3 Language and cognition: The view from anthropology

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In 1888, ethnologist Daniel Brinton wrote an essay entitled 'The Language of Paleolithic Man' which aimed to gain insight into the historical emergence of language through the study of existing Native American languages, conceived of as being closer to the primitive precursors of modern language. In discussing these languages, he noted that

> the phonetic elements . . . are, in many American languages, singularly vague and fluctuating. If in English we were to pronounce the three words, *loll*, *nor*, *roll*, indifferently as one or the other, you see what violence we should do to the theory of our alphabet. Yet analogous examples are constant in many American languages. Their consonants are 'alternating,' in large groups, their vowels 'permutable.'
>
> (Brinton, 1888, p. 217)

The following year Franz Boas, the founding father of American anthropology, produced a rejoinder, his classic paper 'On Alternating Sounds'. He reviewed psychological evidence showing that people often recognize or mis-hear speech sounds because they utilize categories familiar from past experience to guide perception. He then showed that even well-trained observers show the influence of their native language when they describe an unknown language and try to transcribe its sounds. He concluded:

> For this reason I maintain that there is no such phenomenon as synthetic or alternating sounds, and that their occurrence is in no way a sign of primitiveness of the speech in which they are said to occur; that alternating sounds are in reality alternating apperceptions [by the observer] of one and the same sound.
>
> (Boas, 1889, pp. 51–52)

The problem, Boas argued, lay not with the Native American languages, but rather with Brinton's misunderstanding of them, grounded in his own language experience as framed by certain hierarchical value judgments.

In this exchange we see in microcosm the chief lineaments of the

emerging anthropological orientation towards language: Recognition of the behavioral importance of linguistic differences, rejection of hierarchical rankings of languages, and identification of the conceptual and methodological ethnocentrism underlying such hierarchical judgments. The anthropological approach to language and cognition begins from this distinctive orientation towards language diversity. Even when methods and findings produced within this tradition appear to be quite similar to those in other fields, they are in fact shaped throughout by this distinctive orientation. This essay aims to clarify that guiding orientation and then to articulate and exemplify through representative works how it yields a distinctive set of methodological problems, solutions, and empirical efforts.

LANGUAGE DIVERSITY

The diversity of human languages has long given rise to speculation about its sources and consequences. Why do languages render the same reality so differently and what are the consequences of language differences for human thought? These two questions are in fact intimately related: How we understand *language diversity*, the ways languages differ in their renderings of reality, greatly affects our approach to understanding *linguistic relativity*, the effects of linguistic diversity on thought. To understand the distinctiveness of the anthropological approach, we need to review how this diversity has been treated historically, then look at the distinctive stance of anthropology toward diversity, and finally show how that stance challenges and reshapes traditional views.

Historical approaches to language diversity

The interpretation of language diversity in terms of evaluative hierarchies has a long history. It emerges clearly in the two approaches that have dominated Western understandings of language diversity over the past several hundred years (see Aarsleff, 1982).

First, there are those who have adopted the Leibnitzian view that there is a natural (or absolute) connection between language and the world. Confronted by the empirical diversity of languages, those holding this view have two ways of explaining how it arose. For some, existing languages all represent various sorts of decline; that is, what we see is an accumulation of human corruption upon some earlier pristine form of language, the language of Adam or the ancient Hebrews being the classic reference points, but any idealized historical reference point may be invoked. The route to grasping this uncorrupted form lies through the historical reconstruction of the original language. One can hear echoes of this view in any language ideology about the supposed slovenliness of contemporary modern speech as contrasted with earlier, even ancient forms or even in the

common complaints by parents about the sloppy speech of their children. Alternatively, within this approach, one can imagine that the pristine form still lies secure within each language and that all we have to do is peel back the superficial encrustation concealing it and we will find the original natural logic of language revealed. One hears echoes of this view in all those ideologies about underlying competence, deep structures, universal primitives, and the like; ideologies typically held by those who purport to have discovered the key to uncovering these common treasures lying beneath apparent diversity. Ultimately, however, in their search for a common universal language, such views dismiss the theoretical and practical importance of variation among languages.

Second, there are those who have adopted the Lockean view that languages by their nature bear an artificial (or conventional) relation to reality. Hence the diversity among languages is an intrinsic and unavoidable feature of languages. Some celebrate this diversity as of local historical significance: Languages contain in their form living traces of history and are to be treasured as repositories of the genius of a people. Although such views embrace diversity as a good thing, they are often coupled with a more or less explicit evaluation of one or another language (or language type) as superior—along with the culture and thought of the people who created it. (One thinks especially of Humboldt in this regard; see Aarsleff, 1988.) Alternatively, some take a more neutral view of this diversity, but recognize that the lack of a uniform natural relationship presents obstacles to clear communication, especially in philosophy and science. However, the very conventional nature of language, its intrinsic flexibility, allows us to build up specialized vocabularies and professional jargons as needed to convey our views accurately. Our inheritance from Adam, then, is not a particular language but the liberty to create language. So instead of seeing diversity as a sign of decline and corruption as in the first approach, languages here are seen both as the repository of the historical genius of a people and at the same time holding the potential for the progress and perfection of language and discourse. Here we find both the impetus to prize diversity and to transcend it, typically by making it more transparent through the development of precise technical terms and other language refinements. (One variant of this approach seeks to substitute formal mathematical models for language. However, the knowledge embodied in these formalisms can only be set free by recourse to the language of some discursive community, whereupon all the usual problems return.)

Despite the differences between these two dominant approaches to understanding language diversity, they share the common underlying assumptions that there is a single unitary reality and an ideal relation of language to it, however elusive. In one case, that ideal relation has been lost and has to be recovered or uncovered. In the other, the ideal remains a goal to be attained, at least by some peoples or in some activities. But

either way, the common assumption of an ideal relation between language and reality is tacitly embraced.

The anthropological approach to language diversity

The anthropological approach to language diversity is deeply informed by the culture concept, especially as developed by the American school led by Franz Boas (1966). Historically, there has been much less interest in language within the various European anthropological traditions. For example, early attention to language in British anthropology by Malinowski and others did not lead to an ongoing concern with language. Likewise, in French anthropology the influence of structural linguistics as a methodological model for social analysis, especially in the work of Levi-Strauss, was not accompanied by a concern for everyday language.

