Chinese as a Metonymic Language

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This paper studies the nature of lexical polysemy using Chinese and English dictionaries as sources of data. Two senses of polysemy are distinguished. One sense of polysemy refers to the ratio of polysemic words to the total number of a vocabulary. A second sense of polysemy refers to the differential degrees to which polysemic words develop distinct numbers of senses. The Chinese data cast considerable doubt on the presumption of the universality of a greater degree of verb polysemy in either sense of the term. Indeed the Chinese data point to the opposite conclusion: nouns as a whole are slightly, though not significantly, more polysemic than verbs. We analyzed a representative sampling of 30 highly polysemic words in English and Chinese and concluded that cross-linguistically nouns and verbs are significantly differently structured, with the former tending more frequently to exploit metonymies for sense development and the latter more likely to have recourse to metaphoric mappings for sense extension. Furthermore, based on the fact that dimorphemic nouns in Chinese are more polysemic than dimorphemic verbs and that nouns are distinguished from verbs in being more metonymically structured, we conjecture that the higher degree of noun polysemy in Chinese correlates with a more extended operation of metonymies. We thus hypothesize a distinction between two types of language in terms of the way lexical senses are structured: a metaphoric language and a metonymic language. A metaphoric language, represented here by English, works more often through metaphorical mappings to extend lexical meanings, resulting in a greater degree of verb polysemy. A metonymic language, an exponent of which is Chinese, operates chiefly through metonymic shifts to create lexical meanings, leading to a greater degree of noun polysemy.
Finally, adjectives in English are found to align more closely with nouns than with verbs in patterns of sense distribution, showing symptoms of a noun-adjective language. On the other hand, adjectives behave quite analogously to verbs in the way polysemic senses are structured in falling back predominantly on metaphoric mappings for sense development, showing symptoms of a verb-adjective language. On balance, then, in lexical semantics, exactly as in morphology and syntax, adjectives display characteristics intermediate between nouns and verbs.

1. Introduction

Ambiguity is ubiquitous in language; it exists at every level of processing. At the lexical level, it is common for a word to have multiple meanings. As evidence for the pervasiveness of a multiplicity of meanings, a survey of the first thousand pages (1–1000) of entries from *Longman Dictionary of Contemporary English* (LDOCE) revealed that 39%

of the entries were polysemic and that the average number of senses of these polysemic words stood at 3.02 (the range is from 2.75 for adjectives to 3.33 for verbs).

Lexical ambiguity is of two types, syntactic and semantic. Syntactic lexical ambiguity refers to ambiguity of category, e.g. noun vs. verb. For example, *cash* can be either money in the form of notes and coins or the act of exchanging a check at the bank for the amount it is worth. Semantic lexical ambiguity is of three types.[1] Shifts in application refer to variations on one sense of a word due to pragmatic modulation. Take the word "open" for example. We open doors and open windows and though these actions are very different, we would have to think twice to notice the difference. Polysemy refers to word whose several senses are related: e.g., sweet temper, sweet coffee. Instances of polysemy where there is one lexical item with a family of related senses contrast with homonymy, which refers to words whose senses are unrelated, as in the two senses of *pen* in a *ball-point pen* and a *sheep pen*.[2] Since relatedness is a matter of degree, these three types are not completely distinct, but form a continuum. The line between homonymy and polysemy can be drawn, to be sure, but often at the risk of arbitrariness, since different dictionaries differ markedly on where the line is. Thus within the space of a hundred pages (pp. 251–350) of LDOCE, there are 51 homonyms, of which only 27 are recognized as such by Random House Dictionary of the English Language (RH). A divergence of such an order of magnitude in the way homonyms are recognized between the two dictionaries serves only to underscore the continuous nature of meaning.

However, what appears to be incontrovertible is the thesis that cross-linguistically different lexical categories structure meaning differently and exhibit differential degrees of polysemy. In a series of papers, Gentner (1981, 1988) has argued that verbs are inherently more mutable than nouns and suggested that part of the explanation for the greater verb mutability might be due to their greater degree of polysemy. Gentner (1988) believes that there is a causal relationship between mutability and polysemy. If one asks how polysemy comes about historically, one plausible way in which a word could accrue meaning senses over time is by being relatively mutable. The end result of the gradual accretion of contextually adapted meaning variants would be a high degree of polysemy. In this way, verb mutability could provide a mechanism for the greater degree of verb polysemy.

But is the greater degree of verb polysemy found by Gentner for English a language universal or simply an English-specific phenomenon? One of the goals of this paper is to offer evidence that seriously undermines this thesis and to demonstrate a distinction between two types of language in terms of the way lexical meanings are structured: a metaphoric language and a metonymic language. A metaphoric language works largely through metaphorical mappings to extend lexical meanings, resulting in a greater degree of *verb* polysemy. A metonymic language, on the other hand, operates chiefly through metonymic shifts for sense development, leading to a greater degree of *noun* polysemy.

This paper is organized as follows. In Section 2, I examine Gentner's claim of verb polysemy and point out differences in patterns of sense distribution between nouns, verbs

and adjectives. In Section 3, I summarize Gentner's analysis of verb mutability. In Section 4, Chinese data are adduced that cast doubt on the universality of a greater degree of verb polysemy. In Section 5, I hypothesize a distinction between the metaphoric language and the metonymic language, and argue that noun polysemy is intimately tied to the operation of metonymies and verb polysemy to the operation of metaphorical mappings. Section 6 is the conclusion.

The data base used in this study is LDOCE for English and *Wunan Guoyu Changyong Cidian* (*Wunan Mandarin Chinese Dictionary*, 1989, abbreviated as WGCC) for Mandarin Chinese.

2. Verb polysemy

In an important study on lexical semantics, Ruhl (1989, p.207) speculates that words with semantic figures are more likely to be words that readily refer and that noun are thus more likely to be figural than verbs. Although this view has some initial plausibility, in the survey of LDOCE cited earlier, a total of 14041 noun entries were found to have 280 figurative senses (marked as fig. in LDOCE), as compared to 293 figurative senses for a total of 4565 verb entries and 104 figurative senses for 4966 adjective entries. X^2 tests showed that all differences, except that between the noun and the adjective, between different lexical categories were significant. For the frequencies of figurative senses of nouns and verbs, $X^2=100.82$, $p<.001$. This means that, according to LDOCE, verbs are much more likely to develop figurative senses than nouns, contrary to Ruhl's conjecture.

It may be that Ruhl (1989)'s conjecture should not be so lightly dismissed. His stricture on the notion of polysemy notwithstanding[3], there is another way of testing his idea by construing him as claiming that nouns are more likely than verbs to develop polysemic senses, since these are generally believed to have developed through such figurative processes as metaphor, metonymy, generalization, specialization, and others. Again, however, the available evidence suggests that verbs, not nouns, to have a relatively higher degree of polysemy, at least in English, whereas Chinese data appear to be more nearly, though not quite, in tune with his conjecture, as I will try to show in Section 5 below.

Gentner (1981) compared the number of dictionary meaning senses for words of different lexical categories across four different levels of word frequency. Across all categories, more frequent words have greater numbers of senses and, at all frequency levels, verbs have substantially more senses than nouns. Her results are reproduced in Table 1.

Table 1 Number of words and mean number of word senses for different categories across four frequency samples

	freq. wds.	-1000[a] senses /words	freq. wds.	-100[b] s/w	freq. wds.	-10 s/w	freq. wds.	-1 s/w
Verbs	20	13.1	30	12.4	13	5.1	11	3.5
possible aux	17	12.9	0	—	0	—	0	—
non-aux	3	13.7	30	12.4	13	5.1	11	3.5
Nouns	6	—	45	—	66	—	71	—
common nouns	6	10.8	42	6.6	49	3.1	49	2.2
proper nouns	0	—	3	—	11	—	22	—
Modifiers[c]	20	6.1	12	3.5	20	2.8	15	1.0
Function wds.[d]	53	7.0	3	1.7	0	—	0	—
non classifiable	1	—	10	—	1	—	3	—
Total	100	8.2	100	7.1	100	2.9	100	1.9

a Frequency range 897–69971
b Frequency range 100–108
c modifiers include adjectives and adverbs.
d Function words include articles, conjunctions, pronouns, quantifiers and prepositions.

