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AUTHOR Stewart, Richard D.
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ABSTRACT

The review of research presented here examines studies based on Benjamin Whorf's hypothesis of linguistic relativity, which states that cultural traditions encourage certain types of thinking and are reinforced by structural characteristics of particular languages. Studies were selected for inclusion if: (1) the subjects were learners and speakers of languages from language families unrelated to their first languages; and (2) analysis was of semantic/cognitive/perceptual effects using the Whorfian hypothesis as a theoretical base. Both qualitative and quantitative studies are included. Each study is examined and discussed separately. It is concluded that contextually based, multi-level research methods that view the Whorfian hypothesis and its relationship to semantic transfer as problems of discourse are most appropriate, and that discourse-based, naturalistic research would also be of value. Contains 32 references. (MSE)

Linguistic Relativity and Semantic Transfer: A Research Review

Richard D. Stewart

Indiana University

Introduction

Language transfer is a hotly debated and variously defined concept among linguists, psychologists and language teachers alike. The following definition by Odlin (1989) is relevant to the present research review: "Transfer is the influence resulting from similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired" (p. 27). In the present review, such influence relates to cross-linguistic effects that arise in the area of propositional semantics (the study of meaning in statements), or semantic transfer.

A basic issue in the study of semantic transfer in individuals learning a foreign or second language is the relationship between language and thought. As Odlin (1989) asserts, "expressions such as 'learning to think in French' reflect a common belief that learning a particular language requires adopting a worldview which, to some extent, is unique to that language" (p. 71). This implies that if second or foreign language learners do not "think in French," for instance, they must still be using their first language as a basis for cognitive activities.

How closely language and cognition are related is still largely an open question (cf. Whorf 1956; Foss & Hakes 1978; Lakoff 1987). Similarly, it is also an open question as to how much native language semantic structure influences second language performance. But some research indicates that cross-linguistic differences in structure do reflect variations in thinking (cf. Bloom 1981; Regan & Tan 1988). Thus a

review of the literature that analyzes such differences is appropriate. In the present discussion of research on linguistic relativity and semantic transfer, both qualitative and quantitative studies are examined.

Linguistic Relativism and Language Learning

Despite evidence for the universality of certain reasoning processes (cf. Hamill 1978; Hutchins 1981), cross-cultural differences in cognition do seem to exist, and one source of such differences is linguistic variation. Many writers have asserted that intercultural variations in thought processes are somehow reflected in language differences. The following excerpt from Whorf (1956) contains some of the strongest claims for linguistic determination of cognitive processing:

> The background linguistic system (in other words, the grammar) of each language is not merely a reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual's mental activity, for his analysis of impressions, for his synthesis of his mental stock in trade. Formulation of ideas is not an independent process, strictly rational in the old sense, but is part of a particular grammar, and differs, from slightly to greatly, between different grammars. We dissect nature along lines laid down by our native language. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds---and this means largely by the linguistic system in our minds (pp. 212-213).

Parts of this passage reflect the so-called strong relativist position (or strong form of the "Whorfian Hypothesis," after Whorf [1956]). Yet, as many researchers have observed (cf. Berlin & Kay 1969; Rosch 1973; Mervis & Roth 1981), this view is beset with problems.

For instance, if individual languages (and cognitive systems) were as radically different as the strong form of linguistic relativism suggests, learning a second language might often be impossible. But, as Odlin (1989) points out, "while the results of second language acquisition often fall short of what is desired, there are no known cases of an absolute "acquisition barrier" between speakers of different languages" (p. 73). This and other considerations (cf. Rosch 1978; Foss & Hakes 1978) militate against adopting the strong stance on linguistic relativity. But the "weak" form of linguistic relativism is plausible; as the last sentence above from Whorf (1956) asserts, language can have a significant effect on cognition. The literature review to follow will examine several studies that have addressed this influence.

Selection of Studies

Rationale

The review's rationale stems from the need for methodological critiques of much of the existing research on linguistic relativity and semantic transfer. Current methods are almost universally founded on a positivist, reductionist experimental model (cf. Bloom 1981; Au 1983; Kay & Kempton 1984; Liu 1985), or on less than adequately formulated naturalistic or linguistic methods (cf. Hockett 1967; Regan & Tan 1988),

that fail to address language as a holistic, perceptually based sociocultural sign system. In the words of Sherzer (1987), "Language is cultural in that it is one form of symbolic organizaton of the world. It is social in that it reflects and expresses group membership and relationships. Language includes grammar, but goes beyond grammar. As a sign system, language has the interesting property of being both unmotivated and arbitrary and motivated" (p. 296).

