Language, Culture and the Embodiment of Spatial Cognition

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Abstract

Our aim in this article is to argue that an adequate account of semantic development in early first language acquisition requires a theory and methodology that synthesize the insights of cognitive and cultural linguistics with a Vygotskian socio-cultural approach to human development. This involves recasting and extending the notion of Embodiment, which is a central philosophical underpinning of cognitive linguistics. We discuss evidence from the cross-linguistic and cross-cultural study of spatial semantic development, and argue that current controversies regarding language-specific acquisition strategies and universal cognitive bases of semantic development may best be resolved by viewing the issue of “linguistic relativity” in a socio-cultural, as well as a grammatical, perspective.

Keywords: linguistic relativity, space, semantics, acquisition, embodiment, Vygotsky

1. Introduction: Embodiment and cognitive semantics

[It] is always difficult for the psychologist to think of anything ‘existing’ in a culture … We are, alas, wedded to the idea that human reality exists within the limiting boundary of the human skin! (Bruner, 1966: 321).¹

The Embodiment thesis is central to cognitive semantics, both as a general philosophical and psychological perspective, and as a source of specific hypotheses about linguistic meaning, metaphor, imagination and cognitive mappings (Johnson, 1987; Lakoff, 1987; Lakoff and Johnson 1999). The Embodiment thesis challenges the Cartesian dualism which has had such a long and pernicious influence on traditional philosophy of mind, and which has been deeply influential in modern linguistics and first-generation, “classical” cognitive science (Chomsky, 1968). Where Cartesianism posits a formal and universal rationality, instantiated only contingently (but innately) in the human organism, the Embodiment thesis stresses the continuity and motivating character of the relationship between pre- or non-linguistic bodily experience, and cognition; and seeks deep
explanatory principles in human neurobiology. The Embodiment thesis is consistent with current thinking in cognitive neuroscience (Damasio, 2000). It is also consistent (when interpreted developmentally) with epigenetic connectionist computational modelling (Elman et al., 1996; Plunkett and Sinha, 1992). The Embodiment thesis is thus very much in tune with the new, second-generation cognitive science which is steadily gaining ground, and indeed can be seen as one of the main philosophical contributions which cognitive linguists have made to this “new” cognitive science.

Although the Embodiment thesis, and in particular the linguistic hypotheses which it has given rise to, is original and distinctive, it nevertheless has clear affinities with earlier accounts in cognitive psychology, as well as philosophy. Johnson (1987), for example, cites Neisser’s (1976) ecological cognitive theory, and both Lakoff and Johnson explicitly acknowledge the affinity of the embodiment thesis with Gestalt psychology. There is also an obvious similarity between the cognitive semantic notions of image schema and force dynamics, and Piaget’s (1953) account of the sensorimotor foundations of cognition in infancy. It is perhaps worth pointing out, in the light of Johnson’s critical discussion of Kant’s account of the imagination, that Piaget believed that the basic motivation of his genetic epistemology was to provide a developmental and biologically-based reformulation of Kant’s synthetic theory of cognition (Piaget, 1972a). At the level of specific formulation, it cannot be denied that there are profound differences between Piagetian theory, with its emphasis on formal logico-mathematical models of reasoning, and the theory of embodied cognition. Still, the fundamental motivating impulse of the two approaches is similar: to ground cognitive theory in the biological properties of the developing human organism and its interactions with the physical world.

The Embodiment thesis also shares with Piagetian theory (and with dominant strands in cognitive psychology) an essentially universalistic and individualistic vision of the mind. It would be wrong, and an oversimplification, to say that Piaget entirely neglected the importance of social interaction in cognitive development. In fact, he stressed that social interaction was a necessary condition for cognitive development. However, entirely in keeping with his research program of elucidating the formal constructions that, he believed, constituted human intelligence, Piaget considered the features of the social environment necessary for this constructivist process to be in all essential respects trans-cultural:

Whether we study children in Geneva, Paris, New York or Moscow, in the mountains of Iran or the heart of Africa, or on an island in the Pacific, we observe everywhere
certain ways of conducting social exchanges between children, or between children and adults, which act through their functioning alone, regardless of the context of information handed down through education. In all environments, individuals ask questions, work together, discuss, oppose things and so on; and this constant exchange between individuals takes place throughout the whole of development according to a process of socialisation which involves the social life of children among themselves as much as their relationships with older children or adults of all ages. (Piaget, 1972b: 35).