According to Gentner's findings, then, verbs in English have greater breadth of meaning than any other lexical categories, with the single exception of prepositions in the highest frequency sample. However, since her results were based on a distinctly small sample of only 400 words taken from the Kucera and Francis (1967) corpus, a larger sample and a different data source might yield an entirely different pattern of distribution. This was attempted in my fairly comprehensive survey of LDOCE. LDOCE, designed for learners of English as a second language, is a full-sized dictionary containing over 56000 entries. It contains several non-standard features, such as elaborate grammar codes and pragmatic information, and definitions written within a core vocabulary of 2000 base words (called the Longman Defining Vocabulary). Words that are spelled the same but belong to different word classes are dealt with in separate entries, marked with a raised number. Each meaning sense in LDOCE is given a number, and, in a few rare cases, a numbered sense is further divided into two subsenses (roughly equivalent to Ullman's shifts in application) a and b. Senses used in a figurative way are marked as fig., though figurative uses are not given a separate number in the dictionary. In the following

tabulations, subsenses and figurative senses were not counted. Table 2 shows, for each lexical category, the total number of words (excluding compounds and phrases), polysemic words (words with more than one meaning), senses of the polysemic words, degree of ambiguity and degree of polysemy.

Table 2 Relationship between lexical category ambiguity in English (based on LDOCE, pp.1–1000)

		N	V	A
(a)	number of words	14041	4565	4966
(b)	number of polysemes	4678	2068	1649
(c)	number of polysemic sense	13697	6894	4531
(d)	degree of ambiguity (=b/a)	0.33	0.45	0.33
(e)	degree of polysemy (=c/b)	2.93	3.33	2.75

X^2 tests showed that there was a significant difference between verbs and nouns both in their degrees of ambiguity (the average number of polysemes) and their degrees of polysemy (the average number of senses of a polyseme), confirming Gentner's previous findings. For the degree of ambiguity, X^2=95.81, $p<.001$. For the degree of polysemy, X^2=18.51, $p<.001$. There were, however, no significant differences between nouns and adjectives in these two respects.

Despite the fact that English verbs showed a significantly higher degree of polysemy, that significance level was achieved only at close to the midpoint of the data sample, when 450 pages of LDOCE had been surveyed, as Table 3 shows. X^2 values experienced steady rise from the second 50 pages on, but suffered some setback at two sampling intervals, one at pp.501–550, another at pp.701–750, when nouns showed an unexpected higher degree of polysemy. The cumulative impact of a greater degree of verb polysemy was strongly felt as larger and larger samples of data were surveyed. Had one chosen to work with a more limited sample, the conclusion would no doubt had been that there was no significant difference between nouns and verbs.

Table 3 Difference between nouns and verbs in polysemy at selected 50-pages intervals

Page Interval	X^2 value
1–150	0.315
1–200	0.921
1–250	1.423
1–300	2.220
1–350	2.350
1–400	3.230
1–450	5.100
1–500	5.560
1–550	4.830
1–600	10.190
1–650	13.050
1–700	13.500
1–750	11.710
1–800	11.800
1–850	12.570
1–900	12.790
1–950	17.280

Gentner (1981) has also shown that English verbs exhibit a pattern of frequency distribution intermediate between that of nouns and function words. Nouns are most heavily represented in the low frequency ranges, in classic open-class fashion. Function words, on the other hand, cluster almost exclusively in the highest frequency range, the classic closed-class pattern. Verbs are more evenly distributed across all frequency ranges; although they are also represented in the low-frequency ranges, unlike function words, their numbers taper off at these low frequencies, unlike nouns.

Significantly, English verbs are also more evenly distributed across all levels of multiplicity, unlike nouns and adjectives, which are more heavily represented in the monosemic level, as Table 4 shows. Indeed, X^2 tests revealed that verbs are significantly more heavily represented than nouns at levels of sense 2 through 6 and at sense 10+. At the sense 2 level, X^2=34.7, $p<.001$. At the sense 3 level, X^2=28.35, $p<.001$. At the sense 4 level, X^2=14.63, $p<.001$. At the sense 5 level, X^2=27.83, $p<.001$. At the sense 6 level, X^2=4.2, $p<.05$. At the other sense levels, the samples for both nouns and verbs became way too small for their difference to achieve any level of significance.

Table 4 Lexical category and sense distribution in English

category / sense	N		V		A	
1	9363	(66.70%)	2497	(54.70%)	3317	(66.70%)
2	2838	(20.21%)	1160	(25.40%)	1102	(22.20%)
3	938	(6.68%)	421	(9.22%)	322	(6.48%)
4	417	(2.97%)	190	(4.16%)	93	(1.87%)
5	167	(1.18%)	103	(2.26%)	52	(1.04%)
6	111	(0.79%)	51	(1.13%)	34	(0.68%)
7	60	(0.43%)	29	(0.63%)	9	(0.18%)
8	41	(0.29%)	19	(0.42%)	8	(0.16%)
9	28	(0.20%)	13	(0.28%)	2	(0.04%)
10	78	(0.55%)	82	(1.80%)	33	(0.66%)

Once again, there were no significant differences between nouns and adjectives at any of these sense levels. I conclude that adjectives in English align more closely with nouns than with verbs both in their patterns of frequency distribution and sense distribution. In these respects, at least, English may be said to be more of a noun-adjective language rather than a verb-adjective language in some extended sense of Schachter (1985). On the other hand, if we look at the way polysemic senses are structured, however, English is more of a verb-adjective language in that adjectives pattern much more similarly to verbs, as I will try to demonstrate in Section 5.

One of Zipf's laws, cited in Crystal (1987, p.87), says that the number of words (n) that have a particular number of senses (s) is inversely proportional to the square of the number of meanings. That is, $n \cdot s^2 = c$. However, the data presented in Table 5, derived from Table 4, fall well short of supporting the law across the three categories, either separately or jointly.

Table 5 Relationship between the number of words (n) and the number of senses (s)

sense	N	V	A	N+V+A
1	9369	2497	3317	15177
2	11352	4640	4408	20400
3	8442	3789	2898	15048
4	6672	3040	1488	11200
5	4175	2575	1300	8050
6	3996	1836	1224	7056
7	2940	1421	441	4802
8	2624	1216	512	4352
9	2268	1053	162	3483

3. Verb mutability

Apart from patterns of frequency and sense distribution, there are other significant differences between nouns and verbs worth noting in connection with the present inquiry with the nature of lexical ambiguity. Research by Gentner (1981) and by Gentner and France (1988) suggests that if the comprehension system is looking for a possible metaphor, it would try the verb first, because verbs are inherently more mutable than nouns. They varied the semantic plausibility of sentences, setting up a competition between nouns and verbs for the domination of the resulting sentential meaning and assessed the relative strength of nouns and verbs in a variety of tasks. They found that nouns tend to refer to fixed entities, while verb meanings bend more readily to fit the context. For example, subjects tend to paraphrase (1) as (2) rather (3):

(1) The lizard worshipped.
(2) The small grey reptile lay on a hot rock and stared unblinkingly at the sun.
(3) The nasty despicable person participated in the church service.

Furthermore, although it often happened that verb meanings were changed while noun meanings were inert, nouns seldom change meanings without a concomitant change in verb meanings. According to these findings, then, the verb should take precedence over the noun in cases where there is a semantic strain between the noun and the verb.

There is apparently a causality between verb polysemy and the verb mutability effect. If we ask how polysemy comes about historically, one plausible way in which a word could accrue meanings over time is by being relatively mutable. The end result of the gradual accretion of contextually adapted meaning variants would be a high degree of polysemy. In this way, verb mutability could provide a mechanism for the greater degree of verb polysemy (Gentner and France, 1988, p.375. Cf. Barsalou and Billman 1989, p.189).