Language is "unmotivated and arbitrary" because it is a formal, abstract system that varies from culture to culture, and it is "motivated" in that individuals experience its meaning and appropriateness in real-life socio-cultural contexts. This leads us to the topic of language as discourse. Viewing language not as a set of parts composed of separable phonological, grammatical, semantic and pragmatic elements, but as "the nexus, the actual and concrete expression of the language-culture-society relationship" (Sherzer 1987, p. 296), that is, as discourse, allows for a more accurate analysis of its true function as the embodiment of culture.

As Sherzer (1987) asserts, "Since discourse is a filter, a creator and recreator, and a transmitter of culture, then in order to study culture [and its effects such as semantic transfer] we must study the actual forms of discourse produced and performed by societies and individuals, the myths, legends, stories, verbal duels and conversations that constitute a society's verbal life" (Sherzer 1987, p. 306). Thus discourse is the embodiment of both language and culture and must be examined in large, contextually based samples. Such an approach reveals the interplay of phonology, syntax, semantics and pragmatics---categories that are traditionally separated out in most studies of linguistic relativity and

semantic transfer.

Limitations of Previous Approaches

Previous research in this area has focused largely on grammatical analysis of brief, decontextualized linguistic samples from contrasting languages, for example, English and Chinese (cf. Hockett 1967; Bloom 1981, Au 1983; Liu 1985). Some of this work will be reviewed below in order to show the limitations of such a reductionist approach. In the process, an alternative methodology will be offered, namely, discourse analysis, which provides a more holistic and thus more valid and representative way to study linguistic relativity and semantic transfer as facets of larger cross-cultural gestalts or systems.

Most studies of the linguistic relativity/semantic transfer interface have typically centered on grammar as conditioning or determining thought, perception and world-view. But as Sherzer (1987) points out, grammar merely "provides a set of potentials. [And] since these potentials are actualized in discourse they can only be studied in discourse" (p. 306). In other words, complex grammatical phenomena such as natural categorization systems only reveal their full meaning and expressive potential through real-life oral or written discourse.

Even pioneers in the study of linguistic relativity and determinism such as Boas (1911) and Sapir (1921), although insisting on the collection of complete texts in their three-fold studies of grammar, texts and dictionaries, did not typically analyze discourse per se. Instead, they saw texts as providing linguistic and ethnological data in the form of fixed, inscribed cultural artifacts, thus neglecting text-context or

language-in-use relationships.

In contrast, discourse analysis examines actual instances of language-in-use, and its methods are best defined in terms of such instances:

> Discourse includes and relates both textual patterning (including such properties as coherence and disjunction) and a situating of language in natural contexts of use. Context is to be understood in two senses: first the social and cultural backdrop, the ground rules and assumptions of language usage; and second, the immediate, ongoing and emerging actualities of speech events (Sherzer 1987, p. 296).

Taking a discourse analytic approach to the interplay of language and culture allows one to reconceptualize the notion of linguistic relativity as it relates to semantic transfer and other areas of study. Instead of asking such questions as does grammar reflect culture, is culture determined by grammar or are there isomorphisms between grammar and culture, one starts with discourse, which "creates, recreates, modifies and fine-tunes both culture and language and their intersection" (Sherzer 1987, p. 296). Advantages of the discourse analysis method will be discussed below after a critique of some recent work employing more traditional approaches.

Foundational Assumption

The major theoretical assumption of this review is a paraphrase of the weak form of Whorf's (1956) linguistic relativity hypothesis: "cultural traditions encourage certain types of thinking, and these cultural patterns

are reinforced by the structural characteristics of particular languages." As Odlin (1989) points out, current work in the area of linguistic relativism "illustrates exceedingly well the difficulties of achieving conclusive evidence that supports the relativist position" (p. 73). However, several contrastive studies (Hockett 1967; Bloom 1981; Hoosain 1986; Kay & Kempton 1984; Regan & Tan 1988) illustrate, through a variety of methodologies, some apparent instances of interaction between language and culture and their potential relationship to semantic transfer in second and foreign language learners.

Selection Method

Studies were obtained through a search of the ERIC, PsycLIT and MLA databases. Descriptors used included "linguistic relativity," "semantic transfer," "Whorfian hypothesis," and "B. L. Whorf." After examining the search entries, the following criteria for study selection were established: (1) use of participants who were speakers of languages from unrelated language families (or analysis of language samples involving unrelated language families), and (2) analysis of semantic/cognitive/ perceptual effects using the Whorfian hypothesis as a theoretical base.

Criterion (1) was used out of a desire to review studies where there were major differences between languages analyzed, thus allowing for the possibility of more pronounced differential effects on cognition and semantic transfer; and criterion (2) was based on a desire to review only studies that saw the Whorfian hypothesis as a potentially powerful tool for understanding semantic transfer or cognitive/perceptual effects that bear on semantics. As mentioned above, the review examines both

qualitative and quantitative research.

