



Semantics and cognition

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The words and grammar of any language encode a vast array of complex prepackaged concepts, most of them language-specific and culture-related. These concepts are manipulated routinely in almost every waking hour of most people's lives. They are largely acquired in infancy and they are intersubjectively shared among members of the speech community. It is hard to imagine such elaborate and variable representation systems *not* having a substantial role to play in ordinary cognition, and yet the language-and-thought question continues to be a contested one across the various disciplines and sub-disciplines of cognitive science. This article provides an overview from the vantage point of linguistic semantics. © 2010

John Wiley & Sons, Ltd. *WIREs Cogn Sci* 2011 2 125–135 DOI: 10.1002/wcs.101

INTRODUCTION

Many aspects of human cognition, such as basic perception, attention, and visual processing, are substantially shared with other primates. Language is primarily relevant to higher order cognitive processes that are largely, if not entirely, species-unique. Importantly, human cognition not only includes reasoning and information processing about physical reality but also includes the so-called social cognition, i.e., assessing and reasoning about intentions, mental states, and social situations,¹ and it is in this arena that language has some of its clearest cognitive effects. Although higher order thinking need not be conducted exclusively in terms of linguistic concepts, there can be no doubt that language plays a substantial role in normal cognition (including categorization, planning, problem solving, and memory). Some scholars maintain that language is partially constitutive of higher order cognition and epistemologically essential to any inquiry into it.²

The crucial fact is that there is tremendous variation across the world's languages in the semantic (meaning) content of words and grammatical categories.^{3–13}

The basic arguments for the involvement of language-specific semantics in cognitive processes are simple and compelling. In order to speak using the lexical categories and observing the grammatical

distinctions of any language, speakers must attend to and manipulate a large number of language-specific conceptual distinctions. Thus, at the very least, there must be a mode of cognitive processing, which Dan Slobin¹⁴ dubbed 'thinking for speaking', which dovetails with linguistic concepts. Viewed from another angle, any language can be thought of as a 'tool for thinking', inasmuch as its lexical and grammatical categories provide speakers with a vast array of ready-made concepts. The packaging of complex concepts into words enables complex manipulations to be undertaken, which would be impossible without conceptual 'chunking'. From the developmental perspective, evidence indicates that language acquisition does not merely reflect conceptual development, but contributes to it in complex ways. As a shared system of cultural representations, language is one of the main instruments by which children are socialized into the values, beliefs, and practices—including thinking practices—of their culture.

Although the relationship between language and thinking is a perennial topic (under the rubric of the Sapir-Whorf hypothesis and/or linguistic relativity), the question is often approached in a rather abstract fashion. At the worst, there is a thinly veiled assumption that all languages are 'broadly similar', i.e., not much different to English, so far as categories and conceptual content is concerned, a belief which has been partly nurtured by acceptance of the formal universals of generative grammar and partly by the fact that most cognitive scientists in the Anglophone world are monolingual. The primary emphasis of this article is therefore on the nature, scope, and cognitive import of language-specific differences in lexicon and grammar.

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DOI: 10.1002/wcs.101

These matters are dealt with in sections *Language-Specific Lexical Semantics and Cognition* and *Language-Specific Grammatical Semantics and Cognition*, respectively. The section *Metalanguage and Tertium Comparationis* looks into methodological issues facing studies of semantics and cognition. The section *Universals in Semantics and Cognition* considers claims and counterclaims about language-universal conceptual categories embedded in human languages. The section *Conclusion* contains concluding remarks.

LANGUAGE-SPECIFIC LEXICAL SEMANTICS AND COGNITION

As Gentner and Goldin-Meadow¹⁵ observe, the language-and-thought question is often viewed in a rather schizophrenic fashion. In one breath, it is admitted that words—of course—have an influence on our thinking, and in the next this influence is dismissed as banal, trivial, uninteresting, etc. To some extent the paradox may be explained as a side effect of simple ignorance about the scale of cross-linguistic differences, but the cognitive influence of the lexicon is sometimes downplayed on the seemingly more reasonable grounds that speakers may exercise conscious control over their choice of lexical options. In reality, however, many culture-specific influences of words on cognition are non-obvious and below normal conscious awareness or control.