Piaget did acknowledge that socio-cultural factors could accelerate or retard stagewise development, to the extent that he suggested that, in some cultural settings, the final stage of formal operational thinking might not be attained by individuals. However, the order of development of stages is necessarily invariant in his theory, being given by the logico-mathematical formalization of the operations constitutive of each stage. In this sense, the socio-cultural context of cognition and its development was seen by Piaget as simply a necessary and perhaps limiting condition, which could in his view only modulate the pace and terminal point of a universal, endogenous sequence of cognitive development.

Piaget’s theory of stages is no longer central to developmental psychology, but both the experimental paradigms which he pioneered, and the wider, biologically grounded, constructivist and epigenetic vision which informed his research, continue to inspire some major currents in contemporary developmental psychology. However, since as far back as the 1920’s, and repeatedly until the present day, Piaget has also been criticized by many developmentalists for his “epistemic individualism” and his neglect of the socio-cultural and communicative context of cognitive development. Such criticisms have often been coupled with criticism of his neglect of the specificity of the cognitive domain of language, and of its possible formative role in cognitive development. These criticisms were forcefully developed some 70 years ago by the Russian psychologist Vygotsky (e.g. Vygotsky 1978, 1986), whose work (to which we return below) remains a basic reference point for the articulation of an alternative, more socio-culturally oriented approach to the development of language and cognition (Bruner, 1990; Sinha, 1988). The case that we wish to argue here is essentially that the Embodiment thesis, as currently formulated, suffers from the same shortcoming as Piagetian developmental theory: despite its many virtues, and its superiority to its formalist rival, it has failed to
pay sufficient attention to the importance of culture and society in human cognition, in the motivation of linguistic structure, and in the acquisition of language.

One rhetorical formulation of this critical point would be to say that the Embodiment thesis breaks only with half of the dualistic framework of the Cartesian paradigm. Although it successfully challenges mind/body dualism, it leaves intact the dualism or opposition between the individual and society, a residual dualism that leaves it open to the dangers of collapsing into “neural solipsism” (Sinha, 1999). Like Piagetian theory, the Embodiment thesis pays a kind of lip-service to the social surround, but does not explore its specific role in cognition and language, and tends to see cognitive mappings in terms of a one-way street from individual (embodied domains) to society (abstract and social domains). Our aim is to explore this issue in relation to the cognitive and linguistic domain of space. We begin with a brief overview of cognitive linguistic work on spatial semantics, a discussion of how the Embodiment thesis may be extrapolated to hypotheses about language acquisition and language change, and a look at some evidence bearing on these hypotheses.

2. Spatial semantics, embodiment, universals, and cognition

The Embodiment thesis can be stated as a general proposition: “[The] properties of certain categories are a consequence of the nature of human biological capacities and of the experience of functioning in a physical and social environment.” (Lakoff, 1987: 12).

Note that this formulation explicitly acknowledges both the interactive nature of the experience which gives rise to cognitive categories, and the fact that the environment in which the organism functions (and develops) is a social as well as a physical one. It does not, however, specify in which ways these two aspects of the organism’s environment relate to each other; nor in what respects varying social environments may give rise to varying experiences; nor the extent to which such varying experiences may be relevant to the categories which are formed as a (partial) consequence of such experience. The relevance of social experience is in no way denied, but it is not further explored, and, in most analyses, cognitive linguists concentrate exclusively upon the similarities and differences in the categorial or conceptual structures which are expressed in specific languages (and the typological relations between them). As we shall later argue, this self-limitation reinforces a limited and inadequate formulation of the (probably mis-named) “linguistic relativity hypothesis”.

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A further specification of the Embodiment thesis, which stresses the extent to which it can serve as a source of positive hypotheses, and to which most cognitive linguists (including ourselves) would subscribe, would read something like: “The human body (and nervous system) interacting with the physical (and social) world is the universal source of image schemas (and event schemas, force dynamic and motion schemas).” This formulation remains highly general, inasmuch as the nature of the interaction (how frequent and how active does the subject’s participation, for example, in an event-type, have to be in order for a schema to emerge?), and the extent to which such experience may vary between individuals and between cultures remains unspecified.

Moving further in the direction of specific hypotheses, and evidence for them, we can suggest that the Embodiment thesis makes the further claim that: “Embodied experience structures through metaphoric extension many other non-physical (e.g. psychological and social-interpersonal) domains.” This is a central tenet of cognitive semantics and cognitive metaphor theory, and can be illustrated by a well-known example (Johnson, 1987: 35):

(A) common type of metaphorical projection treats social or interpersonal agreements, contracts or obligations as bounded entities. This generates such expressions as,

4(a) Don’t you dare back out of our agreement.