Qualitative Studies

Ethnolinguistic Study

Hockett, C.F. (1967). Chinese versus English: An exploration of the Whorfian theses In H. Hoijer (Ed.), *Language in culture* (pp. 106-123). Chicago: University of Chicago Press.

Method

Based on the weak version of the Whorfian hypothesis discussed above, and "on the assumption that 'thinking in words' is more apt to be colloquial than literary" (p. 111), Hockett examines various colloquial forms in Chinese and English. "Equivalent" terms from the two languages are analyzed for semantic differences and similarities. Chinese is represented by the dialect of northern Mandarin spoken by educated residents of Beijing. Chinese citations are given in the standard form of transliteration known as "Yale Romanization."

The author compares a series of Mandarin expressions with their English equivalents by first attempting to find correlations between

particular nonlinguistic segments of Chinese culture, and certain semantic features of Mandarin. He then compares these Chinese cultural/semantic correspondences with similar ones in the English-speaking community. For example, with respect to age categories, Hockett compares the English use of cardinal numbers followed by "years old" or "years of age" to the Chinese use of the same numbers followed by the measure *swei*`. Possible matchings of English and Mandarin expressions under various conditions are illustrated as follows---where in English age is given to the nearest birthday:

'zero'	
'one'	yi
'two'	lyang
'three'	san
'four'	sz
. . .	. . .

The author accounts for the lack of exact matching here by defining the meaning of the measure *swei* , which he translates as "number of years during all or part of which one has been alive."

Hockett goes on to say that in either Mandarin or English one can be much more precise in stating a person's age than these most customary expressions allow: "In both languages the age of an infant is usually given

in months, or months and days, rather than by any approximate formula" (p. 113). But he also admits that there are fewer occasions in Chinese culture in which such precision is called for than there are in English culture. This causes many Western scholars, who approach Chinese "with too large a dose of glottocentrism" (p. 113), to pass snap judgments on Chinese habits of age designation and to say things like, "In China [or: In Chinese] you are a year old when you are born" (p. 113). Similar analyses are made of terms related to architecture, horticulture and technology.

The author also analyzes comparative linguistic factors of Mandarin and English such as the handling of singularity and plurality, metonymic expressions for motion and locus, and terms related to time and space. Hockett supplies abundant examples of sentences and phrases to support his arguments about various syntactic/semantic/epistemological differences between Mandarin and English. For instance, in his discussion of the comparative expression of space and time, he gives examples from the two languages to show how, through Mandarin, "the Chinese make use of the linguistic machinery which they have on hand primarily for discussing temporal sequence and separation, in extended senses which are alien to English." He concludes that only some of the Mandarin linguistic forms referring to sequences and processes coincide with what English speakers would interpret as temporal: "When the specific reference is temporal, the usage strikes us as normal; when it is not, it strikes us as alien."

Findings

In discussing his analysis, Hockett asserts, "From a tentative

discussion one can draw only tentative conclusions" (p. 122). Yet he also states that, based on his study, the following generalizations are reasonably well supported in the specific case of Chinese versus English:

1. Languages differ not so much as to what *can* be said in them, but rather as to what is *relatively easy* to say. In this conection it is worthy of note that the history of Western logic and science, from Aristotle down, constitutes not so much the story of scholars hemmed in and misled by the nature of their specific languages, as the story of a long and successful struggle against inherited linguistic limitations.

2. The impact of inherited linguistic pattern on activities is, in general, least important in the most practical contexts, and most important in such goings-on as story-telling, religion, and philosophizing--which consist largely or exclusively of talking anyway. [Thus] some types of literature are impervious to translation (pp. 122-123).

Based on these conclusions, one can reasonably assume that semantic transfer due to differences in cognition between Mandarin Chinese and English speakers is most likely to arise through the "higher" functions of language use such as academic discourse, speculative philosophy, and the like. But the methods used to analyze linguistic relativity in Hockett's study are rather limited in scope, and are also open to questions of validity. These points will be addressed in the discussion section of this review.

Participant Observation/Quasi-experimental Study

Regan, J. & Tan, D. (1988). From observation to research: Tracing back

connections within a culture. Lake Bluff, IL: *LACUS Forum: Proceedings of the Annual Meeting of the Linguistic Association of Canada and the United States* (pp. 528-537).

Method

The study, which the authors admit was pilot-like in nature, used informal observational and quasi-experimental techniques that led to the following hypothesis: "There is a significant, linguistically-based difference between Chinese- and English-speaking readers' abilities to recognize details of and recall two-dimensional visual material." The authors assert that their study once again raises McLuhan's (1962) Whorfian-hypothesis-based proposal that broadly practiced, extensive cultural habits such as "cultural choices made in a writing system extend to other habits and perceptions" (p. 536).

