

## NOTES AND DISCUSSION

### The Noun-Verb Problem and Chinese Aphasia: Comments on Bates et al. (1991)

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It is often observed that Broca's aphasics have more difficulty in processing verbs than concrete nouns while Wernicke's aphasics have more difficulty in processing concrete nouns than verbs (e.g., Miceli, Silveri, Villa, & Caramazza, 1984; Miceli, Silveri, Nocentini, & Caramazza, 1988; Zingeser & Berndt, 1990). This double dissociation between nouns and verbs was replicated in a recent study on Chinese Broca's and Wernicke's patients. Using a picture naming task, Bates, Chen, Tzeng, Li, and Opie (1991) found an interaction between patient group and object (noun)/action (verb) naming. The authors concluded that action-naming deficits in Broca's aphasia and/or the object-naming deficits in Wernicke's aphasia cannot be attributed to morphological differences between nouns and verbs because in Chinese, all the disyllabic or polysyllabic nouns and verbs are essentially compounds with no overall difference in morphological complexity.

However, one peculiar claim in the study is that the dissociation can also be extended to the *sublexical* level: while Broca's aphasics tend to make errors on the verbal element of a Verb-Noun (V-N) compound, Wernicke's show the opposite pattern. According to the authors, this finding is difficult to explain in syntactic terms and, more importantly, by the standard lexical account. Unfortunately, the last claim cannot be substantiated by their data, simply because these researchers confounded compounds with phrases. Although the authors mentioned some grammatical properties of V-N forms in their footnote 1, they, in general,

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ignored the differences between Chinese V–N *verbal compounds* and V–N *phrases*. Over half of the V–N forms classified as verbal compounds in their study are in fact V–N phrases. The Broca's and Wernicke's aphasics they tested were therefore responding to verbal phrases, not to the verbal and noun elements of compound words. The suggestion of a sublexical level double dissociation in naming verbal and noun elements of V–N verbal compounds needs to be investigated further.

### COMPOUNDS AND PHRASES IN CHINESE

It is notoriously difficult to make a distinction between a compound and a phrase. As Bloomfield (1933) pointed out, "the gradations between a [compound] word and a phrase may be many; and often enough no rigid distinction can be made" (p. 227). This issue becomes more acute in Chinese because there are no distinguishing phonological features and no distinguishing word order differences between a compound and a phrase. Moreover, there are no inflectional morphemes in Chinese that otherwise might help in distinguishing between the two. The most difficult to distinguish are V–N verbal compounds in which the grammatical relationship between the verb component and the noun component generally resembles the verb–object relationship in a V–N phrase. The inseparability of constituent morphemes, which is an important feature of word status in English, is not applicable to Chinese V–N forms. Even the most unambiguous verbal compounds like *guan-xin* ("close-heart": to care about) can undergo limited insertion, as in *guan-dianr-xin* ("close-little-heart": to care a little bit about). Most V–N forms can be expanded in this way, with other morphemes inserted between verb components and noun components, even when one component is a bound morpheme. For instance, *you-yong* ("swim-swim": to swim) can be expanded to *you-le-yi ci-yong* ("swim-ASPECT MARKER-once-swim": swam once), whereas *yong* cannot stand alone as a word.

A number of linguistic criteria have been proposed to differentiate the V–N verbal compounds from phrases, although linguists differ in their proposals (Chao, 1968; Huang, 1982, 1984, 1988; Huang, 1991; Li & Thompson, 1981). The most strict criterion would be C.-T. J. Huang's Phrase Structure Condition (PSC), which is proposed as one of the well-formedness conditions of Chinese sentences. The PSC can be simply understood as "one verb, one complement (or object)." Each verb can only take one complement at a time. From the PSC, C.-T. J. Huang further argues that most of the so-called V–N compounds (including the above example *you-yong*) in Chinese are actually phrases, not compounds. Compare the following three sentences.

- 1a. *ta you de hen hao.*  
     she swim DE very well  
     "‘She swam very well.’"