4(b) If you want out, bow out now, before we go any further.

4(c) He’ll weasel out of the contract, if he can.

Being bound in this cases involves something metaphorically akin to being in a physical space where forces act upon and constrain you ... So, to get out of such a contract or agreement is to be no longer subject to its [moral or legal] force”.

The ubiquity of such metaphoric mappings from the spatial (physical) to nonphysical domains does indeed attest to the psychological primacy or primitiveness of spatial schemas such as “containment/constraint”. We know, too, from developmental psychological research that such prelinguistic schemas (though not necessarily innate) are early acquired, well before the end of the first year of life (Mandler, 1996). A strong reading of the Embodiment thesis would lead to the hypothesis that such early spatial schemas are directly grounded in bodily experience, in the sense of movements of one’s body and of other objects in relation to one’s body.
Johnson (1987: 34) indeed proposes such a hypothesis, suggesting that “the projection of in-out orientation onto inanimate objects is already a first move beyond the prototypical case of my bodily movement” (though he is careful to indicate that this is a speculative hypothesis, and to insist that his general proposition, that experience of physical space is primary to the metaphoric spatial structuring of interpersonal relations and social institutions, is unaffected by whether the speculation is correct or not). What can developmental psycholinguistic evidence tell us about this hypothesis? We can note first that, the speaker’s body (or part of it) is frequently expressed (both as Trajector, as in situations of being picked up and being put down; and as Landmark, as in situations involving putting on or removing clothing) in very early locative utterances spontaneously produced by Danish, English and Korean acquiring children (Choi and Bowerman, 1991; Bowerman, 1996; Thorseng, 1997). Nevertheless, utterances in which speaker’s body, or part of it, is either Landmark or Trajector, do not seem systematically to precede utterances in which both Landmark and Trajector are other objects, either in general or for particular expressions. There is no evidence, in other words, that the child’s own body serves in these languages as a “prototypical case” in learning to talk about spatial relations.

This finding provokes the question: What makes my body, as such, a more truly “embodied” or material realization of the schema of containment/constraint than, for example, a cup, an artifact designed to be a container, and with which (in Western culture) infants learn to interact from a very early age? In fact, there is evidence that pre-linguistic infants (in England) already understand at the age of around 9 months that cups are containers, and that in order to function as such they must be in their canonical, upright orientation (Freeman et al. 1981). We shall argue that the question just raised is a fundamental one, which gives us a clue as to why the Embodiment thesis needs to be extended “beyond the body”. In other words, we shall argue for an extended conception of Embodiment that is no longer restricted to the “humanly corporeal”.

In summary of the developmental evidence discussed so far, we can note that both spontaneous speech data, and experimental evidence regarding pre-linguistic cognitive schematizations of basic spatial relations, point to the conclusion that early spatial schemas implicate “non-self” objects and events at least as much as they implicate the developing child’s own body. This does not preclude (though neither does it support) the possibility that the child’s own bodily actions in the physical world are causal, as Piaget proposed, in the development of such early schemas. However, the data clearly
argue against a strong developmental reading of the Embodiment thesis, in which the human body would be hypothesized to be the schematic source for the later ontogenetic development of spatial schemas.

Turning now to comparative linguistic evidence, one fact frequently cited in favour of a strictly "corporeal" interpretation of the Embodiment thesis is the widespread occurrence, in the languages of the world, of constructions in which body-part names occur in locative constructions (as in Eng. “at the foot of the hill”, “into the mouth of the cave” etc.). The use of body-part terms equivalent to “front” and “back” to express spatial orientation is widespread, and in some (predominantly meso-American and West African) languages, spatial relational meaning (including, but not limited to, orientation) is linguistically conceptualized regularly and obligatorily through the use of grammaticalized body-part terms.3 In some cases, such as the well-known one of Mixtec (Brugman, 1983; Lakoff, 1987), both animal and human body schemas are employed by speakers in the conceptualization of the Landmark, while other languages (e.g. those of the related Otomanguean Zapotec family) make exclusive use of the human body schema (MacLaury, 1989). It may be argued (although we are not aware of evidence on this issue) that in cases such as Mixtec, the historically originary schema is that of the human body, and that the animal body schema is derivative. On the basis of an extensive survey, Heine (1997: 143) concluded that “the ability to use the human body as a structural template to understand and describe other objects can be assumed to be universal; hence, we may expect this to be reflected in all languages”.