Regan & Tan state that they attempted to work from observation toward "the inner cultural information core" (p. 529) of their participants. They raise the possibility that, mainly because of the unique characteristics of the "geometric-like Chinese character writing system" (p. 529), the visual traits and capacities of native Chinese speakers are different from those of native English speakers: "For thousands of years the Chinese have kept up [a] visual reference feat [through the pictographic nature of their written language] and have succeeded in building a splendid, literate way of life around a separate shape constellation for almost everything they could say" (p. 530).

Step one of the study involved observing a native Chinese-speaking graduate student in Nanjing moving his finger along the palm of his hand

while simultaneously talking about his name. This observation was not pre-planned, but occurred spontaneously as one of the researchers rode on a bike with the subject down a tree-lined street. After the subject and researcher reached a flat area near a lake, the subject took a thin stick and carved his name in the mud, thus demonstrating how his three-character name looked.

After a question-and-answer session with the subject, the archers concluded that the latter had a definite predeliction to transfer Chinese characters to kinetic form through his complex "finger ballet, and that this habit derived from "a cultural habit practiced before schooling" (p. 531). The subject was obviously skilled in decoding and remembering the movements used to create the 40,000-odd Chinese characters, as well as their static forms. This in turn led to a series of questions such as: What is it that the outsider cannot see that this Chinese speaker is seeing? Does such a skill develop a stronger recognition of such shapes in Chinese speakers than in others, a greater ability to hold such shapes in memory, to reproduce them accurately? and Are there related behaviors?

Further observations of Chinese daily life led the researchers to see that the "finger writing" of their first subject was common among many Chinese speakers in the functional contexts of explaining and thinking about Chinese names and characters. They also observed that their Chinese subjects showed great visual acuity in recalling details of Chinese characters in literary contexts, and great appreciation of the beauty of Chinese characters, often in preference to the esthetic qualities of accompanying Chinese paintings.

Regan and Tan then conducted an out-of-context analysis of "character-like shapes used in Western aptitude tests claimed to be predictive of success in certain professions and activities" (p. 533) such as dentistry, a field that requires great acuity in discriminating among visual details. The authors also studied nonverbal intelligence-type tests. From this data they devised pilot instruments to test (a) awareness of differences in a sequence of shapes, (b) recall of differences and (c) capacity to reproduce them.

These instruments were used to test: (1) Chinese- and non-Chinese-speaking students' interpretations of various "fused" forms of Chinese characters that had been combined to create new meanings; for instance, a composite character representing intimacy (as close as milk and water) was created from characters for milk and water; (2) Chinese-speakers' speed in detecting similarities and differences in compact, character-like geometric shapes; and (3) Chinese-speakers' association of Chinese orthographic forms with culturally imbedded prejudices against women.

Findings

The authors argue that their observations and test results demonstrate that "the Chinese special interest in the look of words is widespread and deeply ingrained in a myriad of daily behaviors that go beyond words themselves" (p. 530). They also conclude that there exists a wide range and variety of "shape interests" that differ markedly between Chinese and American English speakers:

The observational evidence shows that the Chinese have pushed to

> an ultimate end one of the mind's ways of representing. Elaborating the visual, the Chinese [as opposed to American English speakers] have created a system which displays a visual lexicon, and showed what can result from extrapolation of one of the human semiotic opportunities, one of the mind's ways of building meaning (p. 537).

The authors add that their study supports the notion of "feedback interrelationships" existing between a speech community's imbedded cultural/linguistic practices and the behavior of members daily recruiting those practices.

The authors also discuss research on the relatonship between certain types of brain damage in Japanese subjects and their capacity to process sound-based versus icon-based components of the Japanese writing system (Sasanuma & Monoi 1974). The results of this study indicated that such differential processing may be related to distinct areas of the brain: "The dual nature of orthographic systems in Japanese serves as a useful indicator in distinguishing the phonologic and semantic types of impairment" (Sasanuma & Monoi 1974, p. 632). Regan & Tan assert that such evidence supports the notion that their own results may have a neurophysiological foundation: "a logographic orthography [such as Chinese] experienced and practiced in a mass culture [may] have neurological implications" (p. 536).

Quantitative Studies

Quasi-Experimental Study

Bloom, A. H. (1981). *The linguistic shaping of thought: A study in the impact of language on thinking in China and the West.* Hillsdale, NJ: Lawrence Erlbaum.

Method

Bloom noted that the Chinese language lacks two linguistic devices possessed by all Indo-European languages: "the counterfactual" and "entification." Counterfactual expressions commit the speaker to the falsity of the proposition in which they appear: for example, "If John had gone to the library, he would have seen Mary" (Bloom 1981, p. 14). Here the subjunctive indicates that John did not go to the library and did not see Mary.