The Boasian school argued for the importance of cultures, that is, bodies of historically developed traditions, in explaining how humans differ from other species, in explaining differences among human groups, and in explaining differences within groups (Sapir, 1993). Cultural explanations provided an important alternative to various nineteenth-century theories that explained human differences in terms of innate racial capacities. Likewise, the anthropological approach to language (seen here as part of culture) also rejects explanations in terms of racial differences. Instead, the capacity for language distinguishes humans from other species, all normal humans are capable of learning a natural language, and differences among languages spring from history not race. This much of the anthropological perspective has been broadly accepted in the human sciences.

The anthropological approach also characteristically rejects hierarchical views that cast some cultures and languages as more primitive or advanced than others (Boas, 1966), a view that reproduces nineteenth-century racial hierarchies as cultural hierarchies. Instead, each culture is regarded as worthy of respect as a valid way of life. Similarly, the understanding of language also rejects hierarchical views that see one language as intrinsically superior or inferior to another. From a historical point of view the rejection of hierarchical evaluations of languages was quite revolutionary. And despite its egalitarian impulse, which many today would embrace in principle, it has been a very difficult position to implement and sustain in practice. The difficulty in escaping hierarchical views stems in large part from the unwitting tendency to take one's own language as a guide in understanding and evaluating other languages. So the anthropologists' critical stance toward ethnocentric evaluations of other cultures includes a similar stance against unwitting lingua-centrism, that is, the interpretation and evaluation of other languages in terms that are ultimately rooted in one's own language.

During the 1930s these anthropological assumptions about language diversity were extended to concerns about the relation of language and

thought, particularly in the work of Edward Sapir (1921) and Benjamin Whorf (1941/1956) (see Lucy, 1985, 1992b for reviews). Whorf in particular sought to apply the principle that all languages were equally valid instruments of communication while simultaneously accepting the diversity of how they represented reality. This led him to question the existence of a single ideal relation of language to reality and in precisely this sense to question also our conceptualization of a unitary reality, since its qualities would vary as a function of the language used to describe it. If there is no ideal relation of language to reality, hence a fundamental uncertainty about the character of that reality, then the whole problem of the relation of language to experience changes. Claims for universality in the relation of language to reality cannot now simply be presumed but require empirical proof. And no language, whether ancient or modern, received or constructed, can be judged inferior or superior, corrupted or perfected in light of its match with reality. Crucially, we lack a language-neutral standard against which to form such judgments; that is, no single language can provide, through its system of categories, a reliable guide to reality for the purposes of research. Whorf also argued that the language we speak influences the way we habitually see reality outside of language. So in his view it is also not trivial to circumvent language by direct appeals to our understanding of reality. In short, he questioned the fundamental assumptions that had long guided research and speculation on language diversity and its relation, thought.

Whorf's challenge disturbed many people and led to unusually strong negative reactions against such research. Their reactions against this 'linguistic relativism' have their root in the recognition, explicitly or implicitly, that his view challenges the researcher's own claims to have an unmediated grasp of reality. By way of rebuttal, such researchers typically caricature his position in one of three ways: as saying that languages bear *no* relation to reality, as saying that we cannot think *at all* without language, or as saying that each language so completely *determines* our thought that we can never establish whether he is right. None of these misrepresentations can sustain close scrutiny (see Lucy, 1992b), but collectively they have provided a comforting rationale that there is no need to engage in further research on his proposals. So virtually no empirical research on the relation of language diversity and thought has emerged from these critics of Whorf's ideas.

However, others have taken up the conceptual and empirical challenge of developing ways of investigating the relation of language and thought without privileging the vision of reality in our own language from the outset. Some have been favorable to the view that language influences thought, while others have been opposed to such a conclusion, but all have recognized in one way or another that something new was now required, namely, a more neutral method for characterizing the differences among languages in regards to how they represent reality.

LANGUAGE DIVERSITY AND THOUGHT

Two strategies of research

Since the appearance of Whorf's formulation of the language and thought problem, two primary strategies of empirical research have emerged aiming to solve the problem of how to provide a neutral metalanguage (or frame of reference) for comparing languages (see full review in Lucy, 1997a). Each approach has characteristic advantages and drawbacks, but each takes seriously the problem of how to provide an operationally unbiased characterization of language, reality, and cognition.

The domain-centered strategy

One strategy, which I call *domain-centered*, selects a domain of experience (such as color or time or space) and seeks to describe it on language-independent grounds, in order first to ask how individual languages treat the domain and subsequently how speakers then treat that domain during cognitive activity. The domain-centered strategy seeks to solve the comparison problem by asking how different languages partition the same domain of reality. Although the strategy offers a number of advantages for comparative purposes, it tends to suffer from two weaknesses. First, the representation of the domain is typically drawn from one linguistic and cultural tradition. As such it begs the question being asked, namely, whether such representations, or even the domain itself, are universally recognized. Acknowledging this problem, some seek to anchor the description in well-established scientific concepts to help assure neutrality and objectivity. This can be illuminating, but more often one ends up with a description of reality in terms of parameters drawn from natural or biological science and not from parameters semantically or structurally relevant to actual linguistic systems; this in turn can lead to a dramatic misrepresentation of the languages at issue. Further, by adopting one vision of reality, even a scientifically refined one, as the standard for comparison, one still necessarily favors the original language and culture from which it arose. This leads, not surprisingly, to any number of demonstrations of difference in which a hierarchy quietly (re)emerges: In effect such efforts simply show how well languages do or do not represent the semantic values of the language system framing the comparison. The method used for creating a neutral system based on reality thus often undermines the very possibility of fair comparison.

Perhaps the best-known example of work using this strategy is the long tradition of research on color terms. This line of research was begun in the 1950s by psycholinguists Brown and Lenneberg (1954) as a way of addressing the Whorfian methodological challenge. From the late 1960s until the present, work on color terms has been continued by anthropologists Berlin

and Kay and their colleagues (e.g., Berlin & Kay, 1969; Kay, Brent, Maffi, & Merryfield, 1997; Kay & McDaniel, 1978) who interpret their findings as evidence against Whorf's claims. In this research one represents reality though a selection of color chips designed to sample a color space and then asks speakers of different languages how they partition this space. The difficulties are legion: The proper definition and sampling of a color space is far from obvious; some languages don't even have color terms and they certainly are not central to the semantic structure of many languages; and languages that do have relevant terms may deploy them quite differently, such that they are often misanalyzed by those unfamiliar with the language or simply disqualified for inclusion in the study. But the most important difficulty is that any color systems encountered are ultimately arrayed or scaled along an 'evolutionary' cline of how finely they represent this color space; that is, how closely they approach our own system of dedicated color terms. Here we see the re-emergence of the old hierarchical portrayal of languages in terms of how well they match the underlying natural relation of language to reality, where the 'natural' in this case corresponds to the system in our own language (Lucy, 1997b). Ironically, even under these constraints, all reliable evidence still indicates that variations in color language predict cognitive performance more accurately than do the purportedly underlying natural relations (Davidoff, Davies, & Roberson, 1999; Roberson & Hanley, 2010).

