

Comprehension – Behavioral Studies: Psychological Reality of Linguistic Structure

THE NOTION OF PSYCHOLOGICAL REALITY

This lemma reviews the notion of psychological reality and its application to Chinese linguistic structures. Linguistic structures claimed to be psychologically real are claimed to be psychologically active, not merely descriptively convenient, even if there is no direct physical evidence for them.

In an early study on psychological reality, Sapir (1949) argued that phonemes are not merely notational tools for grouping physical sounds, but mental entities with causal effects on behavior. Describing how his Sarcee-speaking consultant claimed to hear a contrast between two phonetically identical words, which only reveal their differences when suffixed, Sapir concluded that the phonemes implied by the alternations were psychologically real.

However, claims of psychological reality remain controversial. One reason is that it is unclear what sort of reality psychological reality might be. Linguists often seem to assume that linguistic structures have causal effects (e.g. on acceptability judgments) via consultation of the grammar during processing, but an alternative is that grammar is actually an abstract functional description of processing (Matthews 1991, after Marr 1982). In favor of the latter view, Neeleman and van de Koot (2010) argue that real-time grammar consultation would be impossibly inefficient. As they also argue, however, only as an abstraction can grammar generalize across both input and output systems and encode the regularities necessary for communication, regardless of how the code is processed.

Also controversial is what sort of evidence would be necessary to demonstrate psychological reality. After all, traditional linguistic evidence is already psychological. In particular, informal judgments of sentence acceptability not only involve psychological states,

but as has been pointed out repeatedly (see Myers 2009a for review), they are also collected using methods similar to formal experiments in cognitive psychology, with stimuli (the sentences) and responses (the judgments). Thus there is no intrinsic difference between supposedly "psychological" and "non-psychological" evidence (Chomsky 1980).

Nevertheless, traditional linguistic evidence is limited in its ability to rule out alternative psychological hypotheses. For example, generative phonologists assume that lexical phonological patterns represent grammatical knowledge, but words could instead be memorized by rote, with the patterns already present (Ohala 1986). Similarly, the informal nature of traditional syntactic acceptability judgments (a few sentences tested by a few syntacticians) leaves open the possibilities that the judgments are statistical flukes, theoretically biased, or shaped primarily by general processing constraints (Schütze 1996).

Therefore, for claims of psychological reality to be taken seriously, linguistic methods should be chosen for their power to narrow down the range of candidate hypotheses, a feature Ohala (1986:2) calls "winnowing capacity."

TESTING THE PSYCHOLOGICAL REALITY OF LINGUISTIC STRUCTURES IN CHINESE

Just as for other languages, claims about the psychological reality of linguistic structures in Chinese have been made on the basis of natural speech errors, experimentally collected acceptability judgments, and other experimental tasks.

Speech errors generate novel forms unintentionally, so patterns in them cannot be ascribed to rote memory or metalinguistic bias. Wan and Jaeger (1998) use such errors to support an analysis of Mandarin tone as a lexical component of a syllable, rather than as a prosodic feature like stress, with contour tones more holistic than is the case in African tone languages. For example, they note that when speakers erroneously blend two lexical syllables,

the tone contour of one source syllable appears on the rime preserved from that syllable (e.g. 說 *shu* 'say' and 談 *tán* 'chat' blended as *shán*).

Interpreting speech errors is difficult, however; Chen (1999) comes to very different conclusions about Mandarin tone from Wan and Jaeger (see Wan 2007 for a response). Moreover, speech errors only reflect production, not other aspects of phonological processing. For reasons like these, Ohala (1986) rates natural speech errors as having less winnowing capacity than experiments, which are under researcher control and generate a greater variety of data.

Grammar experiments often use acceptability judgments. Judgment tasks have been used to study Chinese phonology (Wang 1998, Kirby and Yu 2007) and morphology (Myers 2007), but as in traditional linguistics, it is most common in experiments on syntax or semantics. The strength of acceptability judgments comes from their winnowing capacity, not their status as intuitions, since intuition has no more direct access to grammar than it does to any automatic mental system. Speakers can judge acceptability, but acceptability is not grammar, but rather a (noisy) side-effect of the processes that implement (or consult) it.

Concerns about bias and unreliability in acceptability judgments can be dealt with by using standard psycholinguistic protocols, with enough items and theoretically naive speakers for statistics (Cowart 1997, Myers 2009a). Ironically, such methods have provided evidence that traditional syntactic judgments are already quite robust (Sprouse and Almeida 2012). Myers (2009b) exemplifies this point by experimentally replicating most of the Chinese judgment claims in Li (1998).

However, as Myers (2009b) also points out, careful experimental design remains crucial. Xu (1996) presents a cautionary tale in his review of experimental judgment studies on Chinese reflexives. Battistella and Xu (1990) found experimentally that naive Chinese speakers consistently interpreted 自己 *zìjǐ* in complement clauses as coreferential with the

matrix subject. However, this long-distance binding pattern was due to their matrix verbs always being like 告訴 *gàosù* 'tell'; with verbs like 勸告 *quàngào* 'advise', Ho (1995) found that speakers preferred local binding. Xu (1996) concluded that explaining the variation in judgments requires taking pragmatics into account, a hypothesis made more precise by Huang and Liu (2001) and Pan (2001).