Bloom compared such English subjunctive coding of counterfactuality to counterfactual coding in Mandarin Chinese, which has no linguistic label corresponding to the subjunctive form. To make statements contrary to fact in Mandarin one can juxtapose clauses with no special marking:

Zhangsan he jiu, wo ma ta

(= literally, "Zhangsan drinks wine, I scold him," but with a counterfactual implication in context) (after Comrie 1985).

Mandarin has other forms that express possibility, hypotheticality, or probability, but constructions such as the above are most relevant to Bloom's study.

Concerning entification, Bloom asserts that in English, it is used to express ideas while avoiding commitment to their truth value. When an event, action, property or condition is "entified" (e.g., from "approve" to

"approval"), the resulting nominal form is "truth-commitment-free" (Bloom 1981, p. 41): for instance, "approval" can be discussed without worrying about whether or not something has been actually approved. Further, an entified form can be embedded in a more complex statement that is also hypothetical and removed from reality. In contrast, in Chinese, entification has not been used traditionally, and its use would be unnatural if forced, as in English translations of Chinese texts.

In Bloom's view, counterfactuality and entification are critical in expressing abstract hypothetical thinking that is not tied to the actual presence of a real-world object or event. And if the weaker form of the Whorfian hypothesis discussed above is correct, it follows that Chinese-speakers may have difficulty engaging in abstract thinking, because their language lacks appropriate devices for representing such thinking.

Bloom sought to test the weaker version of the Whorfian hypothesis. He gave American subjects an English paragraph containing either counterfactual or entification expressions, and Chinese subjects a paragraph with the same contents written in Mandarin (in forms similar to the one discussed above). Each paragraph was followed by a question aimed at assessing subjects' comprehension of its contents. The author reasoned that if the weaker form of the Whorfian hypothesis is correct, English-speakers would outperform their Chinese-speaking counterparts in this question-answering task, because the direct linguistic labels for counterfactuality and entification in English would help the Americans think in a hypothetical, detached way.

Findings

As expected, Bloom found that his English-speaking subjects consistently demonstrated better comprehension of the given paragraphs than did their Chinese-speaking counterparts: for example, in the initial phase of his study, only 7% of the Chinese-speakers gave counterfactual interpretations (in Mandarin) of a story (written in Mandarin) that was presented to them, whereas 98% of the English speakers did so (in English) to the same story (written in English).

In phase two, the author asked Chinese-speaking bilingual students and non-students to respond to a different version of this story written in English. The non-students, who had provided about 6% counterfactual responses (in Mandarin) to the first version of the story three months earlier, this time gave 86% counterfactual responses (in English) to the second version. This 86% rate was significantly higher than the 50% counterfactual response rate of a comparable group of Chinese-speaking non-students writing in Mandarin.

Bloom felt the significant difference between Chinese-speaking non-students' response rates to version two in Mandarin (50%) versus English (86%) to be the most compelling support for the weak version of the Whorfian hypothesis: "For many, if not most, of the bilinguals in the study, the counterfactual mode of thought remains associated in their minds with the English linguistic world, activated more readily when cognitive processing is elicited by that world than by their native Chinese" (Bloom 1981, pp. 31-32). In other words, Bloom argued that his bilingual subjects' tendency to think counterfactually depended significantly on whether or not the language they were using possessed a linguistic construction for counterfactuals.

Quasi-experimental Study

Au, T. K. (1983). Chinese and English counterfactuals: The Sapir-Whorf hypothesis revisited. *Cognition*, 15, 155-187.

Method

Au performed a series of five studies designed to replicate the findings of Bloom (1981) discussed above. She challenged Bloom's results on three grounds: (1) his stimulus materials, (2) his research procedures, and (3) his descriptions of the use and expression of counterfactuals in Chinese. As a native Chinese speaker, Au found the Chinese texts of the original counterfactual stories used by Bloom to be unidiomatic and thus difficult to comprehend, and rewrote them to make them read better. These rewritten versions were called by the same names as Bloom's versions and were used along with the original Bloom stories.

The author began with Bloom's hypothesis that the absence of a distinct counterfactual construction in Chinese may be related to Chinese speakers' difficulty in reasoning counterfactually. In three of her experiments, Au did not use monolingual Chinese speakers as subjects, but rather Chinese-English bilingual high school students who had 10 or more years of instruction in English as a second language; in another she used American high school students; and in her last study, she used fourth through seventh-grade children with four to seven years of ESL respectively, whom she termed "nearly monolingual."

