgbo	Miskitu	Navajo
(1)a.	The pot broke.	Íte ahụ̀n kụ-wa-ra akụ́wa .	…kri-w-…	…ii-dlaad…
	This child brokethe pot.	Nwátá à kụ-wa-ra íte ahụ̀n .	…kri-k-…	…ii-ɬ-dlaad…
b.	The tank filled up.	Tank áhùn gba-ju-ru àgbáju.	…bangh-w-…	…ha-di-bin…
	I filled up the tank.	Á gbà-ju-ru m tank áhùn.	…bangh-k-…	…ha-di-ɬ-bin…
(2)a.	Ézè laughed.	Ézè chị-rị ọ́chị̀.	…kik…	…-ghi-dloh…
	*The dancer laughed Ézè.	*Égwugwu ahụ̀n chị-rị Ézè ọ́chị̀.	—	—
	(The dancer made Ézè laugh.)			
b.	We slept.	Ànyí hyìn-rin ụ́ran.	…yap-…	…-'i-ɬ-ghosh…
	*The wine slept us.	*Mí̧ ahụ̀n hyin-rin ànyí ụran.	—	—
	(The wine put us to sleep.)			

On the syntactic basis of the difference between (1) and (2), cf. §4.1. The point is that the restriction holds for all natural languages, independent of the inventory of morphosyntactic categories, so the "absence" of a certain category in a particular language is not decisive for conceptual semantics.[1]

2. Political questions

Are there reasons to look for Whorfian effects besides sheer curiosity?

2.1 Relativism or racism

Tambiah (1990) argues that comparisons of rationality across cognitive systems depend on a shared "space" containing a single set of "decision procedures". This condition is of course not guaranteed for many ethnographic phenomena. Tambiah implies and Sperber (1986) explicitly claims that many terms (marriage, witchcraft, chieftaincy…) are interpretive, not observational, i.e. they translate the contents of conscious awareness shared by a set of individuals. I would add, in accord with Boas' observation of the independence of 'race', language and culture, that bounded cognitive systems need not coincide with language boundaries. The linguistic component of 'expert knowledge' may be lexical and or stylistic. A Whorfian argument is not necessarily racist, unless it entails relativism of whole populations. That Whorf's intent was antiracist is agreed by Lakoff (1987: 330) and Pinker:

> Linguistic relativity came out of the Boas school, as part of a campaign to show that nonliterate cultures were as complex and sophisticated as European ones. (Pinker 1994: 64)

Pinker, though, dismisses this antiracist argument as an unscientific "Standard Social Science Model":

> The SSSM has not only been the foundation of the study of humankind within the academy, but serves as the secular ideology of our age, a position on human nature that any decent person should hold. The alternative, sometimes called "biological determinism", is said to assign people to fixed slots in the socio-politico-economic hierarchy, and to be the cause of many of the horrors of recent centuries: slavery, colonialism, racial and ethnic discrimination… Two of the founders of the SSSM, the anthropologist Margaret Mead and the psychologist John Watson, clearly had these social implications in mind.(1994: 406)

As against this wooly liberal thinking, Pinker conterposes "Evolutionary Psychology" or "biological anthropology"(1994: 409, 419) as practiced by David Marr and Dan Sperber (why not E. O. Wilson?). Ironically, however, Pinker's sociology of Whorf doesn't kill him off so much as reattach him to one of the great ideological life-support systems of our era, the system which sells *The Bell Curve* and fuels debates about the "genetic hereditary background" needed to break 750 on the SATs.

[1] The fact that languages have differing means to causativize the items in (2)—i.e. that the parenthesized types are not universal—may be predictable from their biclausal nature, which puts the matter beyond lexical category inventories.

2.2 Individualism and globalization

The other side of the coin of racist relativism, as Tambiah also notes, is individualist universalism, undermining cultural diversity in the human species. An example is the phenomenon of 'language death', resulting from 'free market' expansion by genocide and forced migration, as well as from political and ideological aggression e.g. colonial schooling, missionary work and mass media (Wurm 1991). Indigenous languages are the software of a wide range of databases. Recognition of intellectual property corresponds to the privatization of knowledge in high tech production. In this context, the Whorfian question is whether the loss of a language signifies the destruction of intellectual resources, or whether knowledge can be 'downloaded' across language boundaries. More bluntly, are languages intellectual species and is linguistic diversity part of ecological diversity? Are speakers of 'endangered languages' an 'indicator' of health in the world resource park, a human spotted owl? Linguists need not have this concern about language death in order to oppose it, since they oppose the destruction of evidence of the set of possible human languages. The latter question does impinge on the form of conceptual structure, but only in principle since, as Jakobson used to say, in an implicit reproach of Greenberg (1963), you can always find a five-legged cat in Brazil if you look: in other words, the search for language universals of the kind alluded to in §1.3 does not proceed inductively.