The structure-centered strategy

A second strategy, which I call *structure-centered*, selects some grammatical structure (such as number or gender or aspect marking), asks how it differs across languages, and how reality might appear differently from the vantage of each relevant system. Structure-centered strategies build squarely on a long tradition of comparative work in linguistics, seeking to characterize individual languages by the types of categories they employ and then to compare these structures of meaning. But the strategy is difficult to implement: Comparing categories across languages requires extensive linguistic work in terms of both local description and typological framing, can be derailed by blindness to categories very different from one's own, and may not easily yield referential entailments suitable for an independent assessment of cognition. Nonetheless, this strategy holds the most potential for closely respecting the linguistic differences and thus holds the greatest promise for identifying structural differences and directing the search for cognitive influences in appropriate directions.

The classic example of a structure-centered strategy is Whorf's own comparison of number marking patterns in English and Hopi (Whorf, 1941/1956; see also Lucy, 1992b). Whorf argued that English speakers measure and count cyclic experiences such as the passage of a day or a year in the same way as ordinary objects with a form and a substance. This

leads ultimately by analogy to the projection of these cycles as forms (or containers) for a homogeneous substance 'time'. By contrast, the Hopi language differentiates these cycles as a distinct type of recurrent event and its speakers are not therefore led to the same view of time as English speakers. From these linguistic observations Whorf was led to identify patterns in habitual behavior that he felt bore the impress of this difference in outlook toward time. There are difficulties in Whorf's work to be sure, notably the anecdotal quality of the characterization of effects on thought or cognition. But his approach does illustrate the structure-centered strategy of beginning comparison with an analysis of language structure and then building a characterization of reality through the categories provided by the languages themselves. And, crucially, this approach does not entail any hierarchical evaluation of the languages with respect to a pre-given reality or other metric.

In sum, these two dominant strategies seek to address the new concerns about presuming a unique, optimal language-to-reality mapping. One attempts to describe reality (in the guise of a selected referential domain) independently of languages, and then asks how that reality is partitioned by languages. The other seeks to describe languages (typically in the form of particular structural categories) independently of prior assumptions about reality, and then asks how reality would look from the perspective of each system. The first tends to suffer from implicit bias and semantic irrelevancy in characterizing the domain, the second from descriptive complexity and difficulty in cognitive comparison. And it is fair to say that both strategies were at first much more concerned with characterizing language differences than with mounting systematic efforts to assess the effects of those language differences on cognition.

Two contemporary innovations

The period since 1980 has been marked by two dominant trends that crosscut the two traditions described above. First, there has been an increased effort to ground language comparisons in systematic language description and typology. Second, there has been an effort to provide direct assessment of whether individual cognition can be influenced by language. Although these innovations first arose within the structure-centered tradition in the work of Lucy (1992a), they have been most widely applied and influential within the domain-centered tradition associated with Levinson (2003) and his colleagues at the Max Planck Institute for Psycholinguistics, Nijmegen.

Innovations in domain-centered research

The most successful recent effort at domain-centered research has been undertaken in the domain of space (Levinson, 2003; Majid, Bowerman,

Kita, Haun, & Levinson, 2004; Pederson et al., 1998). Spatial conceptualization has been widely regarded as invariant within philosophical, psychological, and linguistic circles and yet these researchers have been able to show that there is considerable cross-linguistic variability in its encoding. They have accomplished this by undertaking many careful cross-linguistic comparisons of referential practice with respect to a wide range of spatial phenomena using a variety of innovative techniques in order to compare 'the meaning patterns that consistently emerge from domain-directed interactive discourse . . .' (Pederson et al., 1998, p. 565). Indeed, it is fair to say that one of the most important contributions of this research effort has been to create a new kind of linguistic typology, a typology of referential practice, that inventories and characterizes systematically all the ways a given domain can be referred to by each language and then builds a series of typological generalizations from a comparison of these systems (for examples, see esp. Levinson & Wilkinson, 2006).

One example can serve to illustrate the approach. This group has been particularly concerned to develop a typology of the spatial frames of reference that speakers can use to locate objects in space. The full typology (Levinson, 2003, Ch. 2), which is based on many languages, identifies three basic frames of reference in language: Intrinsic, in which objects are located with respect to other objects; Absolute, in which objects are located with respect to an environmentally anchored coordinate system; and Relative, in which objects are located with respect to a viewer. (Critics such as Li & Gleitman, 2002, often truncate this typology; see discussion in Levinson, Kita, Haun, & Rasch, 2002.) For example, many European languages favor the use of Relative frames linked to a viewer (e.g., 'the man is to the left of the tree') whereas other languages such as Guugu Yimithirr (Australian) and Tzeltal (Mayan) favor Absolute systems anchored in 'absolute' cardinal direction terms or topographic features respectively (e.g., 'the man is to the east/uphill of the tree'). These frames can be formally distinguished from one another by their transitivity relations and invariance under rotation, each of which can be anchored in displaced origos (or deictic reference points), and more than one system can be used in combination, creating hybrid systems.

Using field experiments, these researchers have been able to show that speakers differ in their approach to a variety of cognitive tasks (i.e., memory, inference, etc.) as a function of the frame of spatial reference they would routinely employ in describing the spatial configurations involved in a task. So in the example given above, speakers using a Relative system in a task will maintain the left–right orientation of an array of items even as they turn their body around to recreate the array in another location across a room, whereas speakers using an Absolute system will maintain the east–west orientation of the array under a similar rotation. These experimental results have proven robust across a wide range of languages from all over the world. And the experimental results are supplemented by

an array of naturalistic evidence. For example, speakers who routinely use Absolute means of spatial description typically orient their co-speech gestures absolutely and are more accurate in dead-reckoning tasks that require indicating the exact locations of landmarks not in sight. In short, it appears that speakers of languages that represent space in different ways verbally also routinely think about space in different ways in nonverbal tasks. The results strikingly refute the common view that spatial cognition is uniform across human populations and suggest that language resources play an important role in shaping it.