- 1b.\* *ta you-yong de hen hao.*  
 she swim-swim DE very well  
 "She swam very well."  
 2. *ta hen guan-xin ni.*  
 she very close-heart you  
 "She cares about you very much."

In (1a), the verb *you* is followed by a descriptive complement while in (1b), the V–N form *you-yong* is followed by the same complement. Since the PSC allows a verb to have one postverbal complement, a V–N verbal compound should be able to take one postverbal complement as well. If *you-yong* is a V–N verbal compound, we would expect (1b) to be well-formed, comparable to (1a). However, (1a) is well-formed while (1b) is clearly ill-formed, indicating that *you-yong* cannot be a compound. The verb *you* has taken the noun *yong* as its object, so it cannot take another complement. In (2), however, the V–N form *guan-xin* legally takes an object, so it must be a compound.

One could argue that C.-T. J. Huang's criterion is too strict in classifying V–N forms as verbal compounds because, under his assumption, the ability to take a postverbal complement or object is a crucial condition in distinguishing a compound from a phrase, and only a few V–N forms in Chinese can actually take postverbal complements (for criticisms on the PSC from other perspectives, see Huang, 1991; Koopman, 1984). The more traditional view concerning the V–N verbal compounds is presented in Li and Thompson (1981). Following Chao (1968), Li and Thompson proposed that any one of the following properties will render a verb–object form a compound:

- (a) One or both of the constituents being bound morphemes
- (b) Idiomaticity of the meaning of the entire units
- (c) Inseparability or limited separability of the constituents

These three properties tend to be correlated. Having a bound morpheme or idiosyncratic meaning usually limits the ability of the verbal compound to undergo the syntactic movements. Moreover, the idiomaticity of whole-word meaning is a matter of degree (see Chao, 1968; Li & Thompson, 1981 for details of the criteria).

Y. Y. Huang (1991) tried to combine the three conditions into one, just as Li and Thompson (1981) reduced the five conditions in Chao (1968) to the present three. She argued that the crucial difference between a V–N compound and a V–N phrase is that the former is accessible to limited insertions, such as object restructuring and insertion of bound morphemes, whereas the latter can be expanded in many ways and undergo various kinds of syntactic movement. For example, Li and Thompson (1981) gave the following sentence (p. 76):

- 3a. *zhei ge huang women bu neng shuo.*  
 this CLASSIFIER lie we not can say  
 "This lie we cannot tell."

According to Li and Thompson, *shuo-huang* ('say-lie': to lie) is a real compound and is undergoing the most drastic type of syntactic transformation that a compound can undergo. Many V-N compounds cannot undergo such a transformation. However, even *shuo-huang* cannot undergo the following transformations.

3b.\* *ni huang shuo mei shuo?*

you lie say not say

'Did you tell the lie?'

3c.\* *huang, wo bu shuo le.*

lie I not say ASP

'I'm not going to tell lies (any more).'

However, the V-N form *feng-yi-fu* ('sew-clothes': to sew clothes), which was classified as a compound in Bates et al. (1991), can undergo not only the 3a type of transformation, but also the 3b and 3c (and other) types of transformations.

4a. *zhei jian yi-fu wo but hui feng.*

this CLASSIFIER clothes I not able sew

'This clothes I don't know how to sew.'

4b. *ni yi-fu feng mei feng?*

you clothes sew not sew

'Did you sew the clothes?'

4c. *yi-feng, wo bu feng le.*

clothes I not sew ASP

'I'm not going to sew clothes (any more).'