3. Closed-class categories

3.1 Whorf on tense

Some of Whorf's claims quoted above concern the domains of verb tense and the expression of chronological time in Hopi. Insofar as these claims are explicit enough to be tested, there are three possibilities: they may be false; they may be true *and* unique to Hopi; or they may be true but found in other languages, perhaps in all languages in the relevant respect—cf. §1 above.

Whorf's statement that "the Hopi language contains no reference to 'time', either explicit or implicit" (1956: 58) is testable only if we can decide the intended meaning of "reference to 'time'". Other passages suggest that he means "objectified time" i.e. an "objectification, as a region, an extent, a quantity, of the subjective duration-feeling" (1956: 145, 143). Put so specifically, however, the claim is trivial: Hopi clearly does not have a lexical item exactly corresponding to the English word *time* as understood "subjectively" by a mid 20th-century New England intellectual. However, any Hopi speaker could undermine this claim rather easily, by borrowing or coining such a word.

Whorf's more impressive observation about Hopi grammar is confirmed by Voegelin et al 1979 (cited by Malotki 1983: 624): Hopi verb inflection opposes future ("expective"), marked *-ni*, to nonfuture, which is unmarked (1946: 176). Whorf describes the reference of the nonfuture as "past (i.e. past up to and including present)" which "reports an actual occurred or occurring fact; it corresponds to past and present tense [combined]" (1946: 176).

Now, even more surprising than Whorf's intuition about Hopi tense, is the existence of overwhelming, crosslinguistic evidence of temporal evaluation even in the absence of overt tense, leading to a hypothesis that $\varnothing_T$ plays a role in the interpretation of 'untensed' sentences (cf. Enç 1987, Déchaine 1993). The evidence is remarkably similar, whether or not a marked 'past' is at issue.

3.1.1 tense/nontense (past/nonpast)

In English, past eventives (3a) and noneventives (3b) are quantified uniformly. Bare eventives (in *-s*) are obligatorily quantified by default (existential closure), (4a); bare noneventives aren't, (4b).

(3)a. Mary built a house.
Mary slept.

b. Mary saw a house.
Mary knew.

(4)a. Mary builds a house. → generic or historic
Mary sleeps. → generic or progressive

b. Mary sees a house.
Mary knows.

3.1.2 nonmodal/modal (nonfuture/future)

In Ìgbo, bare eventives (in *-rV*) are past (5a), bare noneventives are not (5b). Aspectually marked forms (future/progressive) are quantified uniformly, whether eventive or not (6).

(5)a. Ńkịtá, yá jḥè-re ébe Ṁgbadan.
dog 3S go-ASP place antelope
'Dog went to Antelope's house'

b. Ébe ahụ̀n ju-ru na ńdị dibịà.
place that full-ASP CASE those seer
'That place is full of seers'

(6)a. Ńkịtá {gà /nà} e-jḥé ebe Ṁgbadan.
dog aux ASP-go place antelope
'Dog {will go/is going} to Antelope's house'

b. Ébe ahụ̀n {gà /nà} e-jú nà ńdị dibịà.[2]
place that aux ASP-full CASE those seer
'That place {will be/is} full of seers'

As in Hopi, future is nondefinite: after the present, the time line branches into conditional probabilities, and so is quantified. Progressive refers not to a point but to an interval, which if anchored to the present includes a portion of the future, so it is nondefinite (Kamp and Reyle 1993; Baker 1995).

In Mohawk, past events (7a) and past states (8b) are also marked nonuniformly (Baker 1995). The definite quantifier (*wa*) is incompatible with the habitual (8a); punctual aspect excludes past (7b).

(7)a. Wa-h-atorat-e'.
definite-AGR-hunt-punctual
'He hunted'

b. *R-atorat-e'-kwe'.
AGR-hunt-punctual-past
['He hunted']

(8)a. *Wa-h-atorat-s.
definite-AGR-hunt-habitual
['He was hunting/was a hunter']

b. R-atorat-s-kwe'.
AGR-hunt-habitual-past
'He was hunting/was a hunter'

The above evidence, replicable across the world's languages, shows that Whorf's error was to assume that English tense is temporally symmetric, like Newtonian time. Montague shared this error.