This research has attempted to gain the advantages of precise, extensive comparison characteristic of a domain-centered approach while simultaneously avoiding its chief pitfalls by explicitly incorporating extensive linguistic description and typology into the project from the outset. And it rigorously avoids entering into an evaluation of which type of semantic system is superior or more natural, seeing each as having characteristic costs and benefits. In these respects this effort escapes the usual weakness of domain-centered approaches. But it does so only by allowing serious slippage with regard to the original concern with linguistic structure: A single 'language' may use more than one semantic approach to spatial description, and languages considered the 'same' in their referential usage may in fact be using radically different structural means. In the end then, the linguistic analysis and typology are not concerned so much with the meaning conveyed by particular linguistic structures (i.e., systems of 'sense') but rather with the patterns of linguistic usage (i.e., systems of 'reference'); and a single language can be used to implement more than one referential strategy depending on local context (e.g., using absolute frames in rural setting and relative ones in urban settings; Pederson, 1993).

Innovations in structure-centered research

The most extensive recent effort to extend and improve a structure-centered approach is my own comparative study of the relation between grammatical number marking and cognition among speakers of American English and Yucatec Maya (Lucy, 1992a). The study develops a comparative linguistic analysis of the two languages within a broad typological framework, which allows a neutral characterization of their differences, draws from these differences specific inferences about how reality is being construed, and then provides systematic assessments to text whether reality is being thought about differently.

This study begins with a grammatical contrast of English and Yucatec number-marking patterns. The two languages differ in the way they signal plural for nouns. English speakers obligatorily signal plural for some nouns (e.g., *chair/chairs*) but not for others (e.g., *mud*, but not *muds*). By contrast, Yucatec speakers are never obliged to signal plural for any noun,

although they often do apply an optional plural to those referring to animate referents. The two languages also contrast in the way they enumerate nouns. English speakers directly modify some nouns with a numeral (e.g., *one candle*, *two candles*), but for others they must provide an extra form indicating the unit to be counted (e.g., *one clump of dirt*, *two clumps of dirt*). By contrast, Yucatec requires that *all* constructions with numerals be supplemented by such an extra form called a 'unitizer' (or 'numeral classifier') that indicates a unit (e.g., *'un ts'iit kib'*, 'one long-thin candle', *ká'a ts'iit kib'*, 'two long-thin candle'). Crucially, these patterns of plural marking and numeral modification are in complementary distribution: Plurals are obligatory only for nouns for which unitizers are not required and unitizers are obligatory only for nouns for which plurals are not required. This complementary distribution suggests that the two patterns form part of a single number-marking structure within the language.

The interaction of these two aspects of number marking forms part of a regular typological pattern across languages (Lucy, 1992a, pp. 61–71). First, broadly speaking, languages with obligatory plurals tend not to require unitizers and languages with obligatory unitizers tend not to require plurals. Second, for languages that have both forms, the obligatory uses tend to appear in complementary distribution. Although the specific boundary point between obligatory plurals and obligatory unitizers can vary, it does so in a systematic way governed by a hierarchy of noun phrase types based on semantic features. This cross-language typological patterning makes it possible to characterize any given language within a much broader, neutral framework that does not require taking either language as the baseline for characterizing the other.

Within this framework, the contrasting formal patterns of English and Yucatec can be interpreted substantively as follows. English treats some of its nouns as indicating a quantificational unit (or form) in their lexical meaning, others as not indicating a quantificational unit. Yucatec essentially treats all nouns as if they were semantically unspecified as to quantificational unit, almost as if they all referred to unformed substances. So, for example, the semantic sense of the Yucatec word *kib'* glossed as 'candle' in the example just cited actually refers to the substance and is better translated into English as 'wax' (i.e., 'one long-thin wax'). In ordinary speech, when occurring alone without a numeral modifier, the form *kib'* can routinely *refer* to objects that we would call candles, but the *semantic* value of the word does not contain any element signaling form or function—it can be used equally well for anything made of wax. Given the quantificational neutrality of the noun it becomes clear why one must specify a unit when counting, since expressions such as 'one wax' do not make quantificational sense. In short, whereas English is neutral about unit only for some nouns, Yucatec is neutral about this aspect of meaning for all of its nouns.

To assess whether traces of these contrasting verbal patterns appear in

speakers' cognitive activities more generally, we need first to draw out the implications of these grammatical patterns for the general interpretation of experience. If we consider the denotational meaning of nouns referring to discrete concrete referents—that is, *stable objects* that maintain their physical appearance over time—then certain regularities appear from which cognitive implications can be drawn.

The quantificational unit presupposed by English nouns referring to objects of this type is frequently the *shape* of the object. Hence use of these English lexical items routinely draws attention to the shape of a referent as the basis for incorporating it under some lexical label and assigning it a number value. Here, to draw on our example above, is a contemporary definition of *candle* from *Webster's Seventh New Collegiate Dictionary* (1965, p. 121): '1: a long slender cylindrical mass of tallow or wax containing a loosely twisted linen or cotton wick that is burned to give light. 2: something resembling a candle in shape or use . . .'. Although the shape and structure now predominate in the definition, historically the light-giving function apparently predominated—compare the related *(in)candescent* and Latin *candere* 'shine, glow, gleam (white), etc.'. The material can be any suitable fuel such as tallow, wax, or, nowadays, paraffin—it is not criterial to the use of the word.

By contrast, Yucatec nouns referring to objects of this type, lacking such a specification of quantificational unit, do not draw attention to shape and, in fact, fairly routinely draw attention to the *material* composition of the referent as the basis for incorporating it under some lexical label. If these linguistic patterns translate into a general cognitive sensitivity to these properties of referents of the discrete type, then we can draw the following prediction: Yucatec speakers should attend relatively more to the material composition of stable objects (and less to their shape), whereas English speakers should attend relatively less to the material composition of stable objects (and more to their shape). And for objects that are not stable, which we can call *malleable* objects, the two groups should attend equally to material.