Findings

Au's results differed markedly from those of Bloom. Her Chinese secondary school subjects had counterfactual response rates for her revised story in English and Chinese ranging from 93% to 100% and from 86% to 89% for the original story used by Bloom (1981). In her study with American English-speaking high school students, Au's findings showed that they performed significantly worse on the original Bloom story (72%) than on her revised story (97%), unlike her Chinese-speaking subjects. There was no significant difference between the counterfactual response rates of the author's English- and Chinese-speaking subjects on the revised story versus the original Bloom story. In the author's final study, 85% of her "nearly monolingual" fourth and seventh grade subjects responded counterfactually to a simplified version of her revised Bloom story. Further, Au found that her elementary level subjects' ages were positively and significantly correlated with correct response ($r=.25$, $p < .001$). Au recognized that this seeming developmental pattern in her elementary school subjects could be attributed not only to age, but also to years in school, mastery of Chinese and English, or a combination of such factors.

Nonetheless, generally speaking, Au's results showed that Chinese speakers have little trouble in correctly interpreting counterfactual stories, especially those that are idiomatic. Based on these results, Au asserts that "mastery of the English subjunctive is probably quite tangential to comprehension of a counterfactual story in Chinese" (p. 182). She concluded that her findings provided no support for the Whorfian hypothesis at either the lexical or the syntactic level.

Discussion

Research on the Whorfian hypothesis and its potential relationship to semantic transfer has been limited to a few cognitive areas---memory, logical inference and judgments of similarity. Until the pioneering work of Bloom (1981), Au (1983) and Liu (1985), there had been no attempts to study the effects of linguistic categories on reasoning and the linking and separating of elements of reality. But even these latter "tests of the Whorfian hypothesis have been devised in a way that reflects the concern of experimenters to work with definable independent and dependent variables, [and] there is a risk in this of a narrowness that omits most of Whorf's original concepts" (McNeill 1987, p. 179).

Such narrowness is demonstrated in the research reviewed above. The limited approach of analyzing isolated lexical terms or phrases (Hockett 1967; Regan & Tan 1987) or decontextualized stories (Bloom 1981; Au 1983) that are atypical of the speech communities involved fails to address the issues originally brought up by Whorf (1956). Such methods also fail to provide a thorough analysis of semantic transfer effects in L2 or foreign language learners.

The key element of Whorf's hypothesis lacking in the above studies is *the relationship of language to world-view*, which in turn relates to semantic transfer. As McNeill (1987) points out, the Whorfian hypothesis makes three interrelated claims about habitual thought in speech communities:

1. *Linguistic determinism*: The grammatical and lexical patterns of

language are transparent and projected onto reality, and this guides habitual beliefs and attitudes about reality.

2. *Linguistic relativity:* If one language has a certain pattern and associated meaning and a second language has a contrasting pattern and associated meaning, the projections onto reality of the people who speak these languages will be different in ways predictable from the linguistic pattern contrasts.

3. *World view*: Linguistic patterns embody a world view, or model of the world. This embodied model constitutes a distinctive thought world. It is accepted by speakers as the construction of the world. Thus the culture reaches into the habitual thought patterns of its members (p. 178).

Of these three, the determinism and world-view claims are more basic, and for the reasons given below, the world-view claim should be considered as primary.

An important conclusion arising from Whorf's world-view claim is that languages can vary in form in certain respects but not necessarily project different models of reality. Thus the same cognitive models can be embodied in different forms in two languages, and according to the Whorfian hypothesis, the effects of these different forms on thought should be the same. This argument eliminates a group of seeming counterexamples to Whorf's hypothesis: "Between French and English, for example, are many differences of form. These differences, however, do not necessarily lead to different habitual thought-patterns unless they also embody differences of world-view. For this reason, tests of the Whorfian hypothesis should begin with claim number three [above, namely, that

linguistic patterns embody a world-view]" (McNeill 1987, p. 179).

Besides locating contrasts in form between languages it is also necessary to show that, through these forms, the given languages embody different world-views. Thus the Whorfian hypothesis needs to be tested in three steps, corresponding to the priority order of Whorf's tenets:

1. Identify an aspect of world-view.
2. Determine specific linguistic patterns that embody this world-view.
3. Ask whether these patterns and the associated world-view are included in subjects' interpretations of reality. If posing this question proves impossible, then test memory, perception, reasoning, or whatever else the clever experimenter [or qualitative researcher] can devise, that appears to be a sensitive reflection of interpretations of reality (McNeill 1987, p. 197).

Previous research on Whorf's hypothesis such as that of Hockett (1967), Regan & Tan (1987), Bloom (1981) and Au (1983) discussed in this review, has typically jumped right to number three (above) and ignored numbers one and two. Thus a speech community's broader "cultural models" (Quinn 1987) as embodied in its linguistic forms and associated cognitive schemata, are ignored.

Hockett Study

For example, Hockett's study, although informative about structural details of differences between Chinese and English terms and natural categories, fails to do justice to the sociocultural foundation of these linguistic forms by analyzing them out of the context of natural discourse. As Greenberg (1967) states regarding this study, "[it seems] to exclude

systematic semantics from language, or at least from linguistics" (p. 250). In other words, Hockett fails to see the linguistic forms he analyzes as aspects of a larger gestalt or system of meaning, that is, a cultural model or world view.