3.2 Mayan number

Lucy (1992a,b) observes a crosslinguistic distinction in number marking, whereby English obligatorily inflects for plurality all nouns referring to countable entities, animate or inanimate (**two pig*, **two hoe*), but Yucatec Mayan restricts number inflection to animates. Conversely, Yucatec has an obligatory classifier system for all nouns, which is optional in English with count nouns (*a litter of kittens, a bunch of bananas*) and obligatory just with mass nouns (**a water*). Lucy claims that absence of obligatory plural marking in Yucatec inanimate count nouns correlates with the obligatory classifier phenomenon with these nouns indicates that they are conceived as mass nouns (1992b: 73*f*.). He then tests the salience of number in tasks of describing and (nonverbally) matching pictures of sets of objects. The results show near-identity in English and Yucatec speakers' treatment of animates as well as mass nouns, but a strong Whorfian effect for inanimate count nouns: Yucatec speakers were much less attentive to cardinality than English speakers, and conversely much more attentive to the materials out of which the objects are composed (which is the basis of the classifier system).

Lucy's experiment leaves little doubt that a difference in cognitive processing correlates with grammatical type. However, there are still many possible explanations other than his claim that what English speakers conceive as inanimate count nouns are mass nouns for Mayans. Because the tasks all rely on conscious attention to the contents of STM, a plausible model of Lucy's effect could appeal to the presence or absence of phonetic indications of number as a sufficient source of the difference.

One way to decide whether the difference is conceptual or phonetic in nature is to see if number marking may be present *covertly*. Many recent syntactic proposals argue that number inflection is always projected in noun phrases. This issue is complicated not just by animacy, as Lucy recognizes, but also by definiteness and by Case, thus there is a rich set of possible languages, all of which mark number covertly, but which mark it obligatorily under a variety of conditions holding of the linguistic context. Italian is a language where definiteness depends on both number and case (Longobardi 1994). Determiners are either optional or absent in non-argument positions (9); argument positions generally require determiners (10), with the exceptions in (11), (Benincà 1980):

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[2] Aspectual quantification is affected by transitivity, e.g. the inverted version of (10b) is not possible with an aux:

i-a. Ńdị dibịà ju-ru ébe ahụ̀n.
those seers full-ASP place that
'That place is full of seers'

b. *Ńdị dibịà {gà /nà} e-jú ebe ahụ̀n.
those seers aux ASP-full place that

This sensitivity of aspect to surface syntax illustrates the thesis of Verkuyl, already mentioned (§1.1).

(9)a. Gianni è (un) medico. predicative
b. di buona famiglia predicative
c. caro amico vocative
d. Maledetto tenente! exclamative

(10)a. *(Un/il) amico di Maria mi a telefonato.
b. Ho incontrato *(un/il) amico di Maria ieri.

(11)a. Bevo sempre vino. singular mass nouns
b. Mangio patate. plural count nouns
c. Non c'era studente in giro. singular count nouns under sentence negation

(11) shows that definiteness, as expressed by a determiner, depends on number (or quantification, cf. (11c)) in Italian, a language which inflects all nouns for number. Now consider some Ìgbo data.

(12) Òké tà-ra ọ́kpà (áhụ̀n).
rat chew-ASP maize that
'A rat/some rats chewed on/ate up the corn in question' '…is/are corn-fed'

(13)a. Òké ahụ̀n tà-ra ọ́kpà áhụ̀n.
rat that chew-ASP maize that
'The rat in question chewed on/ate up the corn in question'

b. Òké ndị ahụ̀n tà-ra ọ́kpà áhụ̀.
rat those that chew-ASP maize that
'The rats in question chewed on/ate up the corn in question'

The examples show that neither definiteness nor number marking is obligatory in Ìgbo in argument positions, unless there is overt marking of definiteness: a definite noun must be marked plural unless it is singular. Conclusion: the category of number is covert in Ìgbo, like definiteness in Italian.

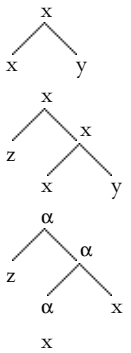
4. Open-class categories

4.1 Whorf's view

Whorf's most detailed look at lexical items—his appendix to Voegelin's (1940) Shawnee morphology—is also compatible with universal grammar. Whorf claimed that some languages could form "all or nearly all of the vocabulary" from a few roots. He called this property "oligosynthesis", and assumed it is lacking in English (1958: 12). However, both the generative semantics tradition of the 1970's and lexical syntacticians of the 90's have argued that seemingly monomorphemic lexical items in English are actually composed of numerous independent syntactic items ('heads'). Here again, I believe, Whorf's intuition about native American languages were essentially correct, but his assumptions about English or (Indo-European languages) were misled, probably by traditional grammar.