These cognitive implications have been tested with speakers from both languages (Lucy, 1992a; Lucy & Gaskins, 2001, 2003). One example will serve to illustrate the approach. Speakers in each language group were shown 15 triads of familiar objects. Each triad consisted of an original *pivot* object and two *alternate* objects, one of the same shape as the pivot and one of the same material as the pivot. So, for instance, speakers were shown a plastic comb with a handle as the pivot and asked whether it was more like a wooden comb with a handle or more like a plastic comb without a handle. The expectation was that English speakers would match the pivot to the other comb with a handle, whereas the Yucatec speakers would match it with the other comb made of plastic. Speakers were shown a large number of such triads, which, across the stimulus set, controlled for size, color, function, wholeness, malleability, and familiarity. The predicted

classification preference was strongly confirmed, with adult English speakers choosing the material alternate only 23% of the time and adult Yucatec speakers favoring it 61% of the time. Clearly the groups classify these objects differently and in line with the expectations based on the underlying lexico-grammatical structures of the two languages. Further, when presented with malleable stimuli, where the languages agree on the material focus, there were no differences between the two groups. And, when presented with other sorts of tasks involving memory and reasoning, the same effects appear. In short, the patterns observed in language structure predict cognitive responses. That language plays the shaping role here is suggested by the appearance of similar effects in societies otherwise widely divergent in other aspects of culture including religion, mode of subsistence, education, modernity, etc. (Lucy, 2004).

This research remedies some of the traditional difficulties of structure-centered approaches by framing the linguistic analysis typologically so as to enhance comparison and by supplementing ethnographic observation with a rigorous assessment of individual thought. This then makes possible the realization of the benefits of the structure-centered approach: Placing the languages at issue on an equal footing, exploring semantically significant lexical and grammatical patterns, and developing connections to related semantic patterns in the languages.

Distinctive contributions of the anthropological approach

The domain- and structure-centered approaches differ fundamentally, the former focusing on referential use and the later on semantic structure. In this they reflect the fundamentally dual nature of language itself in which reference and sense are distinguishable, irreducible, and yet constantly interacting. In this respect, the gap between the two approaches may be narrowed but never ultimately closed. However, when we examine the trajectory of contemporary research here, we see that the two approaches have converged in some other ways that are significant and distinctive. They share the recognition that there must be a neutral framework of comparison, that the surest route to such a framework is through cross-linguistic typology built on close linguistic descriptions of the sense or reference systems of many languages, and that the cognitive entailments of observed language differences need to be tested in controlled ways to assess their impact on how actual speakers engage with the world. In respect to these three issues, both approaches contrast with most other research on linguistic relativity: Research that adopts a metalanguage that is little more than a formalization of the categories of the investigator's own language, research that pays no attention to the language as a structured system or to observable patterns of typological variation in such systems, research that speculates about effects on cognition but which never actually investigates them (e.g., most research in the color

tradition exhibits all of these properties). From this vantage point, this anthropological approach to exploring the effects of language diversity on thought represents the most theoretically coherent and empirically powerful approach currently available. And the resulting empirical research strongly suggests a distinctive role for language in shaping cognition.

LANGUAGE DIVERSITY AND INTELLECTUAL DEVELOPMENT

The first tenet of the anthropological approach to language is that normal children are capable of learning any culture and any natural language. This implies that normal children everywhere begin with similar intellectual and verbal capacities and that differences emerge as part of the process of enculturation. Indeed, the capacities enabling cultural diversity must lie at the heart of what distinguishes humans from other species (see Lucy, 1996, and Haun, 2007, for discussions). Hence understanding the relation of language diversity and thought requires attention to the mechanisms that allow stable differences to emerge from common, shared capacities. Anthropologists have focused on the evolutionary emergence, or *phylogenesis*, of these shared capacities and, to a lesser extent, on their developmental unfolding, or *ontogenesis*, in childhood. The discussion here will be confined to those studies that engage directly with the domain- and structure-centered approaches.

Phylogenesis: Continuities and discontinuities

A recent line of research has used the domain-centered approach to explore the development of language-related cognitive differences in nonhuman primates and children (Haun, 2007; Haun, Rapold, Call, Janzen, & Levinson, 2006). The broad aim is to identify the continuities and discontinuities between humans and their closest animal relatives in the spatial domain. The research has two specific strategies. The first concerns the general effects of language and contrasts the spatial preferences of the great apes with those of human infants. The second concerns the specific effects of language and contrasts the spatial preferences of children who speak different languages. Two examples can serve to illustrate the approach.

One study compared great apes with human children regarding strategies in spatial memory (Haun, 2007). The task involves hiding a reward under one of three distinct objects in a row. Then the row is occluded and either the reward is moved to a new position under the same object or it is left in the same position under a different object. When the participants are allowed to see the array again, the question is whether they will look for reward in the original position or under the original covering object.

Both great apes and 1-year-old children prefer the original position. This suggests a degree of continuity across primates in their innate preferences. However, by 3 years of age human children switch to preferring feature strategies; that is, looking under the same covering object. This shift suggests to Haun (2007) that increasing language proficiency and enculturation lead to a change or 'masking' of the innate cognitive strategy preference. The shift seems clear enough. But to claim that early strategies are *masked* by later strategies suggests the former are real and the latter merely obscure them. From a developmental point of view, however, several other possibilities exist: The later strategy may replace, complement, or consummate the earlier strategy. Indeed, other studies show that some cross-species continuities, such as preferring the use of environmental cues for processing spatial relations, extend to even later ages.

A second study (Haun, 2007) compared Dutch and Namibian elementary school children at about age 8 regarding their preferred frames of spatial orientation (Haun et al., 2006). The two cultures differ in the way they prefer to express spatial relations verbally: The Dutch prefer speaking using a relative (left–right type) frame of reference and the Namibians prefer speaking using an absolute frame (east–west type) of reference. In a nonverbal task the children were shown a row of animal figures and then asked to reconstruct that row in another location where they had been rotated 90 degrees and placed with respect to a local landmark (so that use of distinct frames of reference can be distinguished). The results showed that the Dutch children preferred to reconstruct the array using a relative frame of orientation, whereas the Namibian children preferred an absolute frame of orientation. A separate task that increased the difficulty of the array and prompted children to use their dispreferred strategy revealed that they made many more errors, showing that it was difficult for them to switch from their habitual preferences. This study suggests, then, that the adult language patterns predict the children's cognition by as early as age 8, a pattern that then continues into adulthood. Related studies suggest that the use of this relative frame of orientation may be more difficult for young children to implement (Haun, 2007).