As a preliminary example, consider the role of numbers and number words in relation to numerical cognition. Many languages of the world lack elaborate systems of number words and do not engage in counting (or similar practices, such as tallying). It is widely recognized that numbers furnish a ‘cognitive technology’ that greatly enhances underlying universal cognitive capabilities for manipulating and remembering precise numerical quantities. Even the difference between Arabic and Roman numerals can be shown to have important cognitive consequences. Similarly, it is widely recognized that the highly elaborated kinship vocabularies of indigenous Australian languages, for example, provide a cognitive scaffolding that enables speakers to routinely manipulate and store complex genealogical and social information (hence the term ‘kinship algebra’). Consider the elaborate and largely obligatory systems of honorification (roughly, expressions of respect and social hierarchy) found in Korean and Japanese. As with terms of address systems, these linguistic systems require speakers to attend in great detail to local social distinctions and at the same time, they reinforce and perpetuate these distinctions. Or consider the fact that compared with most indigenous cultures,

European languages have a large stock of expressions to do with measuring and reckoning time (words such as *clock*, *calendar*, *date*, *second*, *minute*, *hour*, *week*, *Monday*, *Tuesday*, etc. *January*, *February*, etc.).

These are examples of what is often termed *lexical elaboration*. Although not an exact term, this expression designates the situation of a language having an impressively large number of words in a particular semantic domain, thereby providing the terminological scaffolding for fine conceptual discrimination in the domain. Lexical elaboration is not necessarily apparent to native speakers.

Another useful concept that points to a powerful possible interdependence between language-specific semantics and cognition is the concept of *cultural key word*.^{9,16,17} The idea is that certain words designate salient concepts that serve as conceptual focal points for a wide-ranging complex of values, attitudes, and beliefs in a given culture. Such terms are usually resistant to translation, but under close semantic study they can be extremely revealing. Two examples will suffice. Scholars of Japan agree that *wa*, usually translated as ‘social harmony’, ‘concord’, ‘peace’ or ‘unity’, is one of the key Japanese social ideals. As one authority has written: ‘To achieve *wa* is certainly a major goal for any Japanese group, and it also is an essential ingredient in the attainment of other goals. In this regard, it is something like “love” in American popular culture, for it is both a major means to social improvement and an end in itself’. Forged by collective effort, *wa* offers not only the comforting feeling of group unity and absence of conflict, but also the promise of group achievement. Thus, *wa* has clear implications of the value placed in Japanese culture on ‘groupism’ and, conversely, on something like ‘anti-individualism’.

To take an example closer to home, it can be argued¹⁷ that the English word *evidence* does not have precise equivalents even in many European languages (French, e.g., does not distinguish between what are termed in English ‘evidence’ and ‘proof’), much less in most languages of the world. Rather it reflects and reinforces an empiricist cognitive style that had its origins in the British Enlightenment, but which has since permeated the modern Anglosphere, along with the pervasive influence of science. Arguably, culture-specific concepts such as Japanese *wa* and English *evidence*, which are ‘commonsense’ concepts in their home cultures, enable and promote patterns of thinking that would be otherwise impossible to carry out in a routine fashion.

The domain of *ethnopsychological categories and processes* holds particular interest for cognitive science because of its role in indigenous folk psychologies and its relevance to the agenda of

cognitive science itself. This can be demonstrated by reference to the English word *mind*—surely, a key word for psychology and cognitive science generally. It is a remarkable fact that the English word *mind* lacks precise equivalents in most of the world's languages, even European languages such as French, German, and Russian.⁹ When Descartes argued for 'mind-body' dualism, for example, he was opposing the word *corps* 'body' to *âme*, a word with a significantly richer meaning than modern English *mind*. Similarly, Freud's primary concept was *die Seele* (roughly, 'soul'), and to translate *Seele* as 'mind' is to significantly distort Freud's thinking. Arguably, the modern English concept of *mind* reflects a dualistic conception of the person as consisting of two parts: on the one hand, the body, and on the other, the *mind*. The interesting thing from a cross-linguistic and cross-cultural point of view is the rationalist slant of the folk concept of *mind*. The *mind* is focused primarily on thinking and knowing, rather than on feeling, wanting, or any other non-bodily processes. (To say that someone has a *good mind* suggests that a person can *think* well, rather than, say, the emotional and moral qualities suggested by the phrase *a good heart*.) Russian *duša*, in contrast, variously rendered in English as 'soul', 'heart', and 'spirit', is a much broader concept linked, above all, with feelings, with a certain profundity or spiritual quality, and with values and moral capabilities. Except for a handful of very general concepts ('think', 'know', 'want', 'feel'; see section *Universals in Semantics and Cognition*), evidence indicates that there are no universally lexicalized concepts in the realm of mental states or emotions.^{18–23}

Can culture-specific categories influence not only cognition about subjective experience, but also the experience itself? Many psychologists are reluctant to entertain the possibility. Anthropologists and humanities scholars are more accepting, but two eminent psychologists who believe that emotional and cognitive experience differs across languages and cultures are Jerome Bruner and Richard Shweder. Bruner²⁴ lays stress on how the 'experience-near' concepts of indigenous folk psychology enter into people's life narratives and self-understandings. Shweder²⁵ (p. 28) sees everyday words and expressions as contributing to the 'implicit meanings (the goals, values, and pictures of the world) that give shape to psychological processes'. In view of the epistemological priority of self-report, one must attach particular importance to the experience of 'deep bilinguals', i.e., people who have lived their lives through two or more languages. Here a substantial body of life writing, both in fiction and memoir, testifies that the caliber and quality of emotional and

cognitive experience indeed vary with the linguistic and cultural environment in which it is lived out.^{26–28}