However, the metaphoric domain-domain mapping between body parts and other domains is not unidirectional. Heine (1997) cites several examples of the recruitment of non-body part object names, and activity/experience terms including non-nominals, to designate body parts (e.g. Fr. tête ‘head’ from Late Latin testa ‘pot’; Ger. Gesicht ‘face’ from sehen ‘to see’). Furthermore, non-body part locative expressions for psychologically basic or “primitive” spatial relational schemas may themselves be recruited to designate body-parts, while at the same time the body schema is projected to spatial and non-spatial domains. Palmer (1996: 5) gives the following example from Coeur d’Alene, a polysynthetic North American language: the palm of the hand is the “surface in the back of the hand”, “a word analyzable into no less than five morphemes: (...) NOM-IN-SURFACE-BACK-HAND. I would later learn that the spatial models that demarcate the entire surface of the body (but not the organs inside the body) and define terms for hands, fingers, toes, and many other body-
parts also apply to Coeur d’Alene place-names and even, metaphorically, to expressions for emotions and social relationships.” What we should note here is that a body-part nominal is constructed out of both “basic” body-part terms, and non body-part locative and object part terms, while at the same time the basic body part terms constitute the foundation of a complex system of mapping of the human body schema to spatial and non-spatial domains.

From the linguistic evidence we have briefly overviewed, it seems that body-part to object part and region mappings are highly frequent, and systematic metaphoric construals of the entire domain of spatial relations in terms of the human body schema are common. Nevertheless, “reverse” mappings do occur, and body-part nominals are only one among the sources from which closed class locative items are derived (see below). In sum, therefore, we would conclude that the human body schema is a privileged, but not unique, source domain for the linguistic conceptualization of spatial relations, and that its widespread recruitment for this purpose reflects its universal experiential salience. To this extent, the Embodiment thesis is empirically well founded. However, other source domains (e.g. geophysical features, geographically or cosmologically based directional systems) also occur with high frequency, and this by the same token also reflects their high experiential saliency. The Embodiment thesis thus predicts a part of the relevant linguistic data, but is on its own unable to account for all of it, unless extended to encompass at least aspects and features of the experientially or ecologically significant, non-corporeal world.

Taking a broader view, the domain of spatial relations manifests wide crosslinguistic variation in terms of the form classes employed and their grammaticalization sources (Verbs of motion and disposition; locative nouns (including body-part nouns); V- and N-derived adpositions; adverbials; particles; case inflections; verbal prefixes and suffixes). The linguistic resources available to natural languages also vary widely in terms of a range of cognitive and perceptual factors influencing spatial schematizations, many of which involve the “situatedness” of the speaker’s bodily position in respect to a schematized referential situation, but not the schematization of the body itself. These include Frame of Reference (Pederson et al., 1998); Path Specification (Casad, 1993); Visibility-Nonvisibility of Trajector (Vandeloise, 1991); Speaker Viewpoint (Casad and Langacker, 1985). Finally, languages vary widely in terms of the mapping patterns from schematization to expression, notably those of conflation (Talmy, 1985) and distribution (Sinha and Kuteva, 1995). “Embodiment” is thus only one among many variables which cognitive (and other) linguists have found it necessary to take into
account in characterizing spatial semantics, and in beginning to construct a cognitive typology of spatial conceptualization and expression.

Amongst the almost bewildering array of linguistic conceptualizations of space, Body-Part Locative languages should provide privileged natural test-beds for psycholinguistic exploration of the Embodiment thesis. What light might language acquisition data from children acquiring such a language shed? A hypothesis consistent with a strong reading of the Embodiment thesis would be that children would consistently recapitulate, as it were, the grammaticalization history of the language, using the body-part terms first as nominals to refer to actual body parts (first their own, perhaps, and then those of others), and only later as locative items referring to spatial relations. An analysis was carried out by the second author (Jensen de López, 1998, 1999) of her San Marcos Tlapazola Zapotec acquisition corpus to test exactly this hypothesis. Zapotec languages are particularly suitable as a test for this hypothesis, since the body-part nominal and its locative counterpart are morphologically identical in many contexts, and the Landmark noun phrase receives no genitive marking when its relevant part or region is designated by the Body-Part Locative (BPL): it is hence not the case that the BPL construction is necessarily morphologically more complex than a body-referenced use of the same body-part term.4