Together these studies show that there is continuity in certain spatial relational preferences using position and environmental cues within the primates, but that there is also discontinuity, in that humans are able to use other features in spatial relational tasks by age 3 and they exhibit diversity by age 8 in the spatial frames of reference that they use in cognitive tasks, frames that are in line with the patterns of language usage in their community. This suggests that humans have new representational capacities that enable departure from innate preferences and hence diversity within the species as well. And it suggests that language use is a key driver and shaper of this diversity.

One further development in this tradition bears mention. The domain-centered approach focuses on the full range of linguistic resources that can

be used to convey specific referential information. This in turn leads quite naturally to looking at the full range of communicative resources outside of the linguistic code proper which can also play a role in conveying such information. Thus within this tradition there has long been interest in pointing gestures and other forms of nonverbal communication. From this expansion beyond the spoken language modality, it is but a small step to more recent work that considers the entire multimodal communicative interaction as the proper unit of analysis. And it is within interaction or, more precisely, the set of capacities necessary to mount interaction, that the evolutionary roots of human sociality are located (Enfield & Levinson, 2006). In this way of thinking, language plays a secondary role, extending the power of interactional strategies that are, ultimately, independent of it and grounded in individual cognitive skills (e.g., Theory of Mind), interpersonal skills (e.g., turn taking), and bodies of shared information (e.g., cultural traditions). Although this work on interaction has produced some excellent new comparative work on both the commonalities and differences in interactional engagement across cultures, it leaves behind a concern for the specific role of language in shaping cognition and has yet to engage the question of how general interaction strategies influence cognition.

Ontogenesis: The growth of mind in middle childhood

A recent line of research has used the structure-centered approach to explore the development of language-related cognitive differences in childhood (Lucy & Gaskins, 2001, 2003). This research program effectively joins a Whorfian question about the impact of language differences on thought with a Vygotskian one about the impact of language on the development of conceptual thought in middle childhood (Lucy, 2010). The research has two aims. First, developmental research can provide a new way to address the question of which comes first, the language pattern or the cognitive pattern. Although many factors suggest that the language categories must be the leading force here (see Lucy, 1992a), direct developmental evidence can provide an important confirmation of the order of emergence. Second, once we have an adult contrast, we can use it to help us diagnose when and how language and thought interact in development. This provides us insight into the timing and mechanism of the developmental process.

Pilot work indicated that the distinctive cognitive patterns were appearing at around age 8. Accordingly, we then administered the full set of the triads described earlier to samples of American English and Yucatec Maya children at ages 7 and 9. Looking first at stable objects, we obtained the results shown in Figure 3.1. As you can see, English-speaking and Yucatec-speaking 7-year-olds showed an identical early bias toward shape —choosing material alternates only 12% of the time. But by age 9 the adult pattern was visible: English-speaking children continued to favor shape,

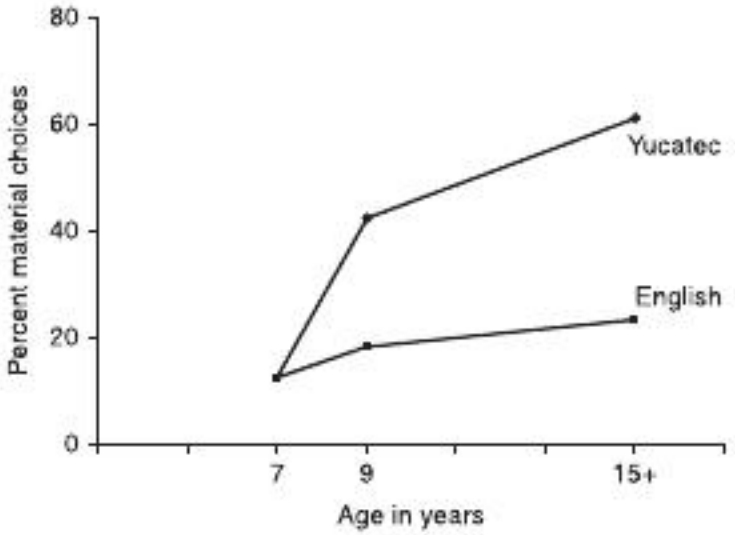

Figure 3.1 Developmental pattern for English and Yucatec classification preferences with stable objects: Material versus shape. *Source:* Reprinted from Lucy (2004, p. 13).

choosing material alternates only 18% of the time, whereas Yucatec-speaking children were now choosing material alternates 42% of the time. Finally, on the far right are the adult results reported earlier. Thus, the same kind of language-group difference found among adult speakers is also found in children by age 9—and this result is statistically reliable.

Turning next to the results for malleable objects, where we expect the two groups to look alike, we find that English-speaking and Yucatec-speaking 7-year-olds both showed a substantial number of material choices, as shown in Figure 3.2. English-speaking children choose the material alternate 42% of the time and Yucatec-speaking children choose the material alternate 46% of the time. At age 9 there is essentially no change: English children choose material alternates 43% of the time and Yucatec children choose them 50% of the time. And again, the adult responses appear on the right. Overall, the similarity of response found among adult speakers for referents of this type also appears in children. However, now viewed in contrast to the developmental data, we can see that the adult results appear more strongly differentiated in a manner reminiscent of the stable object results—which perhaps suggests some general transfer of effect from the stable object category to these malleable object stimuli.

We can bring both of these results together to display the interaction of referent type and language type across age, as shown in Figure 3.3. This composite chart shows that 7-year-olds show clear sensitivity to referent type independently of language group membership. They show a relative preference for material as a basis of classification with malleable objects and relative preference for shape as a basis of classification with stable objects. Both bases of classification respond to stimulus properties and are

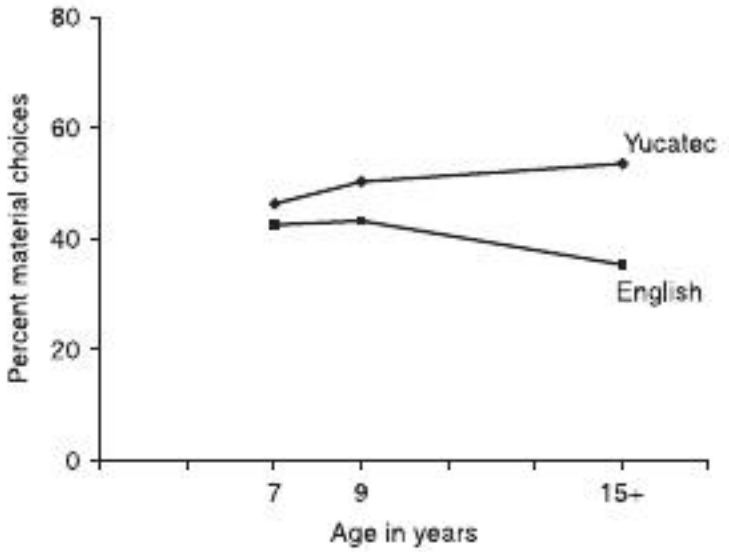

Figure 3.2 Developmental pattern for English and Yucatec classification preferences with malleable objects: Material versus shape. *Source:* Reprinted from Lucy (2004, p. 15).