Lest it be thought that language-specific semantics tends to congregate exclusively in the 'abstract' or 'social' departments of the lexicon, it should be pointed out that there is an extensive body of research attesting to cross-linguistic semantic variation, and co-variation in other cognitive processes, in two very concrete lexical domains: space and motion. The literature on space^{3,7,29} is treated elsewhere. One of the key findings is that cognition about directions, spatial configuration, and navigation is strongly influenced by whether the language of the speakers prefers a relative/egocentric system of spatial orientation (as does English, with its emphasis on 'left' and 'right') or an 'absolute' system (based, e.g., on cardinal directions). As for motion, it is widely recognized that languages differ in their preferred *lexicalization pattern* for motion verbs, i.e., in their characteristic pattern of semantic packaging. English motion verbs, for example, typically encode the manner-of-motion (*run, walk, creep, crawl, limp, jump, fly, dash, climb, clamber*, etc.), but to further encode the path (direction, etc.) one needs to add an additional adverb (*down, away, out*, etc.) or prepositional phrase (*into the room*, etc.). Many languages follow the English pattern, whereas many others, including Spanish, Japanese, Turkish, and Hebrew follow the converse pattern, i.e., they have many verbs coding a path specification, but to further express manner-of-motion one needs to add additional description. Compare English *run down* with Spanish *bajar corriendo* 'descend runningly'. Evidence from a variety of measures—description tasks, composition, recall with visualization—suggests that preferred lexicalization patterns predispose speakers to differently code, store, and recall motion events.^{30,31}

LANGUAGE-SPECIFIC GRAMMATICAL SEMANTICS AND COGNITION

Most modern linguists were little interested in semantic aspects of grammar until the last 15 years or so of the 20th century when interest revived. Consequently, there have been relatively few scholars, in either linguistics or psycholinguistics, who have concentrated on investigating the conceptual content of grammar in a cross-linguistic and cultural perspective. Contrastive semantic analysis has concentrated on social and interpersonal domains. Psycholinguistic research in this area has concentrated on domains that lend themselves to objective reference-based testing, such as object categorization. Some highly abbreviated examples follow.

Categorization in Yucatec Maya

John Lucy³² found significant differences in the way in which adult speakers of English and Yucatec (a Mayan language of southeastern Mexico) process information about concrete objects, on a variety of sorting, similarity judgment, memory, and grouping tasks. English speakers show greater attention to number than Yucatec speakers and tend to classify by shape, whereas Yucatec speakers tend to classify by material composition. These differences correspond to what could be predicted on the basis of grammatical differences between the two languages. In English, number marking (via singular vs plural suffixes) is obligatory for most nouns, whereas in Yucatec it is often optional (*yàan pèek' té'elo'* 'there-is dog over-there' can be used regardless of the number of dogs). On the other hand, numeral classifier constructions, e.g., *ká'a-túul 'úulum* 'two-classifier turkey', are obligatory whenever a noun referent is quantified and force attention to referential categories.

English Interpersonal Causatives

Compared even with other European languages, English has a wealth of analytic causatives, i.e., grammatical constructions that encode causative scenarios by means of an auxiliary verb.^{33,34} In many languages, the subtle differences between *She had him do it*, *She made him do it*, *She got him to do it*, and *She let him do it* cannot be expressed in a compact grammatical form, but would require several sentences of explanation. The *have*-causative, for example, implies some kind of hierarchical relationship such that the causee's readiness to take directions can be assumed; these directions, furthermore, do not have to be expressed directly but can be conveyed via another person. The *make*-causative implies that the causee does something unwillingly, in response to some kind of pressure (threats, parental authority, nagging, etc.). The causee's will is not completely overridden (compare *She made him do it* and *She forced him to do it*); rather, the implicit scenario is that the causee comes to realize that he or she has no choice but to act as the causer wants. The *get*-causative implies that the causee carries out the desired action willingly, only because the causer has done something to bring this about. Although these constructions are sometimes given labels such as 'coercive', 'manipulative', and so on, detailed analysis shows that the scenarios they express are too subtle to be accurately summed up in a single word.