Why should the verb adjust more than the noun? Gentner and France considered various explanations for the verb mutability and suggested two major factors that contributed to it. The first difference is functional: verbs function as predicates over noun arguments, while nouns serve typically as pointers to the perceptual givens of the world. In other words, the verb's function is to link nominal concepts into one coherent assertion, and this may mean suspending one or more of its own internal components in case of conflict between a noun argument and the verb's semantics. The second difference is representational: representations of noun concepts (in particular, object concepts) are more internally dense than representations of relational concepts. That is, the ratio between the number of internal links and the number of components linked is greater for object concepts than for relational terms (the verb *move* was said to have a density of 0.80, while the noun *face* had a density of 2.4). Verb components will have, on the whole, more external neighbors and fewer internal neighbors than noun components. Thus assuming each component is influenced by its neighbors, the verb components are relatively more subject than nouns to external contextual influences and less constrained by internal influences from other components within the same concept. Because external links allow context to push toward new interpretations, whereas internal links make for a stable interpretation of a conceptual component, verbs should be more adjustable than nouns (Gentner, 1981, pp.171–175).

This suggestion of a possible representational difference between nouns and verbs has also been noted by several other researchers (e.g. Lakoff, 1987, Langacker, 1987a, 1987b, and Wilks, 1978). Thus a noun concept, according to Langacker 1987b, presupposes the interconnections among a set of conceived entities, and profiles the region as a conceptual whole thus established. By contrast, a verb concept presupposes a set of entities and profiles the interconnections among the entities.

Clearly these proposals are highly speculative and much more work need to be done to further flesh out the ideas computationally before empirical claims can be tested and substantiated. More importantly, it is worth pointing out that it would be wrong to focus entirely on contexts with metaphorically induced semantic strain for possible sources of verb polysemy, least of all, for sources of noun polysemy. Nouns have been suspected to be much more prone to metonymic shifts than verbs and sense developments in verbs through metonymic inferences are also substantial (see Ruhl 1989, Traugott 1988). Ultimately, however, the viability of these proposals rests on resolving a logically prior issue of whether the universality claim of greater degree of verb polysemy can stand under closer scrutiny. To this issue we now turn in the following section.

4. Universality of verb polysemy

Is the greater degree of verb polysemy a language universal or simply an English-particular fact? Any answers to this question hinge on a conceptual distinction between two distinct senses of polysemy that were implicitly made in the preceding discussion but not explicitly acknowledged. One sense of polysemy, called degree of ambiguity in Table 3 and elsewhere, refers to the ratio of polysemic words to the total number of a vocabulary. It is apparently this sense of polysemy that Gentner and her associates appealed to in their work on verb mutability effect, since they investigated whether verbs were more readily than nouns to be subject to adjustment in semantically strained contexts. A second sense of polysemy, called degree of polysemy in the preceding sections, refers to the differential degrees to which polysemic nouns and verbs develop distinct numbers of senses. It is this second sense of polysemy that Gentner and her associate appealed to in Table 2. Based on data from both English and Chinese, there is considerable doubt about the universality of a greater degree of verb polysemy in either sense of the term as we shall presently demonstrate.

To establish the possible relationship between lexical category and ambiguity in Chinese, we first surveyed pp.150–450 of WGCC, and recorded the number of meaning senses for each monomorphemic word (i.e. the so-called Chinese character) and dimorphemic words (commonly known as compounds). For words with multiple category membership, they were taken as separate entries in the word count. Two types of sense were distinguished: polysemous sense and homonymous sense. A word with multiple category membership and a network of senses like that shown in Fig. 1 would be recorded as containing two entries, one noun and one verb, with 3 polysemous senses and 1 homonymous sense for the former, and 4 polysemous senses and 2 homonymous senses for the latter.

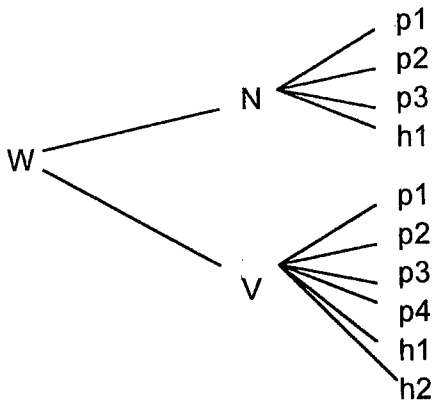


Fig. 1 A possible configuration of sense of a Chinese word

WGCC, like most other Chinese dictionaries, is primarily a dictionary of Chinese characters and not of the spoken language as such. An entry in WGCC is headed by a single character with a complex of information on its etymology, pronunciation, word class(es) and examples, in that order. While a character has a unique, though sometimes controversial etymology, its pronunciation and senses vary depending on whether that character is used to write a basic root form, a derivative, another totally unrelated word or serves as a double (i.e. a graphic variant of another character). After the definitions of the main entry, compounds beginning with the character being defined are listed. Word classes for compounds are as a rule not indicated.

Fig. 2 shows actual sense configurations for four characters.

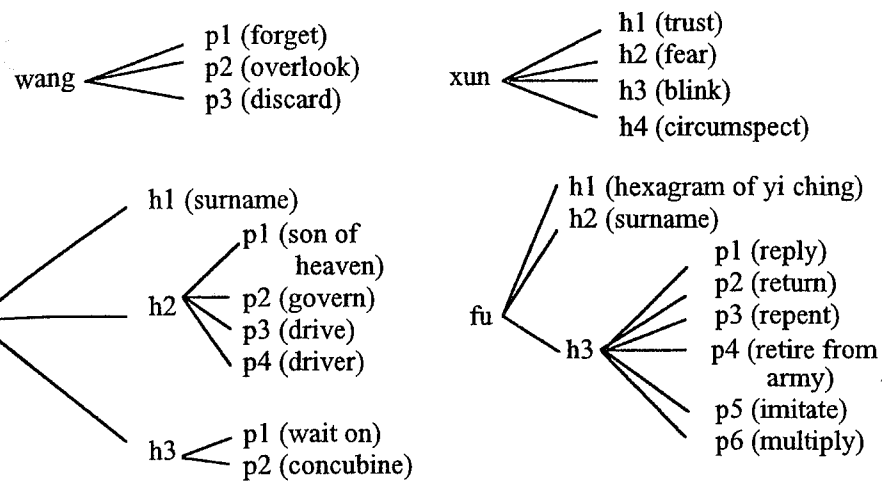


Fig. 2 Sense configurations for 4 words

Table 6 shows, for each lexical category, the number of ambiguous entries, the number of unambiguous entries, the number of polysemic senses, the total number of senses, degree of ambiguity and degree of polysemy.

In Mandarin Chinese, more than in any other Chinese dialects, tonal distinctions and final consonants have been lost, with the result that many single syllable words that were phonetically distinct at earlier stages of the language now would be homophones. The response to this massive homonymy in Mandarin has been a strong tendency to develop dimorphemic compounds. This means that one of the constituent morphemes of a compound word functions in comprehension as the context for possible disambiguation of the meaning of the other morpheme, and vice versa. An interesting prediction that follows from this is that both the degree of ambiguity and the degree of polysemy for compounds would be much lower than that for monomorphemic words. This prediction is borne out by a survey of pp.151–450 of WGCC, as shown in Table 6.

Table 6 shows that as predicted, monosyllabic words consistently showed greater degrees of ambiguity and polysemy across all lexical categories than did disyllabic compounds. X^2 tests performed over the data showed that there was *no* significant difference between nouns and verbs either in their degrees of polysemy, (X^2=0.98<X^2.95(1)=3.84 for monosyllabic words and X^2=0.18 for compounds), or in their degrees of ambiguity, since X^2 = 0.99 (for this last X^2 test, the numbers of

monomorphemic words and compounds were combined to form a single value). To guard against possible charges of either sampling bias or limitedness of the sample (in view of the fact a significant difference between verbs and nouns in English was achieved only when fully 450 pages of LDOCE had been surveyed), we surveyed an additional 350 pages of WGCC (pp.751–1100) and the results are shown in Table 7.[3]

Table 6 Relationship between lexical category and ambiguity in Chinese (based on WGCC, pp.151–450)

Category Value		N/CN	V/CV	A/CA
a.	Number of entries	727/2556	757/1601	320/476
b.	Number of ambiguous entries	262/634	318/330	110/72
c.	Degree of ambiguity (=b/a)	0.36/0.25	0.42/0.21	0.34/0.15
d.	Number of polysemic senses	737/1189	812/607	224/130
e.	Degree of polysemy (=d/b)	2.81/1.87	2.77/1.84	2.04/1.80
f.	Total no. of senses	1202/3111	1251/1878	434/534