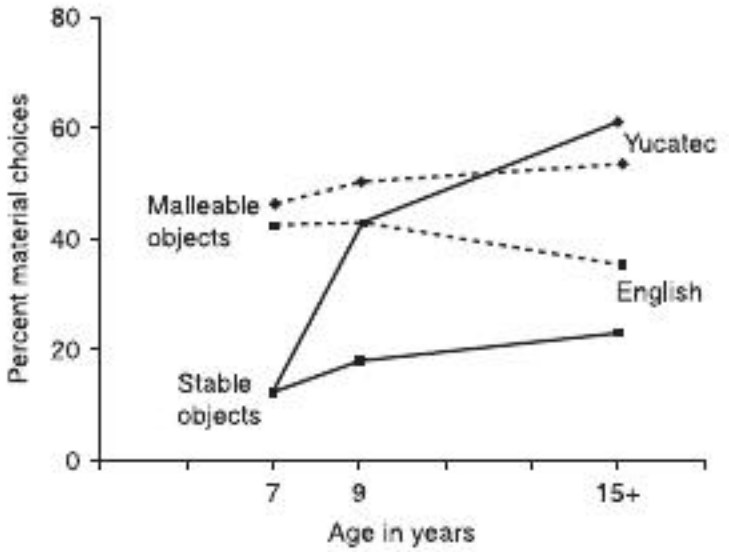

Figure 3.3 Developmental pattern for English and Yucatec classification preferences with both stable and malleable objects: Material versus shape. *Source:* Reprinted from Lucy (2004, p. 17).

fully available to and used by both groups. Apparently, referent type but not language type is the dominant factor in these nonverbal cognitive tasks at this age. Simply having a linguistic form in the language is not enough in itself to shape cognition. By contrast, 9-year-olds show differential sensitivity to referent type along adult lines: Their classification preferences differ where the languages differ and correspond where the languages correspond. This suggests that language categories increase in

their importance for cognition between ages 7 and 9; that is, that category patterns in the linguistic structure become important in a new way. Adult responses continue to show these language-specific patterns but also show a trend towards consolidation into a dominant pattern for each group. The Yucatec responses converge towards material choices and the English responses towards shape choices. The split-marking pattern in English obviously militates against the complete erasure of the distinctions among referent types in that language, hence the overall trend necessarily remains subordinate to the main effect of cognition aligning with the specific linguistic treatment of a referent type. Research on other unitizer languages such as Japanese produces results similar to those found in Yucatec (see discussion in Lucy & Gaskins, 2003). We can summarize the overall pattern of these results by saying that *young children begin by grouping different referent types in the same way and then shift during middle childhood to grouping the same referent types in quite different ways as a function of the structure of their language*.

Note that most of the central elements of the grammar, including number marking, have been in place for many years for these children. Just as English-speaking children have substantial command of plurals by age 7, so too do Yucatec-speaking children have substantial command of numeral classifiers by this age. Seven-year-old Yucatec-speaking children reliably use classifiers when counting, draw appropriate semantic distinctions among them in comprehension tasks, and will judge a number construction lacking them as faulty. However, they do still fall short of having the full adult range of classifiers in comprehension and production. Insofar as the cognitive results derive from basic structural characteristics of the language rather than mastery of the full range of lexemes, there is no reason the effects should not appear at age 7 rather than several years later. Something new must be happening during this middle childhood period.

These results are bolstered by other studies. These effects of language on thought are not merely mediated through lexical categories: The associated inflectional pattern of plural marking has other direct effects on cognition (see Lucy, 1992a, Ch. 3). Likewise, effects are not limited to simple classification tasks: Similar patterns appear in complex classification tasks (Lucy & Gaskins, 2001), in memory tasks (Lucy & Gaskins, 2003), and in everyday behavior (Lucy, 2004). And these structural effects emerge during middle childhood, in accordance with Vygotsky's (1934/1987) views. Taken together, these findings suggest that the specific structure of the language one speaks takes on new significance for cognition during this age period.

Understanding how language and thought come to relate in this new way will require taking a closer look at language development during this period. This is not a period of child language that has been heavily studied, but the available research shows that children develop many new verbal skills during this period and most of these changes suggest that the

structural element of language comes into new significance as the child engages in more demanding discursive tasks. In terms of language structure, children continue their lexical development, adding new forms and reorganizing old ones so as to converge on the meanings held by adults (Ameel, Malt, & Storms 2008). In terms of grammatical structure, they master constructions such as passives (Chomsky, 1969) and the anaphoric use of demonstratives (Karmiloff-Smith, 1979) that enhance discourse cohesion. They also rework existing structural resources to create more coherent narratives through the sophisticated handling of temporal ordering and reported speech (Berman & Slobin, 1994; Hickmann, 1993, 2003). All of these structural developments involve taking existing structural alignments of form and meaning and either overriding or manipulating them in the service of various discursive ends. In terms of language function, children during this period also begin to use language for new forms of verbal humor and insult, as well as specialized stances such as sarcasm and flirting (e.g., Hoyle & Adger, 1998; Romaine, 1984). These skills all involve deploying one line of referential meaning while a second, sometimes diametrically opposed, meaning is also evoked in order to express a stance the speaker is taking towards the material. In formal terms, the child has learned to exploit the reflexive poetic potential of language such that one level of the message effectively 'comments' on another and a new message emerges from the conjuncture. At the same time, new metalinguistic skills emerge as children become able to explain the meanings of words more effectively, setting one construction into equation with another, and as their self-corrections grow beyond a concern with referential accuracy to a concern with communicative appropriateness and rhetorical effect. In particular, the ability to recognize and appeal to a listener's presuppositions and then to manipulate their expectations and reactions suggests a growing enmeshment of language with the surrounding socially shared reality.