'Fatalism' in Russian Grammar

The Russian language has a large family of impersonal and/or dative-reflexive constructions that refer to uncontrolled and inexplicable things that happen to people irrespective of their will.³⁵ For example, a human noun in dative case with a mental verb in the 3sg reflexive form depicts a mental event simply happening inside a person inexplicably and, in a sense, irresistibly (e.g., *Segodnja mne vspomnilas' Praga—sady* 'Today I was reminded of Prague—of its gardens'). Similarly, the high-frequency expression *xočetsja* lit. 'it wants itself to me' suggests a spontaneous and involuntary desire. Impersonal modal predicates with dative subjects are also extremely common in colloquial Russian (e.g., *neobxodimo* 'it is indispensable', *nel'zja* 'one may not', *nado* 'it is necessary', *nužno* 'it is necessary/required', *sleduet* 'one ought to', and *dolžno* 'one has to') and there are sundry infinitive and reflexive constructions that convey meanings related to helplessness, obligation, and necessity. Arguably, this brace of grammatical constructions, along with cultural key words such as *sud'ba* (roughly) 'destiny, fate', gives the Russian language a distinctive cognitive-cultural profile. In a sense, they embody and reinforce a cognitive theme associated, roughly speaking, with the idea that we live in a world that is not fully knowable and that cannot be rationally controlled.^{36,37}

METALANGUAGE AND TERTIUM COMPARATIONIS

A great deal of confusion and inter-disciplinary cross talk is caused by failure to appreciate the basic fault lines that separate different approaches to the investigation of 'meaning'. Two fundamental and inter-related considerations are the following. First, in order to describe and compare language-specific semantic systems, no matter how divergent they may be, one needs a common measure, a *tertium comparationis*. What can furnish such a *tertium comparationis*? Will it be conceptual (intentional), or referential (extensional), or what? Second, in order to describe and discuss anything, one necessarily has to rely on some words or equivalent symbols. However, if we use words to describe the meanings of other words, how can one avoid the dangers of circularity, of infinite regress, and of terminological ethnocentrism (i.e., skewing one's description by imposing the conceptual categories on one language upon another)? These are problems of metalanguage. Conceptual considerations like these often have little impact on psychologists and other empirically focused researchers. Gentner³⁸

(p. 225), a psychologist herself, parodies the attitude as follows: ‘Oh go away—can’t you see we’re busy doing experiments?’. Nonetheless, cognitive scientists ignore these issues at their peril. Here we summarize four leading approaches.

- (1) Extensionalist approaches are the default model in psycholinguistics and psychology generally. In linguistics, the most prominent proponents are the ‘Nijmegen school’ researchers. They have produced a series of influential publications, beginning with the spatial domain and extending to body parts, physical activities, and landscape terms.^{7,39,40} The Nijmegen program depends on describing meaning by reference to supposedly neutral ‘etic grids’, such as standardized kits of physical props and models, line drawings, video clips, and the like. In this, they follow the model of Berlin and Kay’s⁴¹ approach to color meanings, which relied on the Munsell color chips to map out the range of reference of color terms in different languages.

Although appealing in some respects, there are problems with the use of standardized reference-based stimuli. First, it is not as easy as it may seem to devise language-neutral stimuli, on account of the danger of unwittingly relying on the categories of one’s own language. Second, extensionalist approaches are difficult if not impossible to apply to abstract domains, such as cognitive, emotional, and value terminology. Third, even with standardized extensionalist data sets, the metalanguage issue does not go away. One still has to describe and analyze the data in terms of some (meta)language, and in practice researchers who use an extensionalist approach use non-standardized English for this purpose. In effect, the language of the investigators becomes the default standard against which meanings in other languages are calibrated.⁴²

- (2) In linguistics, many researchers use a conceptualist approach, but with an abstract and rather *ad hoc* approach to the metalanguage question. One leading program is *Conceptual Semantics* (CS), as developed by Ray Jackendoff,⁴³ the major semantic theorist in generative grammar. CS assumes that all possible word meanings (lexical concepts) are built up from a finite set of conceptual primitives and principles of combination, but these elements and principles are held to be highly abstract and they

are not expected to correspond to the meanings of ordinary words in any human language. For example, to analyze meanings in the realm of rights and obligations, Jackendoff⁴⁴ posited primitive operators RT and OB (derived from the English words *right* and *obligation*), ACT (which stands for Action) and a function VALUE that maps two arguments, a Stimulus and an Experiencer, onto a scalar Value—either positive or negative. Additionally, there is an EXCH (exchange) operator that can be used (for example) to say that a given ACT₁ by X is in exchange for preventing Z from exercising his or her right to do a given ACT₂. Jackendoff has also developed highly abstract representations of features and functions for modeling directionality and dimensionality, the ‘count-mass’ distinction, types of aspectual systems, and other areas relevant to grammatical semantics. Broadly similar systems are used by researchers in different frameworks such as Role and Reference Grammar and Lexical Constructional Model (LCM).