If we accept that those V-N forms which only allow limited syntactic movements are compounds and those V-N forms which allow various kinds of transformations are phrases, clearly, *shuo-huang* is a V-N verbal compound while *feng-yi-fu* is a V-N phrase.<sup>1</sup>

#### THEORETICAL PROBLEMS WITH BATES ET AL. (1991)

When we apply the above theories to the V-N forms which were listed in the Appendix 2 of Bates et al. (1991) and which served as 'best responses' in picture naming, a problem in the research becomes obvious. If one adopts C.-T. J. Huang's theory, all 27 Verb-Noun targets in action naming and classified by the authors as compounds should be V-N

<sup>1</sup> As we understand it, the differences between V-N verbal compounds and phrases could be more complex than these theories state. There are no general principles to tell us which V-N compound can undergo what sort of limited transformation. The ability of V-N forms to undergo syntactic movements could be a matter of degree. We suspect that other factors (e.g., frequency, productivity) should be taken into account. (We will not go into details since they are beyond the scope of the present short comment). More importantly, we doubt that *all* linguistically defined compounds (especially the V-N verbal compounds) are represented as wholes in the lexicon.

phrases. If one accepts Y. Y. Huang's or Li and Thompson's arguments and adopts lenient criteria (favoring compounds) concerning the idiosyncrasy of word meaning and the ability of syntactic transformation, at least 15 items should still be classified as V-N phrases. Although the authors did not specify what criteria they used when they assigned "best responses", it seems to us that there are no linguistic bases for classifying *feng-yi-fu* ("sew-clothes": to sew clothes), *cui-la-zhu* ("blow-wax-candle": to blow candle), *jian-zhi* ("cut-paper": to cut paper), etc. as verbal compounds.

Confusing phrases with compounds in Bates et al. (1991) is not a trivial matter. This is because their claim about the sublexical double dissociation hinges entirely on the assumptions that their V-N targets are compounds and these compounds are lexically listed in whole-word forms. The authors reasoned that, if Broca's aphasics are found to have more difficulty with the verbal component of a V-N verbal compound while Wernicke's aphasics show the opposite pattern, a lexical account that nouns and verbs are represented separately in the lexicon according to form class (Miceli et al., 1988) must be rejected. It is difficult for this account "to explain patient group differences at the *sublexical* (the authors' own emphasis) level, i.e., a double dissociation that penetrates the internal structure of compound words" (p. 223). By claiming that such a dissociation *within* lexical compounds was indeed observed, the authors advanced a version of distributed lexical representation based on Rumelhart and McClelland (1986). However, when we go through the transcript of patients' responses to the seven V-N forms which we consider as most likely to be real verbal compounds, we do not find a double dissociation: Broca's patients' performance on verbal elements was actually slightly better than that on noun elements (69% vs. 62%). Although Wernicke's patients in general performed better on verbal elements than on noun elements (94% vs. 73%), it was mainly due to the two patients (Nos. 27 and 54, see their Appendix 4).

Moreover, there are at least two problems in their reasoning. First, the claim of the double dissociation at the sublexical level cannot be substantiated by their data because over half of the V-N forms they used were phrases and the sublexical level was *not* involved. Second, although Zhou (1992) found that Chinese disyllabic words are in general represented as wholes in the lexicon, because of the unusual morphological properties of V-N verbal compounds (which were purposely excluded in Zhou), whether the assumption of the whole-word lexical representation for real V-N compounds in Bates et al. (1991) is valid or not is an open question. It could be the case that V-N compounds behave differently in lexical representation and processing from other compounds.

Because the action naming was contaminated by phrases, the authors were comparing lexical effects (naming objects) with syntactic effects

(phrasal descriptions of an action) in their overall analyses. Their main conclusion about the lexical level double dissociation between noun–verb is therefore called into question. Unfortunately, Bates et al. (1991) did not break their data down further according to “compound” types (i.e., N, N–N, V–V, V–N, etc.; see their Appendix 2). Once again, we examined the patients’ responses to the seven V–N forms we consider as most likely to be phrases. Interestingly, we did find a double dissociation in patients’ performance on verbs vs. on nouns (at the lexical level): for Broca’s patients, 48% vs. 74%; for Wernicke’s patients, 86% vs. 57%. Thus it seems that, for Chinese Broca’s and Wernicke’s patients, there is a double dissociation between nouns and verbs at the lexical level. There is, however, no evidence that this dissociation extends to the sublexical level.