In contrast, adopting a more holistic or discourse-oriented approach would have given Hockett a broader perspective on how the linguistic categories he examined relate to the larger cultural network of Chinese semantics. Such an approach would have moved Hockett's analysis from the realm of structure (lexicon and grammar) to the dynamic realm of performance, in which linguistic forms are realized and most powerfully represented: "It is in verbally playful and artistic discourse that we find language turned on to its fullest potential and power, possibilities inherent in grammar [and lexicon] made salient, potentials actualized. Whorf's concept of 'fashions of speaking' goes beyond grammar [and lexicon] to include style, and some of his examples [e.g., 1956, pp. 148-156] include forms of discourse" (Sherzer 1987, pp. 296-297).

For instance, Hockett could have couched his analysis of Chinese versus English age category expressions (discussed above) in the context of discourse samples from native speakers of both languages in order to give a more complete picture of the meaning-making potential of these terms. As Sherzer (1987) asserts, "optional grammatical categories [such as expressions designating age] provide speakers with conscious or unconscious decisions, choices, ways of expressing meaning which are actualized in discourse" (p. 297). Such categories are often expressive of long-standing cultural predelictions and traits and can only be fully represented in the context of real-life speech or writing.

Bloom and Au Studies

Similarly, the studies by Bloom (1981) and Au (1983) reviewed above are extremely restricted in scope, because they attempt to test a particular kind of cognitive process, namely counterfactual thinking, in relation to a limited vocabulary. Concerning such experimental studies, Singer (1967) asserts, "the Whorfian hypothesis says much more than that, and for [research that is] relevant [to the broader implications of the hypothesis], you have to have constructs, both on the cultural and linguistic side, that are far more comprehensive and refer to more phases of culture than do these limited experiments" (p. 269).

A more direct approach to the problem, "whether it be construction of the Whorfian kind of typologies [i.e., the broad, data-based cultural/linguistic typologies in Whorf's (1956) papers] of different thought-worlds, or some other type of construction that at least has a rich content in relation to different cultures [in this case Chinese and Anglo-American] and different languages" (Singer 1967, p. 269) is in order. Such a methodology should involve discourse-based ethnography whereby the researcher "concentrates upon activities in a society, describe[s] all that goes on in these activities, both linguistic and nonlinguistic, and view[s] the two as different kinds of elements within one and the same system. This sort of [approach] gets us much closer to a world-view of a people than any amount of 'grammaticimancy' [i.e., attempts to predict or generalize about language/culture relations based on limited grammatical analyses such as those discussed in this review]" (Lounsbury1967, p. 270).

In contrast to the approaches of Bloom and Au, a detailed discourse or textual analysis comparing, for example, hundreds of newspaper editorials in Chinese with hundreds of editorials in English "might establish---or disconfirm---that counterfactual expressions are indeed rarer in Chinese discourse" (Odlin 1989, p. 75). And such comparative discourse analytic research might conceivably work for other aspects of the Whorfian hypothesis as well, such as the relationship of Whorf's concepts to semantic transfer.

Regarding semantic transfer in Chinese L2 or foreign language learners of English, analysis of discourse-in-context could reveal phenomena such as problems with counterfactual thinking over a long period of time (e.g., in a videotaped longitudinal study of Chinese-speakers using their L1 and English to discuss philosophical topics), which might affect their acquisition of English counterfactual expressions, as Bloom's (1981) results would have us believe. As Odlin (1989) points out, "while the results of Bloom's investigation are not conclusive, they do suggest intriguing implications for the study of transfer" (p. 75). And using a more naturalistic, ethnographic/discourse analytic methodology would address these implications more adequately than the reductionist techniques discussed above.

Other Problems with Bloom and Au

Another difficulty with studies involving both Chinese and Indo-European languages such as those of Bloom (1981) and Au (1983) is the Western bias toward viewing all languages as sententially based. In the case of Chinese and many other ideographic languages, the word, and not the sentence is the pivotal structural basis of the linguistic system.

Classical Chinese views of language, which continue to have a powerful influence on modern Chinese usage, "fix the word as the basic unit. They think of a word as having a scope---the part of reality it selects. They pursue an interest in how stringing or combining words affects this scope. They do not pick the sentence out as a distinctly structured thing. They never specifically [identify] sentence strings as truth-bearing strings" (Allison 1989, p. 82).