The problems with these approaches are considerable. First, the abstract nature of the basic semantic descriptors makes them obscure and hard to understand. On the one hand, this reduces their predictiveness, and on the other it allows the analyst a lot of wriggle room. Either way the verifiability of the analyses suffers. Second, despite the claims to the contrary, it is clear that the terms in the formalisms are in a covert relationship with ordinary English, and hence the systems are open to the charge of terminological ethnocentrism. Keith Allan has aptly described such systems in general as ‘degenerate forms of English’. Third, such systems are problematically open-ended, malleable, and shifting. Despite their formidably technical ‘look’, they are remarkably unconstrained and hence, non-rigorous.

- (3) Cognitive linguistics⁴⁵ is best regarded as a movement or a coalition, rather than a specific theory or model. Cognitive linguists share a commitment to seeing language as an integral facet of cognition, emerging from general phenomena such as perception, attention, and categorization, but they otherwise have no unifying theoretical doctrine. From a metalanguage point of view, a wide variety of representational devices are used. Many are diagrammatic. In relation to grammatical semantics, Cognitive Grammar theorists hold that perceptual

TABLE 1 | Natural Semantic Metalanguage Semantic Primes (English Exponents), Grouped into Related Categories

I, YOU, SOMEONE, SOMETHING~THING, PEOPLE, BODY	Substantives
KIND, PART	Relational substantives
THIS, THE SAME, OTHER~ELSE	Determiners
ONE, TWO, SOME, ALL, MUCH~MANY	Quantifiers
GOOD, BAD	Evaluators
BIG, SMALL	Descriptors
KNOW, THINK, WANT, FEEL, SEE, HEAR	Mental predicates
SAY, WORDS, TRUE	Speech
DO, HAPPEN, MOVE, TOUCH	Actions, events, movement, contact
BE (SOMEWHERE), THERE IS, HAVE, BE (SOMEONE/SOMETHING)	Location, existence, possession, specification
LIVE, DIE	Life and death
WHEN~TIME, NOW, BEFORE, AFTER, A LONG TIME, A SHORT TIME, FOR SOME TIME, MOMENT	Time
WHERE~PLACE, HERE, ABOVE, BELOW, FAR, NEAR, SIDE, INSIDE	Space
NOT, MAYBE, CAN, BECAUSE, IF	Logical concepts
VERY, MORE	Intensifier, augmentor
LIKE~AS~WAY	Similarity

Primes exist as the meanings of lexical units (not at the level of lexemes). Exponents of primes may be words, bound morphemes, or phrasemes. They can be formally complex. They can have language-specific combinatorial variants (allolexes, indicated by ~). Each prime has well-specified syntactic (combinatorial) properties.

relationships such as figure–ground, experiential schemas such as ‘containment’, and ‘force dynamics’ (embodied experience of pressure, force, etc.), cannot be adequately represented in verbal or quasi-verbal form.⁵ Cognitive linguistic diagrams are not transparent without verbal captions, however, and they frequently rely uncritically on culture-specific conventions of Western iconography, such as the use of the ‘arrow’ symbol. Some representations in cognitive linguistics are verbal, especially in relation to conceptual metaphor theory.⁴⁶ There is little or no attempt to standardize the terms of description, however, and it is unclear how they can be made to interface with diagrammatic representations.

- (4) The natural semantic metalanguage (NSM) approach is a conceptualist approach with a constrained metalanguage based on natural language. The basic idea is to represent meanings as extended paraphrases, framed in maximally simple and cross-translatable terms. Its lineage can be traced back to Leibniz, but in its modern form the system was originated by Anna Wierzbicka. The NSM is constrained by the requirements that all the primitives (or primes, as they are now

known) are required to be word meanings attested in all or most languages. After a wide-ranging 30-year research program,^{8,11,47,48} the NSM inventory of primes now stands at 63 in number. These semantic primes, it is claimed, constitute the semantic bedrock of human cognition and communication. Along with certain universal combinatorial properties, semantic primes constitute a kind of mini-language in terms of which all other linguistic concepts can be explicated. Examples of semantic primes include (to use English exponents): SOMEONE, SOMETHING, PEOPLE, DO, HAPPEN, WANT, KNOW, TOUCH, ABOVE, BELOW, BEFORE, AFTER, IF, BECAUSE, and LIKE. In explications, primes are combined into simple combinations such as: ‘someone did something to someone else’, ‘something bad happened in this place because of it’, ‘I want you to do something’, and so on.