Jensen de López’s analysis showed that the majority of those body-part terms which can be used in BPL constructions (a closed subclass of 7 body-part terms) first appeared in the Zapotec corpus in the BPL construction, not referring to an actual human body; and that early locative usage of body-part terms referring to relations between objects occurred more or less parallel with, and not subsequent to, the use of the body-part terms to designate actual parts of human bodies. In other words (and consistently with the evidence and arguments of Bowerman, 1996), when Zapotec children learn to use body-part terms, they learn to use them appropriately and consistently with the speech practices of the surrounding linguistic community, rather than assimilating them to an overriding basic meaning derived from their experience of their own bodies.5 To put it another way, they learn their application in the presumed diachronic target domain simultaneously with their application in the source domain (for a similar argument in another domain, see Johnson, 1999; and for a discussion of why we should not, in general, expect “ontogeny to recapitulate grammaticalization” see Slobin, 1997).
Our provisional conclusion is that neither linguistic nor psycholinguistic evidence provides unequivocal support for the Embodiment thesis as it is usually formulated. That is to say, although the human body is (probably universally) a salient potential source schema for the linguistic conceptualization of space (and other domains), it is by no means the case that “bodily experience” (if by that is meant experience of one’s own body) provides the sole or most common schematic basis for construing space, or for acquiring the language of space. If Embodiment is to remain (as we believe it should) a central notion in cognitive semantics, it requires a reformulation in terms which are psychologically (developmentally) realistic, and which link it more explicitly to systems of cultural schematization and understanding.

3. Linguistics, anthropology, schema and world view

In this section, we situate the Embodiment thesis in the wider engagement of cognitive linguists, and others, with the mutual relationships between language, culture and cognition. The triadic relationship of these three terms is widely recognized to have constituted a fundamental field of scientific inquiry and debate since at least the time of Wilhelm von Humboldt (1988 [1836]). Curiously, however, it is only relatively recently that all three terms have begun to be systematically treated together in the modern psychological, linguistic and anthropological literatures. More commonly, the tendency has been to focus on the relationship between two of the three terms (language and cognition; language and culture; culture and cognition). In part, this may be because of traditional disciplinary boundaries, and the tendency to compartmentalize human reality along the lines of these institutional divisions. It seems that interdisciplinarity is easier to foster when it can be viewed as a “border phenomenon” between two disciplines, giving rise to “sub-interdisciplines” such as psycholinguistics/psychology of language, anthropological linguistics/linguistic anthropology, or (cross-) cultural psychology/cognitive anthropology. Simply listing these sub-fields is almost sufficient to illustrate their institutional insulation from each other: textbooks and undergraduate courses in (for example) psycholinguistics do not commonly refer to cultural-comparative data or theories.

Another reason for the common splitting of the triadic relation of language, culture and cognition into a triple of dyadic relations—with “culture”, frequently, as the poor relation—may be that linguistics, in particular, and psychology to a lesser but still significant extent, have been dominated in the recent past by approaches based upon the notions of modularity, autonomy and innateness. In
such a perspective, language variation is interesting only for the light it sheds upon universal
constraints inherent in the language module(s); and grammar bears an arbitrary relationship to the
socio-cultural surround, just as it is considered to be autonomous from linguistic meaning.

The resurgence of interest in recent years in the “linguistic relativity hypothesis” (Lucy, 1992a;
Lee, 1996; Gumperz and Levinson, 1996) stems from many of the same dissatisfactions with
“autonomous grammar” as have been partially responsible for the rise of cognitive linguistics, and
has helped to revitalize interest in language, culture and thought. However, empirical studies of
"Whorfian effects” have largely been couched in terms of the extent to which language influences
individual thinking (Levinson, 1996; Lucy, 1992b; Pederson et al. 1998). In other words, the (at least
implicit) reference to culture in views ranging from Humboldt, through Boas, to Sapir and Whorf,
which refer to language and “world view”, has been downplayed in the narrowing of the problem-field
to one of individual psycholinguistic functioning.

For Boas, “the purely linguistic inquiry is part and parcel of a thorough investigation of the
psychology of the peoples of the world” (Boas, 1966 [1911], cited in Palmer, 1996: 11); and this
inquiry was explicitly directed to the exploration of both differences and universals. It is likely that
Boas was influenced in this conception by the ideas of Wilhelm Wundt. Wundt, though usually
remembered as one of the “founding fathers” of laboratory experimental psychology, accorded equal
importance (and devoted most of his prolific writing) to what he called “Völkerpsychologie”, the
psychology of the peoples of the world, or (cross-) cultural psychology. In other words, the originating
matrix for what later came to be called the “linguistic relativity hypothesis” was one in which
anthropology, linguistics and psychology were distinct, but related, moments of an integrated inquiry
into the mutual relations of culture, language and thought.