#### METHODOLOGICAL PROBLEMS WITH BATES ET AL. (1991)

Could it be argued that the action names listed in Appendix 2 of Bates et al. (1991) are simply not the “best responses” the authors assumed, so that other V–N verbal compounds can be found to replace the V–N phrases? This question leads us to the methodological problems associated with the research. The pictures the authors used were adopted from Miceli et al. (1988) on Italian patients without considering properly the linguistic/cultural differences. For over half of the pictures, it is simply not possible to find real V–N verbal compounds in Chinese that correspond to the pictures and could be used as target words. We would like to suggest that, instead of using pictures borrowed from a study on a different language, the best way to investigate the sublexical double dissociation in a similar study in Chinese is to find unambiguous V–N verbal (or nominal) compounds first, such as *tiao-sheng* (“jump-rope”: to jump rope) and then match them with appropriate pictures.<sup>2</sup> Moreover, it seems to us that it is hardly appropriate to assign “best responses” by the experimenters without pretesting and normalizing target words.

Third, we would like to stress that asking subjects to give *names* of actions out of context cannot guarantee that, as the authors implicitly assumed (e.g., in their footnote 1), subjects’ (best) responses are words, not phrases. Suppose there is a picture describing a person reaching out his hand to pick up a cup (pen, watch, book, calculator, photo, tape

<sup>2</sup> One reason for the authors not matching word frequencies of nouns and verbs is that they knew of no such frequency norms (p. 215). In fact, such norms do exist, not only for words used in mainland China (Institute of Language Teaching and Research, 1986), but also, as far as we know, for words used in Taiwan, where the authors tested patients. The Taiwan norm was collected by Liu, Chuang, and Wang (1975).

cassette, bag, purse, dish, . . . , or anything that could be picked up), a typical response in action naming would be *na beizi* ("fetch-cup": to fetch a cup). The authors would have to either argue that normal subjects cannot respond, which is unlikely, or argue that all the V-N forms (a verb plus the names of those objects) are compounds. (Note, a few V-N forms in their "best responses" are just like *na beizi* here). It is clear to us that if these kinds of V-N forms are compounds which are listed in the mental lexicon, as the authors would assume, the number of lexical entries in the lexicon would be almost unlimited.<sup>3</sup>

One point of clarification. Although the authors did not discuss the differences between V-N compounds and phrases in their introduction to Chinese, they did mention that there is a *one-to-one* relationship between syllables (a phonological unit) and morphemes (a minimal unit of meaning) in Chinese (p. 211). In fact, only about one-fourth of the 1300 syllables used in Mandarin Chinese have such a relationship. Although most morphemes correspond to definite syllables, most syllables are ambiguous, in the sense that they represent several homophonic morphemes. A syllable, on average, corresponds to 4 different morphemes and a few syllables may represent about 40 morphemes. This point is important because the ambiguity of the syllable plays an important role in the lexical representation and processing of Chinese compound words (see Zhou, 1992).

### CONCLUSIONS

In this comment, we argued that the Bates et al. (1991) study confounded Chinese V-N verbal compounds with V-N phrases. Their argument that the double dissociation of Broca's and Wernicke's aphasics on the noun-verb components of compounds at the sublexical level is invalid and their suggestion for a distributed lexical representation is not substantiated. We also pointed out a few methodological problems associated with the research. But we do not go so far as to deny the double dissociation between noun-verbs in Chinese aphasics. We believe that the processing of V-N verbal compounds, because of their special morphological and grammatical properties, is an interesting issue, not only for Chinese aphasia research, but also for normal lexical processing.

<sup>3</sup> There is an important moral here. If we have a loose linguistic definition of compoundhood, such as assuming *bathroom towel rack* is a compound (Selkirk, 1982), these compounds cannot, to us, be listed as wholes in the mental lexicon. If we have a narrow definition of compoundhood, *bathroom towel rack* would be a phrase and *bathroom* and *rack* would have to be listed separately in the lexicon. Whichever definition we choose, it is difficult to conclude something about the *sublexical* level by comparing performance on *bathroom* and *rack*.

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