CN: Compound noun; CV: Compound verb;
CA: Compound adjective

Table 7 Relationship between lexical category and ambiguity in Chinese (based on WGCC, pp.751–1100)

Catetory Parameter		N/CN	V/CV	A/CA
a.	Number of entries	1077/3350	1065/2672	298/611
b.	Number of ambiguous entries	333/703	426/450	88/108
c.	Degree of ambiguity (=b/a)	0.31/0.21	0.40/0.17	0.29/0.17
d.	Number of polysemic senses	949/1602	1283/954	219/233
e.	Degree of polysemy (=d/b)	2.85/2.28	3.01/2.12	2.48/2.15
f.	Total no. of senses	1693/4249	1922/3176	429/736

X^2 tests showed that, again, there was no significant difference between verbs and nouns in degrees of polysemy. X^2=0.35 for monomorphemic words and X^2=0.19 for compounds. Moreover, as in Table 6, compound nouns exhibited a higher degree of polysemy than compound verbs, though the difference was not statistically significant. It must be noted that dimorphemic compounds in a Chinese dictionary, as in WGCC, make up approximately 75% of the entries as against about 25% for monomorphmic words. Given that compound nouns are more polysemic than verbs, this means that Ruhl would be more nearly correct were his conjecture that nouns are more likely to be figural than verbs directed at Chinese rather than English lexical semantics.

The Chinese data thus failed to support Gentner's contention that verbs overall enjoy a higher degree of polysemy and, therefore, her hypothesis of the verb mutability effect appears to be only a language-specific phenomenon. The Chinese data were fairly robust, since, in both surveys, both monomorphemic and dimorphemic words pointed to the same untenability of a greater degree of verb polysemy, in either sense of the term distinguished above, as a serious psycholinguistic universal. With the Chinese data I hope at least to have helped created doubts about the presumption of greater degree of verb polysemy and the verb mutability effect. Obviously we would welcome data from other languages

which would assist in clarifying the nature of lexical ambiguity. For the present it seems safe to conclude that we have no firm evidence for a greater degree of verb polysemy. That assertion, though stated negatively, actually provides at least a small increment in our understanding of the mechanism of semantic change. On a more positive note, we offer as a psycholinguistic universal, based on the available lexical data from both English and Chinese, the hypothesis that noun senses are more metonymically structured and verb senses are more metaphorically structured. Section 5 is devoted to substantiating this hypothesis.

5. The metaphoric language and the metonymic language

As stated in Section 2, Gentner's work on the verb mutability effect showed that when subjects paraphrased sentences in which the noun and the verb were semantically mismatched, the verb changed meaning more significantly than the noun. Subjects were found to engage in active processing, through the exploitation of *metaphorical* extensions, perhaps effortlessly, in order to interpret the anomalous sentences.

In response to this line of research, one might question whether the alleged relative immutability of the noun was not simply an artifact of the nature of the experimental design, since were nouns as truly relatively immutable as Gentner's results would have us believe, one would be hard put to explain the strong showing of nouns in their degrees of polysemy in English and particularly in Chinese (as Tables 2, 6, and 7 show, degrees of polysemy for nouns and verbs are respectively 2.93 and 3.33 in English and 2.45 and 2.43 in Chinese). There are clearly aspects of noun polysemy that have thus far remained largely untapped. Indeed, metaphorical ambiguity has been the most pervasive type of ambiguity in research undertaken on lexical ambiguity, to the detriment of a true understanding of the nature of noun polysemy. As Culler observes (cited in Ruhl 1989, p.205), metaphor has long dominated metonymy; it has been considered *the* figure, the one most revealing of meaning and truth. Traditional necessary-sufficient conditions, favoring similarity and generalization, by implication have precluded metonymies with proximate, contiguous diversities. The time is ripe for a heathier reorientation in lexical research toward understanding patterns of metonymic shifts. Once we attempt a focussed study on metonymic inferences, it can be readily seen that while polysemic senses of the verb develop more frequently through metaphorical mappings, noun polysemy develops much more frequently through metonymic mappings. The purpose of this section is to pursue in some detail this difference in the way senses are structured.

Following Lakoff (1987), senses of a polysemic word are conceived of as being structured in terms of a network such that each sense is a minimal variant of some other sense. These senses are related by one of a finite number of links. The nature and the number of link-types that must be posited is of course an empirical question (but cf.

Norvig and Lakoff 1987). Three types of links in lexical networks are recognized in the following discussion, in part for ease of exposition and in part to highlight the contrast between metaphor and metonymy. Metaphoric links are links established by metaphoric mappings that exist independently of a given lexical item. Metonymic links are links established by metonymic mappings that exist independently of a given lexical item. Finally, when a meaning represents a specific schema, some of its related senses are merely instances of the same schema, and this kind of connection is called instance linking. Given the lexical network approach, it can be shown that the noun typically structures its senses like that shown in the diagram in Fig.3, and the verb, and the adjective as well, typically has the form shown in Fig.4.

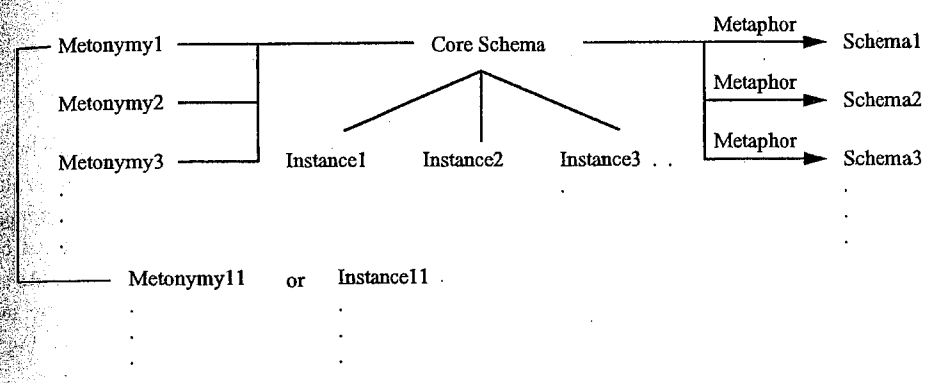


Fig. 3 Lexical network of the senses of a typical noun

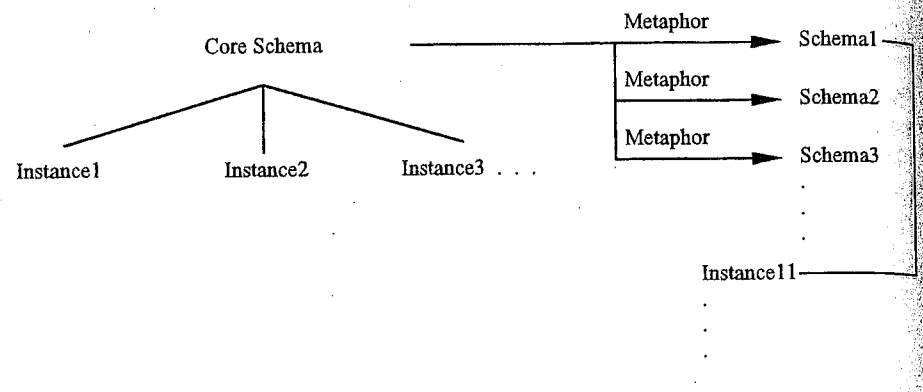


Fig. 4 Lexical network of the senses of a typical verb

In these lexical network representations, the core meaning of a word represents a basic schema, and some of its related senses are merely instances of the core schema in the same domain. Other senses of the word may be related through metaphoric mappings, where one domain is understood in terms of another; still other senses are related by metonymic shifts, where a submodel is used to understand the category as a whole. As an illustration, the representations of the various senses of the noun time, the verb draw and the adjective flat, as understood by LDOCE, are each shown as in Fig.5, Fig.6, and Fig.7 respectively.