Later in the 20th Century, the arbitrariness of the relationship between linguistic structure and the
socio-cultural milieu of the language community became an article of faith for most linguists. Several
reasons—including the notorious difficulty of defining the notion of “world view”—can be adduced for
this. First, in asserting the autonomy of its object, linguistics also asserted its autonomy, as a
discipline, from the social sciences. Second, in differentiating comparative linguistics from
anthropology and sociology, linguists such as Bloomfield pursued the programme, initiated by Boas,
of distancing their scientific approach from the speculative (and not infrequently racist) evolutionism
of 19th Century anthropology. It is not surprising, then, that Sapir and Whorf insisted, despite the fact
that their research materials were largely derived from field anthropological linguistic studies, that it was the grammatical properties of the language that influenced the cognitive processes (habitual patterns of thought) of the speaker, and not the cultural surround in general.

Linguistics and anthropology later achieved a partial rapprochement in the componential-analytic style of early, “first-generation” cognitive anthropology (or ethnosemantics), which borrowed the “etic-emic” distinction directly from linguistics, and which was predicated upon the hypothesis that cultural difference was to be captured in terms of the taxonomic categorizations of specific cognitive domains (kinship; colour; natural kinds), which are shared by individual members of a given culture, but not necessarily by members of other cultures. This approach eventuated in the important and well-known demonstrations by Berlin, Kay and Rosch of the existence of universal cognitive foundations of categorization—the story of which is told by Lakoff (1987), and needs no repetition here. The approach as a whole, however, came to be criticized both for the static and atomistic conception of knowledge which it shared with other varieties of structuralism, and for its reductive conception of culture as the common denominator of individual cognitive representations. To this criticism we can add that of Lucy (1992): its methodology depended upon the identification of conceptualization with lexical structure, and was unsuited to explore the relationship between grammatical construction and cognition that was the focus of Whorf’s thinking. In this way, ethnosemantics preserved the assumption that the grammatical properties of languages (whether or not they affect or determine “habitual thought”) are arbitrarily related to cultural-cognitive pattern or “world view”, which “penetrates” language only to the depth of the lexicon and its structure.

Cognitive linguistics does not treat lexicon and grammar as modularly separate systems. Furthermore, it rejects the analysis of conceptual structure in terms of “classical” taxonomies, employing instead the vocabulary of schema and schematization. It is worth noting in this connection that an early exponent of the “schema” notion was the social-cognitive and cross-cultural psychologist Bartlett (e.g. Bartlett, 1932), who is best known for his pioneering work in the psychology of memory. Bartlett viewed the schema as both a universal principle of cognitive organization, and as a unit of analysis particularly suitable for revealing cultural differences in collective cognitive representations. This “Janus-faced” view of the schema as both a property of individual cognition, and a characteristic “model” underlying cultural world view, has also been emphasized by Shore (1996: 51), who points out that cultural schemas or models can be institutionalized: “cultural models
have two quite different lives: as social artifacts and as cognitive representations … Instituted models always lead a double life, as part of an external social world and as products of intentional behaviour”. Shore’s examples of “instituted models” are “conventional, patterned public forms” such as discourse genres. Below, however, we shall draw attention to the way that material objects, too, can “embody” intentional behaviour and cultural-cognitive schemas.

If culturally specific knowledge or world view can fruitfully be theorized in terms of cultural-cognitive schemas; and if schematization patterns motivate linguistic structure (as is maintained by cognitive linguists), then it follows that cultural schemas (and world views) should motivate, and be entrenched by (and not be “determined by”, in Whorfian terms), linguistic structure. Indeed, precisely this reasoning can be seen as underlying Lakoff’s (1987) famous analysis of the Dyirbal nominal classifier system. The most comprehensive recent treatment of the language-world view relationship, specifying it in explicitly cognitive linguistic terms, is Palmer’s (1996) path-breaking book on cultural linguistics (see also Palmer and Arin, 1999). Palmer defines his research programme as follows: “Cultural linguistics is concerned with most of the same domains of language and culture that interest Boasians, ethnosemanticists and [ethnographers of speaking], but it assumes a perspective on those phenomena which is essentially cognitive.” (p. 36): by which he means that it employs cognitive linguistic concepts and analyses, in conjunction with ethnographic-linguistic methods. Palmer’s innovation consists not simply in the wealth of ethnolinguistic data that he reviews and submits to cognitive analysis, but also in his proposal that “Linguistic meaning is subsumed within world view. Linguistic meaning is encyclopedic in the sense that it involves the spreading activation of conceptual networks that are organized chains and hierarchies of cognitive models. Language both expresses and constitutes world view but could only fully determine it in a culture that lacked other means of expression and communication.” (p. 291; our emphasis). Again, we shall emphasize below that “expression” or “embodiment” of cultural knowledge can also involve material culture.

