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Clarifying the cognitive experimental approach to bilingual research

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In her article, Pavlenko has raised a number of important issues for bilingual research. My comments are limited to a subset of the issues of particular relevance to cognitive psychology. First, I discuss the use of developmental models, the relevance of the concept ''culture'', and the impact of cross-language typicality differences on cognitive tasks. Second, I evaluate the necessity of a distinction between semantic and conceptual representations. Finally, I discuss distinctions among types of research that are often confused.

As Pavlenko correctly argues, developmental models of bilingual language acquisition are likely to be important in the future of bilingual research, because they allow for changes in representation with learning. While cognitive psychologists have studied extensively the organization of bilingual lexical and semantic representation in proficient bilinguals, we have paid far less attention to how the representation got to that point (with the notable exception of Kroll's Revised Hierarchical Model, e.g., Dufour & Kroll, 1995). What does it mean cognitively for a person to go from being monolingual to being bilingual? It is difficult to say at this time, because the data on appropriate cognitive tasks across different levels of learning are sparse. There are very few cross-sectional studies of bilinguals at several different stages of language acquisition (notable exceptions being Mägiste, 1992; Chen, 1990). And longitudinal studies of bilingual language acquisition, as far as I know, are non-existent among researchers taking a cognitive approach, except for a handful of short-term training studies (e.g., Chen, 1990). Therefore, the existing data are insufficient to provide empirical support to build a more comprehensive model of bilingual language development.

There is a large body of developmental or second language acquisition research that *does* describe the patterns of language performance exhibited by second language learners at different levels of proficiency, at different ages, and in different situations. However, they shed virtually no light on the cognitive processes underlying the observed effects. For example, many studies have been interpreted as supporting a critical period for language learning, even at times alluding to biological constraints, yet not one that I know of attempts to explain what cognitive processes or mechanisms might be relatively problematic for older learners. Without a cognitive mechanism for the differences observed, it seems premature to conclude that the differences observed are purely maturational.

Pavlenko argues also that cognitive psychologists tend to ignore the potential influences of culture on cognition and language representation. As with other known effects of non-cognitive variables on cognition, like the effects of emotion on memory, we conduct our studies as if those variables did not exist, relying on random assignment or on keeping such variables constant across conditions. The reason that these variables are ignored is not because we do not believe they exist, but because it is very difficult to define culture and measure it, let alone manipulate it in an experiment. In the experimental tradition, such variables are difficult to accommodate and come under heavy criticism because of disagreement on how to measure them and the inability to draw causal conclusions. For the same reasons, even using language proficiency as a variable (something I do advocate and practice) tends to put the bilingual research outside the mainstream of cognitive psychology.

In spite of my own reluctance to introduce culture *per se* as a variable in my research on bilingual language processing, there is a possibility that if an appropriate measure could be agreed upon, it could become more useful. Awareness of culture ought to be present in thinking about bilingualism and in constructing appropriate experimental materials, but what is an appropriate operational definition for culture? Culture appears to be a catch-all term to explain all unmeasured differences among people with different ways of life and different belief systems. Determining the underlying components of culture that are relevant to language organization may be of more interest. Related to these components are the questions that researchers typically ask bilingual participants in screening or language background questionnaires. Most cognitive bilingual researchers do collect such measures even if the intention is merely to report summary statistics on a subset of the variables. Perhaps we should look more closely at how these variables are associated with the experimental outcomes.

Pavlenko reminds us that across different cultures we should expect to find differences in category member typicality. In fact, typicality of category members can differ substantially even among geographic regions within a single monolingual country (Battig & Montague, 1969), probably because of differences in animal life, vegetation, weather, etc. However, differences in typicality do not necessarily compromise cognitive research, as long as appropriate experimental controls are used. To illustrate, Pavlenko criticizes the Caramazza and Brones (1980) study on the grounds that they assumed that Rosch's typicality norms for English also applied in Spanish. My reading suggests that they did not make this assumption, because they had a native Spanish speaker verify the high and low typicality of the items in Spanish; the absolute rankings of

the particular category members were not of interest. Further, the assumption is not necessary for the main conclusions drawn. The goal of the study was to compare within-language and between-language category membership judgments. The typicality levels were used merely as a blocking variable that served to account for some of the variability in response times. Any differences in typicality would be balanced across same-language and different-language conditions and would therefore not compromise the interpretation that the two languages accessed a common semantic or conceptual system.

A major goal in Pavlenko's article is to build a case for making a distinction between semantic and conceptual representations. My first reaction to this recommendation is that it is a lot to expect given the failure in the literature to distinguish clearly even between lexical and conceptual/semantic levels of representation (Francis, 1999). Some researchers clearly separate the lexicon from a semantic or conceptual store, whereas others clearly include semantic information in the lexicon, and most leave this relationship ambiguous. Similarly, there are inconsistencies in inclusion or exclusion of phonology, orthography, morphology, and syntactic properties in the lexicon. For example, some put the "phonological level" below a "lexical level" that serves only to coordinate phonological sequences with their meanings. On the other hand, some researchers who model the acquisition of language propose systems in which there is no direct representation of meaning; instead there is a large database consisting purely of co-occurrence frequencies for different words.