Although the NSM theory remains controversial, it has the strongest track record in cross-linguistic semantics on the contemporary scene, with literally hundreds of published studies. Among the advantages of the NSM system are the following. First, explications framed in simple words of natural language make very transparent predictions about the

range of use, entailments, and implications of the expression being explicated, thus enhancing predictiveness. Second, NSM explications are accessible and intelligible to native speakers, which opens new avenues for evidence and testing. Third, the system has enjoyed a much greater stability than competing, more technical modes of representation. Needless to say, standardization of the units of description is a basic precondition for replicability. Critics of NSM often allege that particular primes are not lexicalized in particular languages; this criticism is dealt with in the following section. It is also frequently pointed out that NSM explications are often long and, on account of their small vocabulary and restricted syntax, not necessarily ‘natural’ in the sense of idiomatic. Despite the high degree of clarity of expression, it is not a simple matter to learn to use the NSM system. Although the validity of particular analyses can be tested by reference to the range of distribution of the expression being explicated, intuitions of native speakers, and various heuristics of linguistics and lexicography, successful application of the method depends on the skill of the analyst. There is no discovery procedure that can take one from ‘raw data’ to a viable semantic analysis.

UNIVERSALS IN SEMANTICS AND COGNITION

In recent years, a number of linguists, among them Levinson et al.,⁴⁹ have claimed that there are either no substantive semantic universals or the number is vanishingly few: ‘[it is] extremely difficult to find even a few shared concepts that all languages lexicalize (many languages do not, e.g., lexicalize terms equivalent to our “red”, “father”, “if”, or “earth”’). This claim has been repeated and augmented in Evans and Levinson,⁵⁰ in a much-discussed article titled ‘The Myth of Language Universals’. Neither Levinson or Evans mention the extensive body of empirical–analytical work in NSM semantics, perhaps because the main target of their work was not semantic universals, but the claimed formal (syntactic) universals of Chomskyan Universal Grammar. In any case, what is important for present purposes is that there is a very substantial and well-evidenced set of claims about the existence of specific semantic universals. In NSM publications, they are conventionally presented in the form of a table of semantic primes (Table 1), although such a

compressed form of presentation does leave itself open to certain misunderstandings.

The chief caveat to be made is that the relationship between the semantically primitive meaning and the form that represents it in a given language (known as an ‘exponent’ of the prime) is not one-to-one. An exponent (say, *MOVE* or *TOUCH* in English) can have other non-primitive meanings in addition to its semantically prime meaning. This situation—a word has two or more distinct-but-related meanings—is known as lexical polysemy. For example, the English word *move* has one meaning (its semantically prime meaning) in a sentence like ‘I can’t move’ and a distinct, semantically complex meaning in a sentence like ‘I’m moving house tomorrow’. Conversely, a given semantically primitive meaning can have more than one exponent in a particular language, with the distribution of the alternative forms often conditioned by the linguistic context. This situation is known as allolexy. For example, in English the words *other* and *else* express the same meaning, *other* being used as a modifier of nouns and *else* as a modifier of indefinite pronouns.

Patterns of polysemy and allolexy are language-specific. Thus, when we say that (for example) English *do* and Spanish *hacer* are exponents of the same prime, this is not the same as saying that English *do* and Spanish *hacer* are ‘the same’ in all their uses. Both words have additional language-specific meanings, over and above their shared semantically primitive meaning; for example, one additional meaning of *hacer* approximates to English ‘make’. Equally, when we say that English *other* and Spanish *otro* are exponents of the same prime, this claim is not disturbed by the fact that English *other* has an allolex *else* that has no counterpart in Spanish.

Many of the counterclaims leveled at the universality of NSM primes have been based on a failure or refusal to recognize polysemy or (less commonly) allolexy. Needless to say, it is not enough to assume that just because a particular meaning is a discrete semantic unit in English it has the same status in every language. A polysemy analysis must always be supported by detailed language-internal argumentation. Lexical polysemy is, however, a fact of life, i.e., many words in every language are polysemous.

Space does not permit a full review of the inventory of primes here, so we restrict ourselves to a selection of observations bearing on some current issues in cognitive science. (1) The primes *GOOD* and *BAD* (in conjunction with other elements) provide a universal foundation for value concepts and moral psychology. No language is known to lack exponents of these primes, in stark contrast

with ‘right’ and ‘wrong’ (which are sometimes accorded universal status by Anglophone scholars).⁵¹ (2) The grouping of spatial primes includes the orientational primes ABOVE, BELOW, and ON ONE SIDE, as well as INSIDE (roughly, containment), and TOUCH. (3) The quantifier grouping includes ONE, TWO, and MUCH~MANY, but no higher numbers. Research indicates that these elements (along with other primes) are sufficient to construct the ‘number

concept’. (4) There are separate groupings of primes for time and space, so it is not true that temporal concepts are modeled or conceptually abstracted from spatial cognition (a commonly held position in some quarters of cognitive linguistics). Nonetheless, there are alignments between the prime sets in each sub-domain, and, just as importantly, primes of time and space occur together in many motion words, creating additional linkages between them. (5) The primes