Judgment experiments have explored other extra-syntactic influences on sentence acceptability. Hsieh (2009) found that matrix verb choice also affects the interpretation of embedded null objects in Chinese. Lin (2004) tested the tendency for the 被 *bèi* construction to be associated with a negative connotation; verb semantics had no effect, suggesting that the syntax-pragmatic interaction occurred without lexical mediation. As part of a multi-language study, Murphy (2007) also found gradient animacy and telicity effects on the acceptability of the *bèi* and 把 *b* constructions.

Sentence judgments are also affected by syntax, of course. Francis and Matthews (2006) found that Cantonese speakers judged extraction from coverbs to be unacceptable, even though they also judged coverbs to be acceptable with aspect marking. Together these results motivate an analysis where coverbs are not prepositions but verbs that form adjunct islands.

Judgment experiments need not be time-consuming to be informative. In a single small-scale Chinese study, Myers (2012) confirmed that extraction was less acceptable from adjuncts than from conjuncts (consistent with Huang 1982 and Zhang 2009, respectively), even when the gap was associated with topicalization, implying that it involves movement (contra Xu and Langendoen 1985). Moreover, adjunct island effects weakened over the course of the experiment, suggesting a role for online processing in the implementation of this grammatical constraint.

All experimental tasks have limitations, so it is best not to rely on acceptability judgments alone. To study Mandarin syllable structure, Wang and Chang (2001) employed

both a syllable blending task and a syllable splitting task, finding that medial glides were consistently grouped with rimes. Using a concept formation task, in which participants are trained to classify items in a prespecified way to test if the classification is intuitively natural, Wang (2001) found that native speakers of Southern Min tended to group nasal vowels with their oral counterparts, suggesting that lexically contrastive nasality is represented at the syllable level in this language.

Measures of processing speed can also shed light on grammar. Thus subtle differences in lexical decision times have provided important evidence about latent morphological knowledge in Chinese, including the psychological reality of words and morphemes (Myers 2006; see lemma Behavioral Studies: Processing of Chinese Compounds). Similarly, Lin (2012) found that resumptive pronouns in relative clauses cause the following head to be read more slowly, suggesting that Chinese speakers consider such structures unacceptable in part for parsing reasons: a resumptive pronoun makes a relative clause look like a main clause.

Sentence processing experiments have also been designed specifically to test grammatical analyses (cf. Li and Zhou 2010, reviewed above). For example, in an eye-tracking experiment, Ren and Yang (2010) showed that the insertion of a following comma shortened reading time only clause-finally, providing a new kind of evidence for this syntactic constituent. Testing a more controversial constituency claim, Cai (2010) employed a syntactic priming task to test if *bèi* and *b* form a constituent with the nominal alone (i.e. $[[bèi/b \text{ NP}] \text{ V}]$) or with a small clause (i.e. $[[bèi/b \text{ [NP V]}]$). In each experimental trial, speakers repeated aloud a sentence with a given structure, including the 比 *b* comparative, uncontroversially $[[b \text{ NP}] \text{ VP}]$. Participants then described pictures of unrelated transitive actions. Results showed that *b* structures were produced more often when primed with baseline intransitive structures than with *b* structures, suggesting that *b* and *b* are structured differently; results for *bèi* were less conclusive.

Particularly striking is evidence suggesting that the parser itself has sophisticated grammatical expectations. In a self-paced reading task, Lin (2011) found that possessors of inalienable nouns, which imply a relationship, were read faster than possessors of alienable nouns, consistent with Lin's hypothesis that inalienable nouns project a syntactic position expected by the parser. The parser also seems to encode grammatical constraints. Replicating Phillips (2006), Huang and Kaiser (2008) found that in islands where Chinese grammar permits a parasitic gap, reading time slowed at the island-internal verb if the sentence-initial topic was semantically incompatible with it, even though no gap was actually present. This suggests that the parser automatically considered the possibility of a parasitic gap, licensed by a subsequent matrix trace.

Finally, parsing experiments can also help illuminate the semantic component of grammar. After confirming through a judgment experiment that sentences containing a universal quantifier in the subject and an existential quantifier in the object do indeed have ambiguous scope, Zhou and Gao (2009) found via eye-tracking that readers initially maintain both possible interpretations, since eye fixation times were not significantly different in the following clause, where disambiguating contextual information was given. Consistent with a view of syntax as relatively autonomous of semantics, only when readers later reread portions of the sentence did contextual information affect fixation times.

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James Myers

Summary

This lemma reviews the notion of psychological reality and its application to Chinese linguistic structures.

Index terms

acceptability judgments

b construction

bèi construction

Cantonese

parasitic gaps

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reflexives

speech errors

syllables