The project of cultural (cognitive) linguistics represents, in our view, a major advance for cognitive linguistics, but it sits uneasily with the Embodiment thesis. To put it simply, cognitive linguistics is now beset with a familiar contradiction within and between the cognitive and human sciences, which can be encapsulated in the following two propositions:

A. Linguistic meaning derives from embodied (individual) experience.

B. Linguistic meaning is subsumed within world view.
Can both of these propositions be true? Or do we require a dialectical synthesis that incorporates, while transforming, both of them (and, in this connection, especially the Embodiment thesis)?

4. Cultural embodiment and semiotic mediation: An empirical study

At this point, we cast our attention back to a fundamental dispute in developmental psychology which emerged in the 1920’s, but which continues to provoke passionate disagreement and debate. The debate concerned the role of culture, language and social interaction in human development. The original protagonists were Piaget and Vygotsky. To give the flavour of this debate, we provide three citations to add to that (from Piaget) in the Introduction.

There is a logic of co-ordination of actions. This logic is more profound than the logic attached to language and appears well before the logic of propositions. (Piaget, 1963: 51)

Every function in the child’s development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological) … All the higher functions originate as actual relations between human individuals. (Vygotsky, 1978 [1930]: 57)

Within a general process of development, two qualitatively different lines, differing in origin, can be distinguished: the elementary processes, which are biological in origin, on the one hand, and the higher psychological functions, of socio-cultural origin, on the other. The history of child behaviour is born from the interweaving of these two lines. (Vygotsky, 1978: 46).

Note, now, that if we substitute the term “image schema” for “co-ordination of actions” in the first sentence of the Piaget quote, we arrive at a reasoning that is in all essentials identical to the argument by Johnson (1987: 38-40), that logical properties such as transitivity can be derived from the properties of image schemas. Thus, if A is contained in B, and B is contained in C, it is a property of the physical containment relation, and not just of logic, that A is contained in C. And if this property is preserved (as it must be) in the image schema for CONTAINMENT, then there is a logic of schematization which is developmentally prior to propositional or symbolic logic.
Now note, however, a further property of containment not noted by Johnson, but crucial to Piaget’s famous experiments on “object permanence”. That is, that if a container is translated in physical space its contents are also translated in space. Move a cup of coffee, and the coffee goes with the cup. This property of containment is fundamental to the basic human usage of containers, which not only topologically enclose, but also constraint the movement of their contents. We can call this a functional, as opposed to logical, property of containment. In the real, physical world, a container can only reliably subserve this function if it is canonically oriented. Yet Piaget’s experiments with infants involved the movement of an inverted container, and an invitation to the infant to find the contents! To be sure, in the real physical world, if you move an inverted container with a Trajector object under it, on a smooth supporting surface, the Trajector also moves, but this is arguably a different and more complex cognitive schematization than canonical containment. Freeman et al. compared infants’ performance on two simple variants of the “object permanence” or “A-not-B” task, one in which containers were canonically oriented, and one in which they were inverted, and found that it was superior when the containers were canonically oriented. In other experiments (reported in Sinha, 1982, 1988), it was found that children in the age range of about 15-20 mo., when asked to imitate actions of placing an object in, on or under a cup consistently showed a bias towards placing the object in the cup, even when the cup was presented in an inverted orientation. Consistently with other studies, it was also found that children up to about 30 mo. displayed the same canonical “in-bias” when given language comprehension tasks requiring them to put the object in, on or under an upright or inverted cup.

Different explanations of these and other related findings (Clark, 1973; Wilcox and Palermo, 1975) are possible, but taken in the context of a series of experiments (see also Freeman et al., 1981; Lloyd et al., 1981), it is plausible to conclude that the children’s responses were dominated by the socially standard, or canonical, function of the cup as a container, and that their understanding of this property overrode in many contexts both linguistic knowledge, and the physical spatial relations made possible, or afforded by, the immediate perceptual array. Since functional properties, in this experimental design, are dissociated in some conditions from both the affordances of the perceptual array, and the motoric complexity of the action required to instantiate the visible or linguistically encoded target, the children’s cognitive representations clearly involved functional object knowledge. In other words, within a single developmental trajectory, young children, we propose, are integrating (sometimes inappropriately!) socially normative knowledge of the canonical use of artifacts with their
(biologically-based) capacity for schematizing spatial relations; and it is at least consistent with the data that this cognitive representational integration is occurring from about 9 months of age onwards. We deliberately formulate this extremely brief summary of complex data so as to emphasize its affinity with Vygotsky’s point of view, but we emphasize at the same time that it presupposes a cognitive representational capacity, which, just as Piaget proposed, is based in the ability to “abstract” schematization from immediate perceptual content (see also Mandler, 1996).