4.2 A not un-Whorfian "View from Building 20"

Two syntactic relations, four lexical categories, six (main) morphosyntactic patterns (cf. Hale 1995b).



	English	Navajo	Warlpiri	Ìgbo	Lardil	Salish
head + complement	V	V	V	V	V	X
subject + predicate (internal subject) head + complement	P	P	P	V	V	X
subject + predicate (external subject[3])	A	V	N	V	N	X
head (no relation)	N	N	N	N	N	X

[3]The "mediating category" α implicated in the external subject configuration is dispensable in a framework which distinguishes maximal projections in the lexicon (e.g.. Kayne 1994). The irreducible difference between the internal and external subject configurations is that only the former has a head-complement relation (Hale and Keyser 1994).

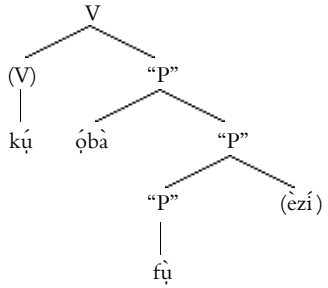
However, the restriction described in §1.3 shows that the distinction between "V" and "A", which English makes overtly, is also made in other languages (Ìgbo, Navajo…), thus covertly. Hale et al. 1994 cite similar evidence for the distinction between "V" and "P", and "P" and "A", in Ìgbo. Unlike V, which does not causativize, P is inherently either causative (14c) or else agentive (14a). A has both patterns (15b) and (15c), and in addition is inherently stative (15a).

(14)a. Ézè fụ-rụ a-fụ́.
out-ASP NOM-out
Ézè exited'

b. Ézè kụ́-fụ-rụ ọ́bà (n'ezí).
knock-out-ASP gourd at yard
Ézè knocked a/the gourd into/out of the yard'

c. *Ọ́bá à kụ́-fụ-rụ (n'ezí) (à-kụ́-fụ).
gourd this knock-out-ASP at yard NOM-knock-out
['This gourd got knocked into/out of the yard']

(14')

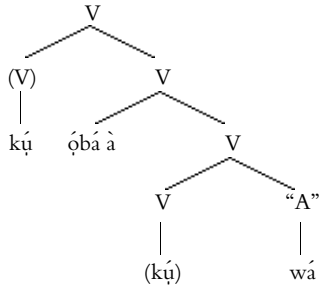


(15)a. Ọ́bá à wa-ra a-wá.
gourd this broken-ASP NOM-knock-broken
This gourd is broken'

b. Ézè kụ-wa-ra ọ́bá à.
knock-out-ASP gourd this
Ézè broke this gourd (by knocking it)'

c. Ọ́bá à kụ-wa-ra a-kụ́-wa.
gourd this knock-broken-ASP NOM-knock-broken
'This gourd got broken (by knocking)'

(15')



The representations in (14') and (15') assume that affixation of the one and only lexical causative operator (V) is restricted only by definitional propeties of the category heading the structure ("P" or "A"). For example, the failure of 'sleep' and 'cry' to causativize lexically in any natural language follows from the necessary absence of a subject position in the lexical representation of these items.

The "inflected P" of Hopi in (16) is directly comparable to the Ìgbo item in (14a)

(16) 'Ita-na paasa-t' a-w-ni. (Hopi, Jeanne 1978, cited by Hale 1995b)
our-father field-ACC 3S-to-FUT
'Father will go to the field'

4.2 Mayan space

An Whorfian interpretation of open-class category data is being tested in the Cognitive Anthropo-logy Research Group at the Max Planck Institute for Psycholinguistics in Nijmegen (MPI). Levinson (1991) claims that speakers of Tzeltal Mayan do not untilize a "$2^1/_2$D" egocentric, stereoptic sketch of visible surfaces (Marr 1982), supposedly congruent with English spatial descriptions as in (17a), but rather an extrinsic, or landmark-oriented system in which position cannot be linguistically encoded independent of shape and substance classifiers, cf. (17b) and the immediately following comment.

(17)a. The cat is on the mat.

b. Pachal ta mexa boch. (Tzeltal, Levinson 1991)
sitting.bowl.like at table gourd
'The gourd is on the table'

> Thus, the 'natural' English strategy of presupposing the structure of the Figure, but detailing the nature of the Ground (i.e. the relation and the relatum) so that the Figure may be found within it, is not followed in the Tzeltal case at all. Instead, Tzeltal takes the strategy of specifying in great detail the Figure, while presuming the general nature of the Ground—the strategy ineffect is: 'look for something of *exactly this* shape and disposition, which has some unspecified stereotypical relation to the relatum, if a relatum has been provided (Levinson 1991: 10)

Now, there are at least two steps in the Levinson's deduction which still need making. First of all, do some languages possess shape and substance classifiers which others lack? And, is the use of classifiers obligatory? A negative answer to either will undermine the Whorfian thesis. In fact, English has abundant evidence of such classifiers in locative expressions. The first observation is that there is no lexical verb in the English example (17a), but when a verb is used, a classifier effect is obligatory, although (as in Tzeltal) the choice of classifier is partly independent of the object, i.e. for some objects in some precision states there is a degree of choice among classifiers, cf. especially (18b).