I do agree that the intended relationship between the terms *semantic* and *conceptual* is ambiguous. In most articles, the relationship assumed by the authors is not specified; in some articles, the terms are used interchangeably, but in others only one term or the other is used exclusively. One possibility is that word meanings, or semantic representations, are a particular type of concept. This subset relationship would be consistent with the position of many linguists. One of the leading researchers on semantics, Ray Jackendoff (1994, 131), gives the following definition: "a word meaning is a fragment of conceptual structure that is linked in long-term memory with a phonological structure (its pronunciation) and a syntactic structure (its part of speech and other syntactic properties such as grammatical gender and case-marking characteristics). That is, the words one knows consist of stored concepts linked with stored elements of linguistic expression." Of course we also have numerous concepts that are not associated with any particular word. Another way to think about this is that semantic representations or word meanings are the mappings of verbal labels to their concepts.

The evidence cited in support of the semantic/conceptual distinction can be satisfactorily explained under a model that does not make such a distinction. First, to clarify the framework for my reasoning about semantic or conceptual systems, a semantic/conceptual system consists of an innumerable set of possible semantic components, of which any word meaning is identified with a subset of those components (as in de Groot, 1992). This subset is identified by a particular pattern of activation or connection weights across the entire system. For example, within the framework of multi-componential semantic/conceptual representations, the reason why L2 words are not as meaningful to the learner as L1 words could be that the L2 words are not yet as strongly associated with their concepts as are L1 words. That is, when a new word in L2 is first added to the vocabulary, only some components of the concept are acquired (i.e., a subset of the L1 conceptual representation), and with more experience more components are acquired (Dufour & Kroll, 1995). When a person learns two languages simultaneously, the components could become associated with the different language labels in different orders, resulting in only partial overlap in the representations, which with increased fluency in both languages should stabilize as a common merged representation.

A second source of evidence cited by Pavlenko in support of the separation of semantic and conceptual levels is the existence of aphasia patients who lose access to language, with non-linguistic categorization and object recognition remaining intact. Clearly, these findings support separate levels of representation for the concepts and their verbal labels. However, we cannot say that the semantic level is impaired, because once the lexical-level representations are eliminated for both comprehension and production, verbal access routes to access the semantic representation are lost. Determining whether the "semantic" aspects of language are indeed impaired or intact in aphasic patients will be extremely difficult.

Pavlenko cites a variety of findings from cross-cultural studies of monolinguals, as if the results were expected to be similar in studies of bilinguals. It seems important to clarify the differences among three types of research that can be easily confused. One type is the cross-linguistic or cross-cultural study of monolinguals, with the issue being the extent to which monolingual speakers of different languages have different conceptual or semantic representations. A second type is whether bilinguals (at different stages or with different backgrounds) have representations more consistent with native speakers of their L1, native speakers of their L2, or some hybrid representation. The third type, and the most common among cognitive experimental psychologists, addresses the relationships among the concepts or languages within an individual bilingual mind. The answers in one area do not necessarily agree with findings in the other. For example, in a study of picture naming, monolingual English and Spanish speakers and Spanish–English bilinguals exhibited differences in their modal responses (Goggin, Estrada, & Villarreal, 1994). Similarly, typicality differences across any two languages are likely larger across monolingual speakers of each language than within bilingual speakers of the two languages. Results from the cross-cultural study of monolinguals are not always relevant in making inferences about bilinguals.

A final point I would like to make is that there is a common misconception in the literature, implied by Pavlenko and stated explicitly by many others, that Weinreich's (1953) foundational work introduced the labels *coordinate*,

compound, and *subordinate* to describe different contexts of language acquisition. While the book includes a chapter on the socio-cultural setting of language contact, the three terms were not used to describe these effects. In the second chapter of his book, Weinreich proposed three models of the relationship among words learned in two languages of a bilingual. The coordinate model corresponds to the modern ''separate-concept model'', the compound model to the ''shared-concept, concept-association model'', and the subordinate model to the ''shared-concept, word-association model''. Weinreich fully acknowledged that the representations could be different for different individuals and for different words within an individual's vocabulary. However, he made no claims about the language-learning histories leading to these representations; that extension was made by Ervin and Osgood (1954), who applied Weinreich's labels for mental representations to particular language-learning histories. They did not merely expand on his work – they changed the definitions of his terms, and their usage of the terms is by far the more common usage of those terms today. Nevertheless, Weinreich's book lays out ideas that set the stage for many of the major issues in bilingual research today.

In summary, Pavlenko's article is thought-provoking and deals with complex and controversial issues in a detailed manner. I especially applaud her effort to integrate literature from psychology, linguistics, and education. Although I disagree with some of the reasoning or conclusions drawn, it certainly made me examine my own views more carefully, and I will look forward to hearing the results of bilingual research that uses the new approaches proposed.

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