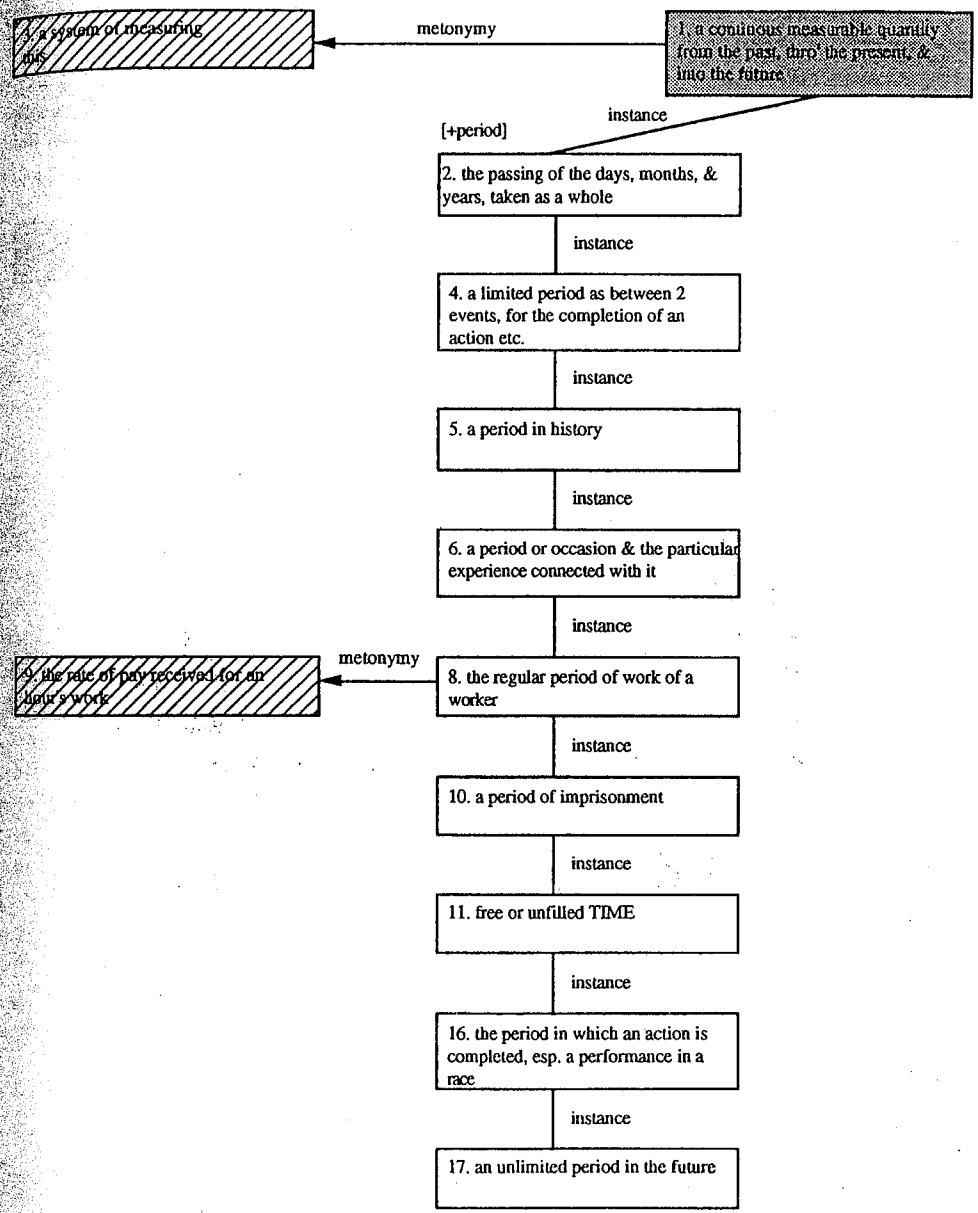
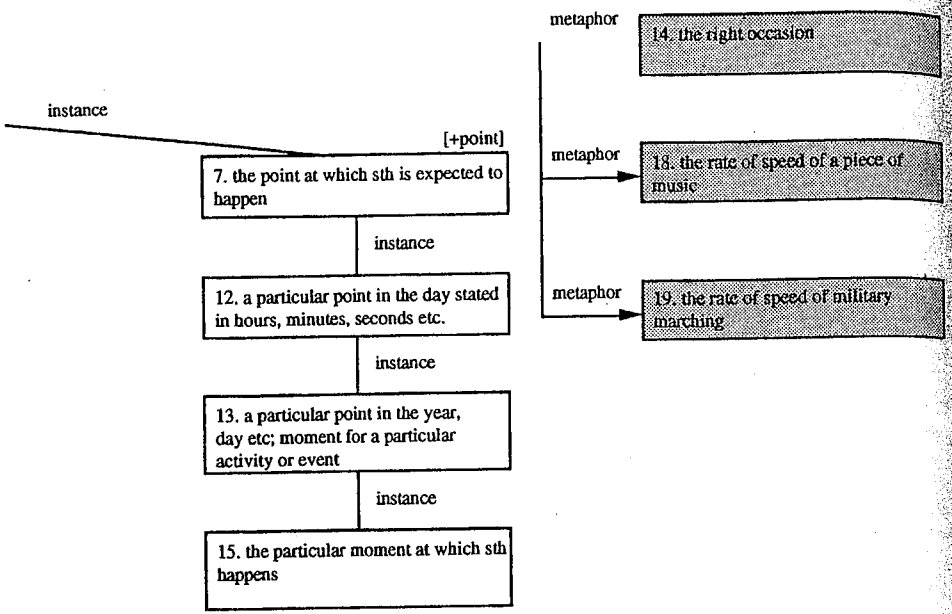


Fig. 5 Lexical network representation for the noun time



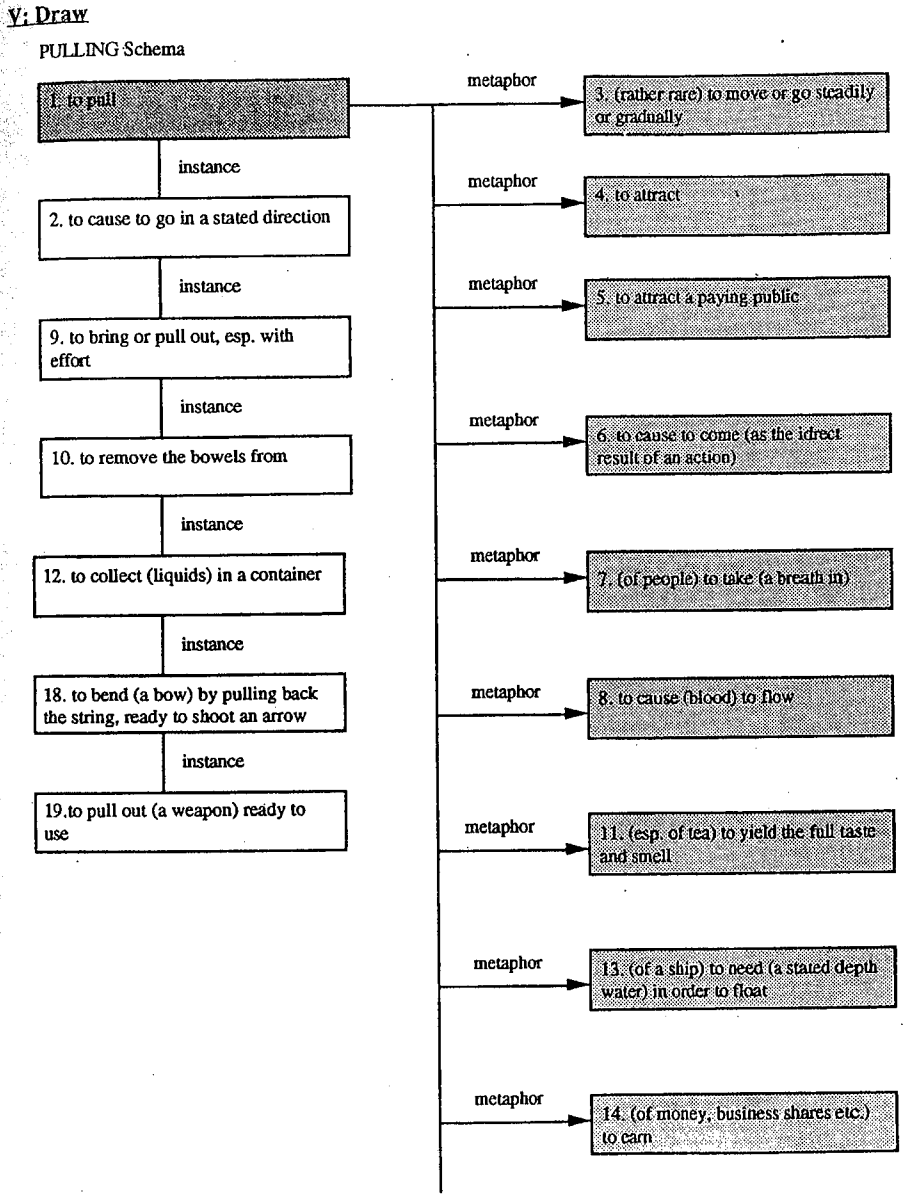
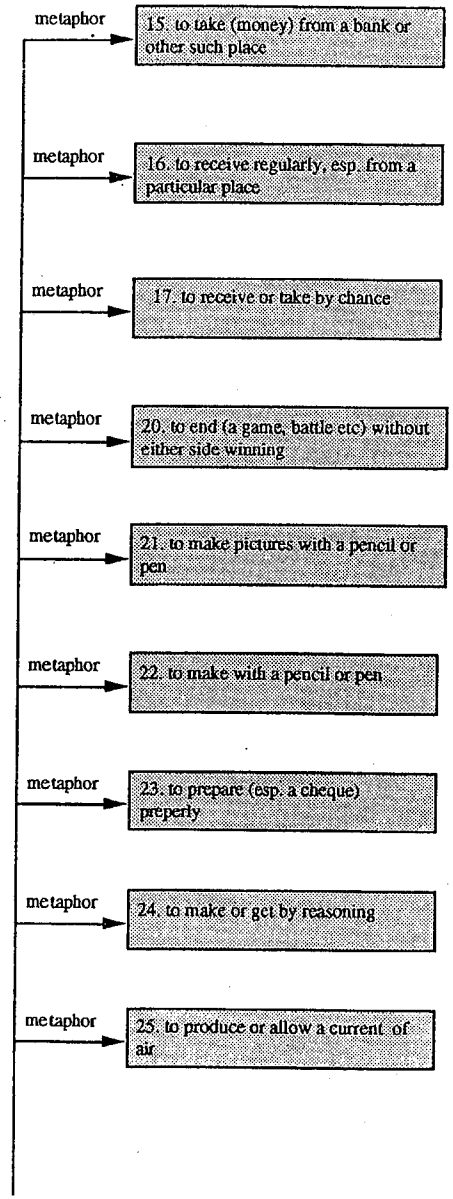