(18)a. The pencil is laying/*standing/*sitting on the table.

b. The blender is laying/standing/sitting on the kitchen table.

c. The cake is *laying /*standing/sitting on the kitchen table.

(19)a. John Harvard's statue *lies/stands/*sits in Harvard Yard.

b. "John Harvard" *lies/*stands/sits facing Johnson Gate.

(18a) suggests that inanimates, i.e. things which lack inherent motion, are obligatorily classified by shape by a lexical verb (not a copula), and (19b) shows that animacy is indeed relevant. Therefore, the difference between Tzeltal and English may reduce to the conditions under which a lexical verb is required in a locative predication. Now this is a categorial difference, entailing a lexical one, but it is not necessarily a difference in the interface between the language and vision modules of the brain.

Since Levinson's initial restatement of the Whorfian thesis, the MPI researchers have tested the spatial information accessed in verbal tasks by monolingual speakers of a wide range of languages. A typical test (or "space game") has one speaker describing a fixed array of objects (e.g. a matrix of cards depicting spatially ambiguous scenes) in coaching another speaker, who cannot see the array, to replicate the arrangement by assembling unpositioned pieces. Last summer, at the cognitive science workshop at SUNY Buffalo, the MPI group presented preliminary statistics showing that performance on such tests differed significantly across language types.[4] Accepting these results, the question is what they tell us about the role of language in spatial cognition.

Minimally, a difference in lexical items entails a difference in processing. But conceptual structure need not be involved, only STM: the module which allows conceptual representatons to be placed in conscious attention. Furthermore, in order to implicate conceptual structure, it is necessary that the inventory of lexical categories differs across languages, e.g. between Tzeltal and English, but the above discussion already casts doubt on this.

5. Translation, metalanguage, conclusion

In summary, I will compare my views with Lakoff's. Lakoff (1987: xi) advocates an 'embodied' mind, i.e. one in which "imaginative aspects of reason—metaphor, metonymy and mental imagery" are central (see also Lakoff and Johnson 1980). One motivation is 'humanist' in a remarkably literal sense shared by Searle, Putnam and other late-Wittgenstinneans:

> If we understand reason as mechanical—the sort of thing a computer can do—then we will devalue human intelligence as computers get more efficient. (Lakoff 1987: xvi)

Lakoff criticizes the computer metaphor for reason as an ideology which is part of popular culture in the industrialized world: AI is part of authoritarianism and the military-industrial complex (which, indeed, has provided most of the funding for linguistics and cognitive science, in recent decades!).

Lakoff's evidence of cognitive relativity, supporting the embodied mind, is limited to lexicaliation. After discussing an example from Mixtec very similar to Levinton's Tzeltal case, he concludes:

> Do the conceptual systems of Mixtec and English differ with respect to conceptual relations? Well, it depends on how one stands on the polysemy issue. If one insists upon an explanation for systematic polysemy in a language, then the answer is yes. English has a system of prepositional relations that Mixtec lacks, and Mixtec has a very rich mapping from body-part concepts onto spatial locations that English has only a hint of (e.g. 'in *back* of').
>
> On the other hand, if one's criterion is sentence-by-sentence translation that preserves truth conditions, then the answer appears to be no. The question is whether one is interested in explanations ofr polysemy rather than mere lists of meanings, and whether one is interested in *understanding* rather than mere truth conditions (Lakoff 1987: 316.)

However, the assumption that one must choose between lexical and sentential representations of meaning is not necessary. For example, Bach and Jackendoff allow both lexical items *and* conceptual structures to play a role in cognition. The question is rather: do relativistic effects occur in both domains? Here, Lakoff already admits that the answer is no, only individual lexical items are relativistic, albeit richly so, and this is accordingly the modern residue of Whorfianism.

Thus, the answer to the question in the title of this paper is yes, Whorfianism can be modernized, and—like apparently everything else in the world, it's going to be—but, as Max Weber observed, modernization of the world entails a large dose of disenchantment. Perhaps the intellectual and political challenges of the process will be sufficient consolation.

[4] Although I was kindly shown these results in Nijmegen shortly before the workshop, they are not yet published.

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