TABLE 2 | Natural Semantic Metalanguage Semantic Primes in Three Additional Languages

Japanese	Spanish	Russian
WATASHI <i>I</i> , ANATA <i>you</i> , DAREKA <i>someone</i> , NANIKA~MONO~KOTO <i>something~thing</i> , HITO~HITOBITO <i>people</i> , KARADA <i>body</i>	YO <i>I</i> , TU <i>you</i> , ALGUIEN <i>someone</i> , ALGO~COSA <i>something~thing</i> , GENTE <i>people</i> , CUERPO <i>body</i>	JA <i>I</i> , TY <i>you</i> , KTO-TO <i>someone</i> , ČTO-TO~VEŠČ’ <i>something~thing</i> , LJUDI <i>people</i> , TELO <i>body</i>
SHURUI <i>kind</i> , BUBUN <i>part</i>	TIPO <i>kind</i> , PARTE <i>part</i>	ROD~VID <i>kind</i> , ČAST’ <i>part</i>
KORE <i>this</i> , ONAJI <i>the same</i> , HOKA <i>other</i>	ESTO <i>this</i> , LO MISMO <i>the same</i> , OTRO <i>other</i>	ĖTOT <i>this</i> , TOT ŽE <i>the same</i> , DRUGOJ <i>other</i>
HITO~ICHI- <i>one</i> , FUTA~NI- <i>two</i> , TAKUSAN <i>many~much</i> , IKUTSUKA <i>some</i> , MINNA <i>all</i>	UNO <i>one</i> , DOS <i>two</i> , MUCHO <i>much~many</i> , ALGUNOS <i>some</i> , TODO <i>all</i>	ODIN <i>one</i> , DVA <i>two</i> , MNOGO <i>much~many</i> , NEKOTORYE <i>some</i> , VSE <i>all</i>
II <i>good</i> , WARUI <i>bad</i>	BUENO <i>good</i> , MALO <i>bad</i>	XOROŠIJ~XOROŠO <i>good</i> , PLOXOJ~PLOXO <i>bad</i>
OOKII <i>big</i> , CHIISAI <i>small</i>	GRANDE <i>big</i> , PEQUEÑO <i>small</i>	BOL’ŠOJ <i>big</i> , MALEN’KIJ <i>small</i>
OMOU <i>think</i> , SHIRU <i>know</i> , HOSHII~TAI~NOZOMU <i>want</i> , KANJIRU <i>feel</i> , MIRU <i>see</i> , KIKU <i>hear</i>	PENSAR <i>think</i> , SABER <i>know</i> , QUERER <i>want</i> , SENTIR <i>feel</i> , VER <i>see</i> , OÍR <i>hear</i>	DUMAT’ <i>think</i> , ZNAT’ <i>know</i> , XOTET’ <i>want</i> , ČUVSTVOVAT’ <i>feel</i> , VIDET’ <i>see</i> , SLYŠAT’ <i>hear</i>
IU <i>say</i> , KOTOBA <i>words</i> , HONTOO <i>true</i>	DECIR <i>say</i> , PALABRAS <i>words</i> , VERDAD <i>true</i>	GOVORIT’~SKAZAT’ <i>say</i> , SLOVA <i>words</i> , PRAVDA <i>true</i>
SURU <i>do</i> , OKORU~OKIRU <i>happen</i> , UGOKU <i>move</i> , FURERU <i>touch</i>	HACER <i>do</i> , PASAR <i>happen</i> , MOVERSE <i>move</i> , TOCAR <i>touch</i>	DELAT’ <i>do</i> , PROISXODIT’~SLUČAT’SJA <i>happen</i> , DVIGAT’SJA <i>move</i> , KASAT’SJA <i>touching</i>
(DOKOKA) IRU~ARU <i>be (somewhere)</i> , IRU~ARU <i>there is</i> , MOTSU <i>have</i> , (DAREKA/NANIKAI) DEARU <i>be (someone/something)</i>	ESTAR <i>be (somewhere)</i> , HAY <i>there is</i> , TENER <i>have</i> , SER <i>be (someone/something)</i>	BYT’ (GDE-TO) <i>be (somewhere)</i> , BYT’~EST’ <i>there is</i> , BYT’ U <i>have</i> , BYT’ (KEM-TO/ČEM-TO) <i>be (someone/something)</i>
IKIRU <i>live</i> , SHINU <i>die</i>	VIVIR <i>live</i> , MORIR <i>die</i>	ŽIT’ <i>live</i> , UMERET’ <i>die</i>
ITSU~TOKI <i>when~time</i> , IMA <i>now</i> , MAE <i>before</i> , ATO <i>after</i> , NAGAI AIDA <i>a long time</i> , MIJIKAI AIDA <i>a short time</i> , SHIBARAKU NO AIDA <i>for some time</i> , SUGUNI <i>moment</i>	CUÁNDO~TIEMPO <i>when~time</i> , AHORA <i>now</i> , ANTES <i>before</i> , DESPUÉS <i>after</i> , MUCHO TIEMPO <i>a long time</i> , POCO TIEMPO <i>a short time</i> , POR UN TIEMPO <i>for some time</i> , MOMENTO <i>moment</i>	KOGDA~VREMJA <i>when~time</i> , SEJČAS <i>now</i> , DO <i>before</i> , POSLE <i>after</i> , DOLGO <i>a long time</i> , KOROTKOE VREMJA, <i>a short time</i> , NEKOTOROE VREMJA <i>for some time</i> , MOMENT <i>moment</i>
DOKO~TOKORO <i>where~place</i> , KOKO <i>here</i> , UE <i>above</i> , SHITA <i>below</i> , CHIKAI <i>near</i> , TOOI <i>far</i> , MEN <i>side</i> , NAKA <i>inside</i>	DÓNDE~SITIO <i>where~place</i> , AQUÍ <i>here</i> , ARRIBA <i>above</i> , DEBAJO <i>below</i> , CERCA <i>far</i> , LEJOS <i>near</i> , LADO <i>side</i> , DENTRO <i>inside</i>	GDE~MESTO <i>where~place</i> , ZDES’ <i>here</i> , NAD <i>above</i> , POD <i>below</i> , DALEKO <i>far</i> , BLIZKO <i>near</i> , STORONA <i>side</i> , VNUTRI <i>inside</i>
-NAI <i>not</i> , TABUN <i>maybe</i> , DEKIRU <i>can</i> , -KARA <i>because</i> , MOSHI (BA) <i>if</i>	NO <i>not</i> , TAL VEZ <i>maybe</i> , PODER <i>can</i> , PORQUE <i>because</i> , SI <i>if</i>	NE <i>not</i> , MOŽET BYT’ <i>maybe</i> , MOČ’ <i>can</i> , POTOMU ČTO <i>because</i> , ES LI <i>if</i>
SUGOKU <i>very</i> , MOTTO <i>more</i>	MUY <i>very</i> , MÁS <i>more</i>	OČEN’ <i>very</i> , BOL’ŠE~EŠČE <i>more</i>
YOO~DOO~YOONI <i>like~how~as</i>	COMO <i>like</i>	KAK~TAK <i>like</i>