Fig. 6 Lexical network representation for the verb draw



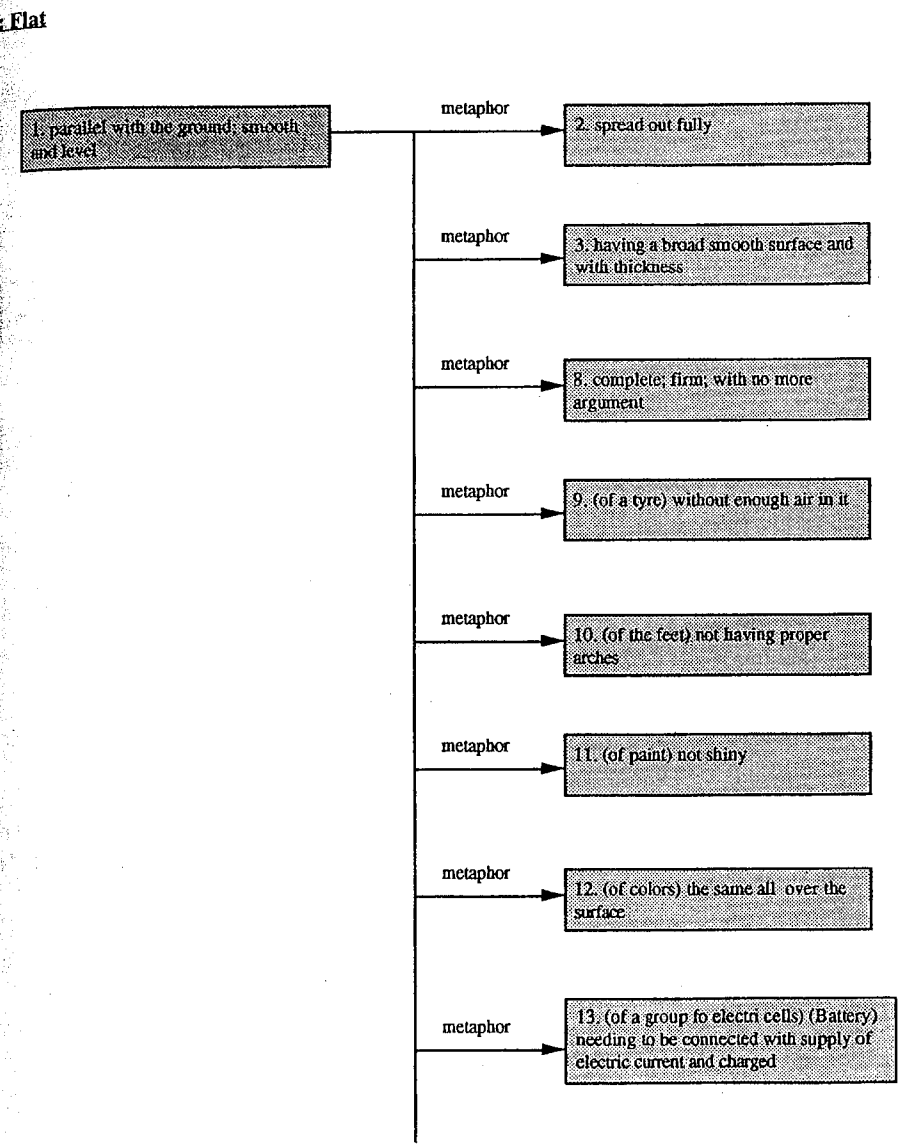
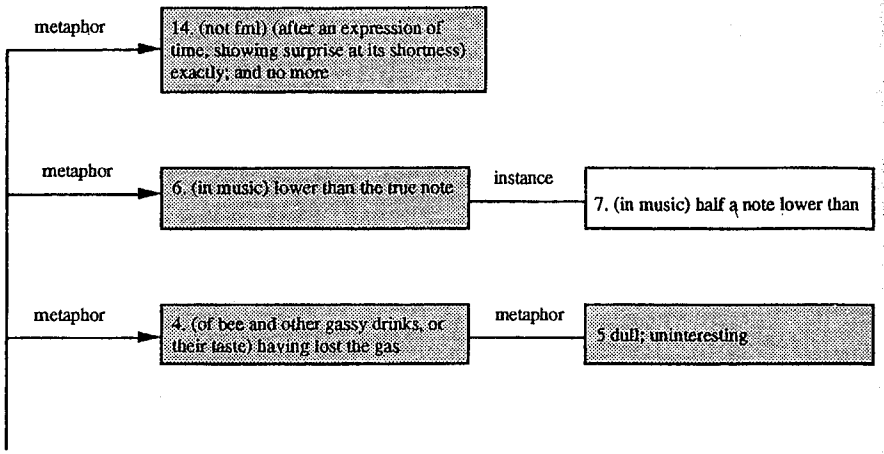


Fig. 7 Lexical network representation for the adjective flat



Words in Chinese, dimorphemic words in particular, are as a rule much less polysemic than those in English, as can be deduced by comparing the appropriate numbers in Table 2 and Table 6. As a result, lexical network representations for Chinese words look less developed and full-blown and lack the kind of density and complexity one finds in Fig.5 through Fig.7. Still, the abstract forms of their structures, category for category, are quite comparable to those in English. Fig.8 gives the representation for the noun xin 'heart' and Fig.9 for the verb shang 'to hurt' and Fig.10 for the adjective ji 'anxious'. In each case, the senses represented are based on WGCC.