Thus the Bloom and Au analyses, being based in sentence-oriented Western modes of thought about semantics and semantic transfer, ignore a vital aspect of Chinese linguistic consciousness. And this issue needs to be addressed in any future work on linguistic relativity and semantic transfer among Chinese ESL learners, especially when complex linguistic forms such as the counterfactual are involved. As Celce-Murcia and Larsen-Freeman (1983) note, the syntax of English hypothetical and counterfactual expressions is an area of great difficulty for ESL learners: "The semantics of conditional clauses [such as counterfactuals] are subtle and hard to understand even for native speakers. ESL/EFL students need a good grasp of the English tense system as well as the modal auxiliaries before they can cope with the full range of conditional sentences in English" (p. 340). Some of this difficulty is probably related to the inherent difficulty of the English grammatical system, "but some of the difficulty may be related to [syntactic/semantic/cultural] differences between languages such as English and Chinese. If borrowing transfer [i.e., the influence an L2 has on a previously acquired language] can occur, substratum transfer [i.e., the influence of a source language, typically the native language, on the second language] is also conceivable" (Odlin 1989,

p. 75). And, based on the notable differences between languages such as Chinese and English, only some of which were discussed above, such substratum semantic effects are sure to be present and discernable through the research methods suggested in this review.

Regan and Tan Study

This study too employed methods that were inadequate to the task of providing evidence to support or refute the Whorfian hypothesis. Although admittedly a pilot study, Regan and Tan's investigation would have been inappropriate to analyzing Whorf's hypothesis even if it had been more thorough-going. As did the other researchers in this review, Regan and Tan adopted a reductionist stance toward the culture/language interface and the Whorfian hypothesis by using a largely quasi-experimental design. Studying the complex issue of whether there is "a significant difference between the abilities and interest of native Chinese and English readers in noticing details of and recalling two-dimensional visual material" (p. 528) requires a more context-based, ethnographic methodology. To quote Singer (1967) again, "the Whorfian hypothesis says more than that [i.e., what is addressed in experimental studies], and for [research that is] relevant [to the broader implications of Whorf's hypothesis] you have to use constructs, both on the cultural and linguistic side, that are more comprehensive and refer to more phases of culture than do these limited experiments" (p. 269).

In stating that they worked from an initial observation about a subject's overt sign-making behavior to "the inner cultural information core" (p. 529) of their Chinese-speaking participants, the authors make a bold claim. This kind of assertion needs to be approached through a

holistic research method that addresses the long-standing modes of thought and culture that contribute to "the Chinese mind" (Allison 1989). Such methodologies can be found in the literature on discourse analysis (e.g., Van Dijk 1985) and ethnography of communication (Saville-Troike 1982).

For example, Hullen (1990) uses discourse analysis in examining certain types of speech acts, to discern which quantitative share each one of them occupies in a large sample of classroom conversation. This approach could be used in a study such as that of Regan and Tan to examine comparative use of visual imagery, terms related to visual perception and the like in native English and Chinese speakers' L1 and L2 discourse. In this way a researcher could make connections between participants' relative tendencies to adopt a "visual mode of knowing" and their linguistic/cultural backgrounds. In fact, Regan and Tan do present a casual example of such a tendency in example #3 of their "broader observations" (p. 533) of some Chinese-speaking participants.

Conclusion

As Odlin (1989) warns, "of all areas of contrastive analysis, cross-linguistic comparisons of discourse are probably the most challenging. Discourse analysis involves a wide array of nonstructural as well as structural characteristics, and the boundaries between contrastive discourse and other disciplines such as cultural anthropology are not clear-cut" (p. 48). Moreover, discourse models are necessarily complex and difficult to analyze. But despite a lack of comprehensive

cross-linguistic descriptions, there has been some progress in the study of contrastive discourse: "Researchers now have detailed information about specific cross-linguistic contrasts in requests, apologies, monologues, and other forms of discourse. Such information points to some probable cases of discourse transfer" (Odlin 1989, p. 48).

And, in light of the above review, discourse analysis seems a more desirable approach to the study of linguistic relativity and semantic transfer as well. As discussed above, other approaches have been limited to small samples of speech or text and have addressed only the grammatical and lexical levels of analysis through reductionist and positivist methodologies. These approaches fail to encompass the larger "cultural models" or world-views that Whorf (1956) saw as the starting point for any study of his hypothesis.

The present review argues for contextually-based, multi-leveled research methods that see the Whorfian hypothesis and its relationship to semantic transfer as problems of discourse. In discussing the need for discourse analytic research, Sherzer (1987) points out:

> Both linguists and anthropologists have traditionally treated discourse as an invisible glass through which the researcher perceives the reality of grammar, social relations, ecological practices, and belief systems. But the glass itself, discourse and its structure, the active medium through which knowledge (linguistic and cultural) is produced, conceived, transmitted, and acquired, by members of societies and by researchers, is given little attention (p. 305).

The fields of second language and ESL education could benefit from more

discourse-based, naturalistic studies as well. Thus problems of semantic and discourse transfer as they relate to Whorf's (1956) sweeping linguistic relativity hypothesis might be more adequately addressed and examined.

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