THINK, KNOW, WANT, and FEEL are all independent primes in the mental domain. This is a highly significant fact for proposed theories of mind and for the explications of mental state terms. (5) Among the logical grouping, IF and BECAUSE are both listed, and they indeed appear to have lexical exponents in all languages, contra the occasional claim that some languages lack any way of expressing these meanings.^a

Table 2 displays exponents of semantic primes in three additional languages: Japanese, Spanish, and Russian. Other languages for which ‘whole metalanguage’ studies have been conducted include Amharic (Ethiopia), East Cree, French, Korean, Lao, Mandarin Chinese, Mbula (PNG), and Polish. Targeted studies on reported problem areas have been conducted in a similar number of other languages. Although a handful of issues have not been resolved for some languages, the clear weight of evidence is that semantic primes are universally lexicalized meanings, and, accordingly, are available as a kind of shared conceptual currency out of which cognitively plausible explications for the innumerable complex and culture-specific concepts of the world’s languages can be constructed.

CONCLUSION

This article has summarized evidence and arguments in support of the view that language-specific lexical and grammatical semantics significantly influences higher order cognition. The issues remain

controversial, however, largely due to lack of consensus about appropriate methodology for linguistic semantics. There are also differences of opinion as to what counts as acceptable evidence in conceptual analysis: intuition, distribution and usage, corpus studies of texts, and controlled experiments. There is a pressing need for more cross-linguistic studies that combine methods and perspectives from linguistics, cognitive anthropology, psychological anthropology, and psycholinguistics.

NOTES

^aEvans and Levinson⁵⁰ back their claim that some languages lack expressions for ‘if’ by citing Haviland’s⁵² short grammar of the Australian language Guugu-Yimidhirr. Haviland, however, states (Ref 52, pp. 151–152): ‘The related particle *budhi* ‘if’ signals uncertainty, or questions the possibility of some outcome, sometimes very much like a subordinate conjunction, sometimes in a more modal sense’. He cites the apparently conditional sentence *Nyundu budhu dhadaa nyundu minha maanaa bira* (2sgNOM if go.NONPAST 2sgNOM meat get.NONPAST indeed) with two glosses: ‘If you go, you’ll get meat for sure’ and ‘Should you go, you’ll get meat for sure’. As in this case, secondary citations about little-known languages often turn out to be ill-founded or open to alternative interpretations once more data come to hand.

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