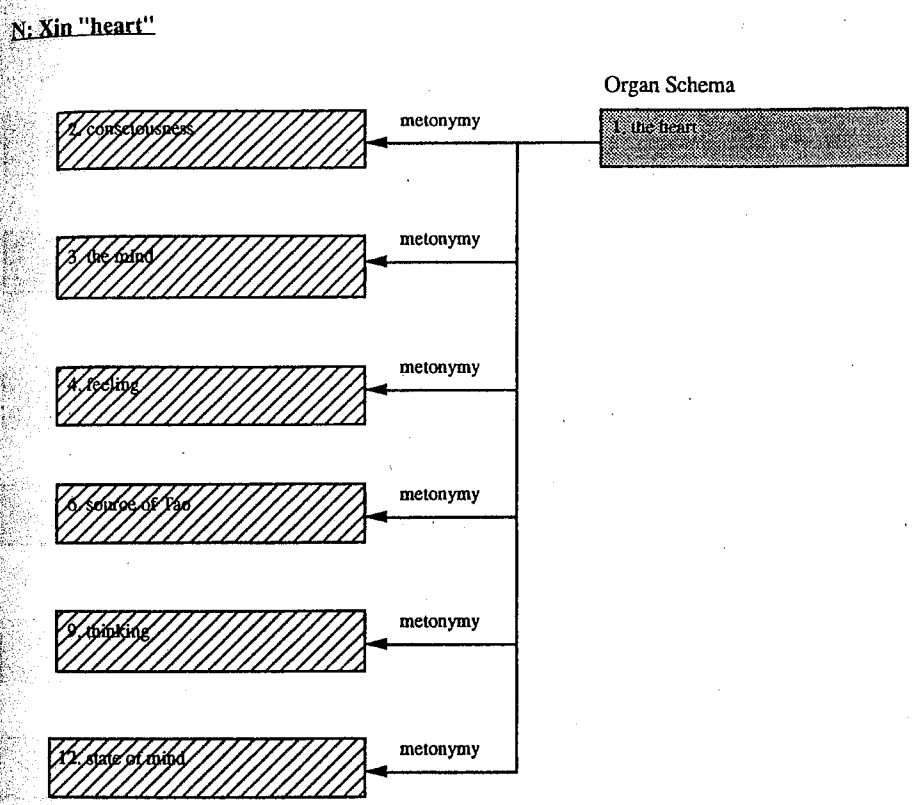


Fig. 8 Lexical network representation for the noun xin

V: Shang "to hurt"

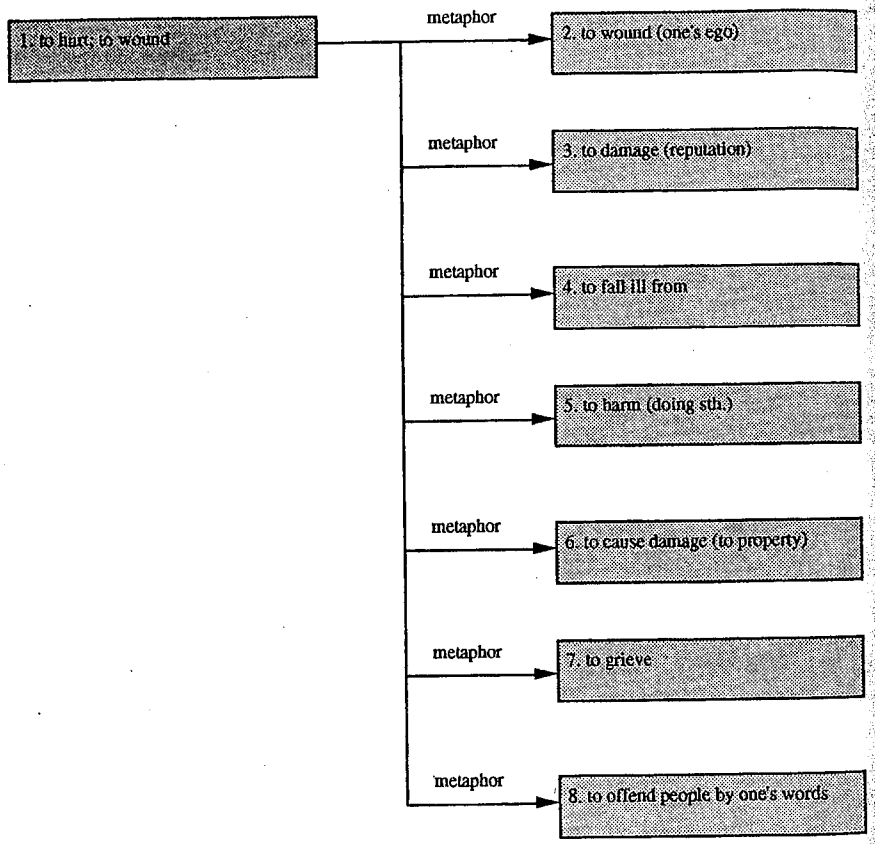


Fig. 9 Lexical network representation for the verb shang

A: Ji "hasty"

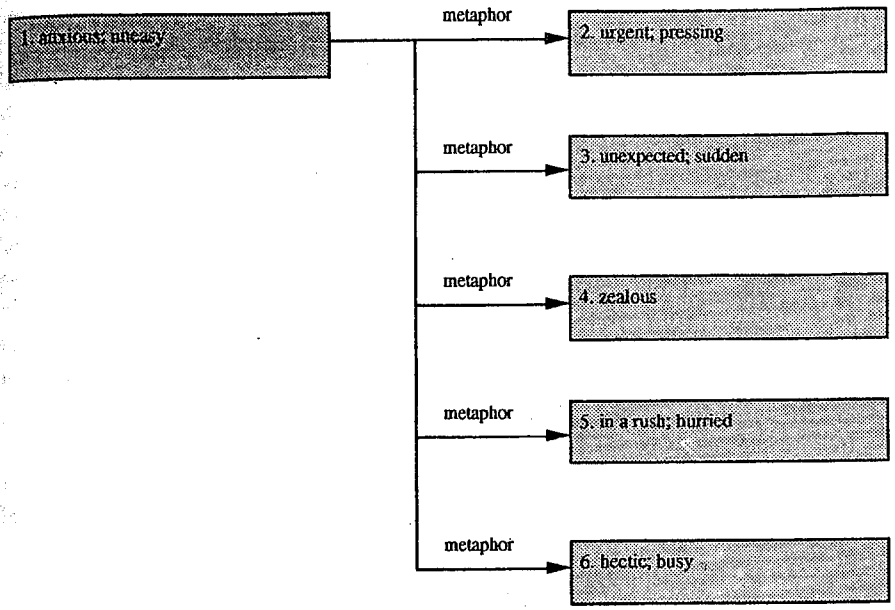


Fig. 10 Lexical network representation for the adjective ji

In order to better understand the roles that metaphor and metonymy each play in the structuring of the senses of words, a total of 30 highly polysemic words, 5 from each of the three major lexical categories in Chinese and English were analyzed for their sense relations. The words analyzed are as listed below, with their numbers of senses in parentheses.

	English	Chinese
N	service (16), time (19), place (19), head (18), line (24)	xin 'heart' (12), tou 'head' (12), gong 'grandfather' (7), ren 'person' (8), yi 'ceremony' (7)
V	break (18), shoot (24), carry (20), draw (25), play (29)	cuo 'work' (7), shang 'hurt' (9), chu 'leave' (10), xiu 'build' (8), bao 'protect' (7)
A	positive (14), flat (14), good (17), soft (17), light (21)	ji 'hasty' (6), leng 'cold' (5), liang 'light' (5), pi 'remote' (6), su 'cheap' (6)

If we tabulate all instances of link types and examine their distributions, we find a marked skewing. Table 8 shows the percentage of each link type for each lexical category.