Collectively, these new skills reflect a growing sensitivity to and mastery of the full structural implications of language forms. This includes the realization that these implications are recognized and used by others, and therefore that they can be relied on achieving a variety of effects in communicative interaction. For the child to draw on the full latent power of the shared structural means in the language and erect new functions upon it, the structure must itself be thoroughly mastered (Karmiloff-Smith, 1979). The child's new capabilities seem to be of three general types. First, there is deeper, more flexible mastery of the fundamentals of the meaning structure, mastery sufficient to permit the use of a single form for multiple meanings and to signal a given meaning through multiple forms. This flexibility permits greater referential precision and allows users to coordinate several messages in a single utterance, whether as speakers or hearers. Second, there is a deeper, subtler mastery of the fundamentals of the discursive space. These new discursive capacities necessarily involve

shaping a message for the participants in a particular speech event. This implies an ability to understand the likely response a given utterance will elicit from a listener in a given situation and what, in turn, their interlocutors' own responses entail for them. In formal terms, what is emerging is the ability to co-construct and sustain a shared reality, a common ground for the purposes of conversation. Third, both of these shifts depend on re-analyzing the deictic forms that anchor linguistic structures in ongoing discourse: person, tense, modality, and evidentials (Jakobson, 1957/1971). Hereafter, such deictic forms not only have reference to the default, taken-for-granted, immediate speech situation that dominates in young children's speech, they also have reference to the broader shared social and interactive context, including language structures themselves, which adult speech both presupposes and helps create.

Interestingly, precisely during this period of enhanced structural mastery and associated verbal competence, children also begin to lose some of their former flexibility in language learning. Children learning a second language later in life will typically exhibit this loss of flexibility in the form of an accent; that is, a structurally driven interference with the new language. And the structures at issue here arise not only in the realm of sound but also in the realm of meaning. That is, children will develop a *semantic accent* and systematically apply the structural meanings of one or another prior language when interpreting a new language (Lucy, 2006). In bilingualism research, the terms *transfer* or *cross-linguistic influence* are more commonly used to discuss the effects of one set of language categories on another (e.g., Jarvis & Pavlenko, 2008). The term *accent* is preferred here because it carries the connotations that such effects are normal, unconscious, durable, and value laden. It also puts more emphasis on the role of an early language on the reception of a language learned later. It is as if the child, in order to implement more sophisticated forms of discourse, is forced in some way to crystallize the existing language system in a way that interferes with later language learning. In other words, new verbal powers seem to be purchased at the expense of structural openness. And henceforth, each new language is 'heard' through the structural paradigms of the first-learned language(s).

The results of the case study reported here indicate that something similar happens with cognition during this period. For it is precisely during this period of emerging verbal skill, resting on virtuoso structural mastery and commitment to local discursive realities, that linguistic relativity effects appear. We not only see new languages through the lens of our own language in the form of a semantic accent, it seems we also come to see and think about other aspects of reality itself through categories of our language. Even as the use of language structures helps liberate us from living and thinking only in the immediate reality, 'enriching' our vision, its structures and their shared entailments are also becoming 'habitual' constraints on our vision of reality.

This suggests that that engagement with the inner structural logic of a language and the particular discursive world it enables provides the leverage needed to transcend the immediate moment so as to re-envision reality, to re-think it, and ultimately to re-make it—precisely the practices that distinguish humans from other species. From this vantage point, linguistic relativity effects are not some unfortunate side-effect of language development, but are rather its intended achievement as we recruit the inner face of our particular language structure to the shared task of re-imagining the reality around us. It is crucial to see that the structural patterns in language that support this development *are* the telos of language development, the end towards which it develops. And this telos is latently there from the beginning both as a presupposition of the developmental process and as its central achievement. The structure of language allows us to reach beyond the immediate speaking moment to construe a historically specific reality, a reality which represents the stable and enduring legacy of each language to its speakers.

CONCLUSION

The distinctive anthropological approach to the study of language and thought derives from the view that no language has an intrinsically superior representation of reality such that it can be taken as the standard for evaluating others. This leads directly to efforts to find ways to compare languages in a more neutral way, in particular by reference to how languages partition domains characterized independently of language or by reference to how structural contrasts between languages implicate different realities. Later refinements of these approaches have converged on the use of referential and semantic typologies to characterize language differences and the use of systematic experimental comparisons to characterize nonverbal consequences of the language differences. Recent work explores the evolutionary and ontogenetic origins of the capacity for diversity and of the specific mechanisms in development associated with the emergence of linguistic relativity effects. These effects seem to be associated with a fundamental trade-off whereby a deeper commitment to the structures of one's language goes hand in hand with the emergence of more sophisticated verbal and intellectual capabilities.

The anthropological approach makes clear that research on the impact of language diversity is inherently difficult because the bias of our own language pervades the research process. First, our understanding of the meaning structure of another language can be impeded by the categories of our own language, what I have called here our semantic accent. Like any other accent, semantic accents are normal, systematic, resistant to change, and value laden. Second, our understanding of the nature of reality can be shaped by the categories of our own language, what is

usually called linguistic relativity. Our categories not only bias how we habitually see the world, they also seem to us uniquely suited to capturing that reality. Third, both of these effects, semantic accent and linguistic relativity, converge to create interpretive problems when we try to understand how another people are seeing reality. Insofar as we interpret their *language* through our categories and then interpret *reality* through our categories, it becomes almost impossible to recognize difference, let alone relativity. If, on the one hand, we observe that their language categories match ours and match our reality, we conclude that languages are not really so different after all, and there is no relativity. If, on the other hand, we observe that their language categories do not match our language or our reality, we may conclude not that there is relativity, but that their language is simply deficient by comparison with ours. It is difficult to recognize the third possibility, that their language is different than ours and represents reality equally well. It is unlikely that this difficulty can be overcome by good intentions in the form of an egalitarian mindset—these biases are too deeply ingrained and useful in other contexts. Rather, from the point of view of research, they can be overcome only through embracing a theoretically informed methodology that forces us to follow the logic of another language on its own terms, to frame the comparison in neutral terms, and then to assess directly the contrasting views of reality held by ourselves and by others. And the execution of this theoretical methodology, in turn, requires sustained practical engagement with other languages.

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