Table 8. Percentage distribution of three types of sense links for selected words in English and Chinese

language / link / category	English			Chinese		
	metaphor	metonymy	instance	metaphor	metonymy	instance
N	42.5	29.7	27.7	35.8	51.2	12.8
V	75.5	12.2	12.2	100	0	0
A	89.7	0	10.2	100	0	0

The pattern of distribution is a striking confirmation of the hunch that, in both languages at least, nouns are significantly more metonymically structured and verbs more metaphorically structured. Chinese appears to be even more determined than English in gravitating toward metonymic shifts for nouns and towards metaphoric changes for verbs. Although one should always caution against overgeneralizing on the basis of only 30 words, the pattern that has emerged from this exercise in lexical analysis is definitely clear: the noun and the verb are significantly differently structured, with the former tending more frequently to exploit metonymic inferences for sense development and the latter falling back predominantly on metaphoric mappings for sense development.[4]

A legitimate question that may be raised at this point is whether the much less polysemic dimorphemic compounds in Chinese would exhibit patterns of sense structure similar to those found for the more polysemic monomorphemic words shown in Table 8. To answer this question, 50 pages (pp. 851–900) of polysemic compounds in WGCC, for a total of 202 words and 447 senses, were analyzed for sense relations and the results, shown in Table 9, were entirely consistent with those shown in Table 8: nouns tend to be more metonymically structured than verbs, while verbs are decidedly more metaphorically structured.

Table 9 Distribution percentage of three types of sense links for selected dimorphemic words in Chinese (from WGCC, pp. 851–900)

link / category	metaphor	metonymy	instance
N (n=349)	43.9	41.4	14.7
V (n=53)	84.4	5.1	10.5
A (n=45)	100	0	0

Why should the noun exploit metonymic shifts more than the verb? As stated in Section 3, several researchers have observed that representations of noun concepts are more internally dense than representations of verb concepts. Thus a noun concept, according to Langacker 1987b, presupposes the interconnections among a set of conceived entities and profile the region as a conceptual whole thus established. By contrast, a verb concept presupposes a set of entities and profiles the interconnections among the entities. It seems clear that the answer that Gentner and her colleague sought to the question of verb polysemy also provides at least a partial answer to noun metonymy. Just as the profiled interconnections among the entities of a verb concept allow context to push toward new *metaphorical* interpretations, so the profiled region as a conceptual whole with a noun concept can more readily have recourse to *metonymic* shifts. If so,

then nouns can theoretically allow metonymic shifts to create new sense relations to the same or even greater extent than verbs can allow metaphoric changes for sense developments. This appears to be exactly what has happened with dimorphemic nouns in Chinese, since given the fact that dimorphemic nouns are more polysemic than dimorphemic verbs and that nouns are distinguished from verbs in being much more metonymically structured, one can only conclude that the greater degree of noun polysemy in Chinese must correlate with a more extended operation of metonymies.

We thus hypothesize a distinction between two types of language in terms of the way lexical senses are structured: the metaphoric language and the metonymic language. The metaphoric language, represented here by English, works more through metaphorical mappings to extend lexical meanings, resulting in a greater degree of *verb* polysemy. The metonymic language, an exponent of which is Chinese, operates chiefly through metonymic shifts to create lexical meanings, leading to a greater degree of *noun* polysemy.

6. Concluding remarks

In the preceding discussion, we have studied the nature of lexical polysemy using Chinese and English dictionaries as sources of data. Two senses of polysemy are distinguished. One sense of polysemy refers to the ratio of polysemic words to the total number of a vocabulary. A second sense of polysemy refers to the differential degrees to which polysemic words develop distinct numbers of senses. The Chinese data cast considerable doubt on the presumption of the universality of a greater degree of verb polysemy in either sense of the term. Indeed the Chinese data point to the opposite conclusion: nouns as a whole are slightly, though not significantly, more polysemic than verbs. We analyzed a representative sampling of 30 highly polysemic words in English and Chinese and concluded that cross-linguistically nouns and verbs are significantly differently structured, with the former tending more frequently to exploit metonymies for sense development and the latter more likely to have recourse to metaphoric mappings for sense extension. Furthermore, based on the fact that dimorphemic nouns in Chinese are more polysemic than dimorphemic verbs and that nouns are distinguished from verbs in being more metonymically structured, we conjecture that the higher degree of noun polysemy in Chinese correlates with a more extended operation of metonymies.

Finally, adjectives in English align more closely with nouns than with verbs in patterns of sense distribution, showing symptoms of a noun-adjective language. On the other hand, adjectives behave quite analogously to verbs in the way polysemic senses are structured in falling back predominantly on metaphoric mappings for sense development, showing symptoms of a verb-adjective language. On balance, then, in lexical semantics, exactly as in morphology and syntax, adjectives display characteristics intermediate between nouns and verbs.[5]

Notes

1. The three-way distinction of lexical ambiguity was first proposed by Ullman (1957) and adopted without modification by Ruhl (1989).

2. Barsalou and Billman (1989) distinguish on psychological grounds between strong and weak lexical ambiguity. Strong lexical ambiguity occurs when a single word refers to multiple categories. *Spring* exhibits strong ambiguity because it refers to a season, a type of mechanical device, and a water source. Weak ambiguity occurs when a word refers to a single category, but the information retrieved for the category varies. Thus although *dog* has only one standard sense, it may access *large*, *brown* and *mean* on one occasion and *small*, *white* and *nervous* on another. It is clear that homonyms are words that exhibit strong ambiguity and shifts in application corresponds most closely to weak lexical ambiguity. Barsalou and Billman point out that representations of lexical categories vary substantially between and within individuals. When individuals produce definitions for words, the overlap in propositions between two individuals' definitions for the same word is only 44% on the average. When the same individual produces definitions for words, only 67% of the propositions in one session are produced in a second session 2 weeks later. Such instability does not necessarily reflect underlying differences in the content of lexical knowledge. Instead, differences in the accessibility of lexical knowledge in LTM produces instability. They suggest that frequency, recency and context are responsible for differences in accessibility.

3. Ruhl's thesis of monosemy holds that lexical meaning must be highly abstract and thus highly formal, some of it highly remote from all ambient contingencies (p.ix), and that semantic research should first seek a unitary meaning, resorting to polysemy, homonymy or idiomaticity only when an extended attempt fails (p.147).

4. While the polysemy/abstraction issue is of considerable interest in its own right, it is not crucial to the issue that concerns us in this paper. (cf. Lakoff and Brugman (1986)).

5 Germination of the ideas contained in this paper was initially inspired by a footnote in Gentner and France (1988) to the effect that "verbs are analogous, nouns metonymous." My intellectual debt to Gentner is gratefully acknowledged.

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Iambic — or Trochaeic with Anacrusis?

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1. Introduction

This paper is part of a series of studies in which I have investigated the phonetic structure of orally produced poetry(summarized in Lehiste 1992). Specifically, this paper deals with the question of the hierarchical structure of a poetic line.

Traditional and also linguistic metrics is generally syllable-oriented; a basic metrical schema presents an ordered arrangement of syllables in the poetic line. A line is described in terms of metrical positions (rise and fall, arsis and thesis)and the kinds of syllables that may fill these metrical positions(light and heavy, strong and weak).

Another way of describing a poetic line involves specification of metric feet as sub-units of the line. The metric feet, in turn, consist of ordered arrangements of strong and weak syllables in ictus and non-ictus positions, ictus referring to metrical stress. A line consists of a sequence of metric feet. It is possible to describe the metric feet, too, in terms of rises and falls. Thus a trochaeic metric foot would be a disyllabic foot consisting of a rise and a fall, and an iambic metric foot would be a disyllabic foot consisting of a fall and a rise. Symbolizing a rise as + and a fall as -, one could represent a four-foot trochaeic line as /+ -//+ -//+ -//+ -//,and a four-foot iambic line as /- +//-+//-+//-+//.

The same line could be analyzed as consisting of strong and weak positions (rises and falls) within the line, omitting the intermediate specification of metric feet. A four-foot trochaeic line would then be symbolized as + - + - + - + -, and a four-foot iambic line as - + - + - + - +.

The term "anacrusis" is used in classical metrical descriptions to refer to one or more line-initial syllables that are not part of a regular metrical scheme (*Princeton Encyclopaedia of Poetry and Poetics*, p. 33.) An alternative analysis of an iambic line would be as a trochaeic line with anacrusis, /-//+ -//+ -//+ -//+/. The present paper describes a set of data that support this alternative analysis.

2. Materials and method

The materials consist of readings of the Estonian poem "Kaks saarlast" (by Betti Alver) by two readers, T.R. and A.E. The recordings were made in Tallinn, Estonia, in February 1989 as part of a larger project (Lehiste 1992). The poem consists of five stanzas. Each