The English language lexically differentiates the spatial relation of canonical containment (enclosure within a canonically oriented container such as a cup) from the spatial relation of enclosure within the bounded space of an inverted container. The first is lexicalized by *in*, the second by *under*. In Zapotec languages, both schematic spatial relations are lexicalized by the Body-Part Locative glossing to English *stomach*. This cross-linguistic difference is illustrated in Figure 1.

The present authors took advantage of the “natural laboratory” provided by this cross-linguistic difference to replicate the action imitation and language comprehension experiments described above, suitably calibrated to the most natural utterance forms in the respective languages, with Danish (which for present purposes resembles English) and San Marco Tlapazola Zapotec acquiring children. Our initial hypothesis was that, in line with the findings of Bowerman and her colleagues, the language-specific semantics of the Zapotec language under study would yield a different response pattern for the Zapotec-acquiring children than that for the Danish-acquiring children in the language comprehension task. Specifically, Zapotec spatial semantic structure, which schematizes an inverted container as “as good” a “container” as an upright one, would induce a language-specific language acquisition pattern for Zapotec-acquiring children in which the “in-bias”, or canonicality effect, demonstrated for English-acquiring children would either be abolished, or would be earlier overcome, in the language comprehension task, than for Danish-acquiring children, who would be predicted to show a similar (in-biassed) response pattern in language comprehension as English-acquiring children. Our experimental hypothesis, with respect to the language comprehension task, was therefore derived from Bowerman’s “language-specific acquisition hypothesis”, which can be contrasted with a generalized “cognition hypothesis” (Cromer, 1972), which would predict universal
(or universally-motivated) acquisition patterns based upon pre-linguistic cognitive development (including, perhaps, canonical-functional object representations) (see also Sinha et al., 1999).

Given that the action-imitation task is in all relevant respects “non-linguistic”, that is, no locative items were employed in the instructions to the children (which were of the form “can you do what I did”, or “can you do the same”), and given that we were using containers that were culturally familiar for Zapotec as well as Danish children (woven baskets instead of cups), we expected that in this task we would find similar response-patterns on this task in the Danish and Zapotec samples.

The Zapotec experiments were prepared and piloted by both authors and administered by the second author, during two of three field visits to the Zapotec community totaling 15 months. The Danish experiments were mainly piloted by the second author, and administered for the most part by trained assistants under the supervision of the authors. The data we discuss below were presented by the first author during the plenary lecture of the 6th International Cognitive Linguistics Conference upon which this paper is based, and will also be part of the second author’s PhD dissertation. We have subsequently, in order to improve the numerical and age balance of the two samples, collected more Zapotec data, which is as yet unanalyzed. In order not to re-publish the same data at a future date, we are therefore simply giving a brief account of the findings so far, in the knowledge that the Zapotec database upon which the discussion is based is incomplete, and must therefore be treated with caution. Nonetheless, it should be emphasized that our summary is based upon statistical treatment of the data, yielding statistically significant differences between the Danish and Zapotec samples.

As we had predicted we found that the Danish children’s response patterns resembled those of English children. The Danish children showed a canonicality effect (an “in-bias”) on both the language comprehension and the action imitation task, with the effect being overcome and the children reaching ceiling performance on the latter task at least 6 mo. before doing so on the former task. The Zapotec childrens’ response patterns on the language comprehension task differed from those of the Danish children, in the expected direction, but perhaps more dramatically than we expected: not only was there a significant difference between the samples, but the “in-bias” was entirely abolished for the Zapotec sample, even for the youngest children. That is, there seemed to be no evidence of a “canonicality effect” in the language comprehension task.
The data from the action imitation task showed (against our predictions) a similar pattern, that is to say, the Danish children's response patterns manifested an "in-bias" which was not present for the Zapotec children. In neither the language comprehension nor the action imitation experiment was the difference between the two samples attributable to a merely random responding of the Zapotec children; in fact (and perhaps partly because the mean age of the Zapotec children was somewhat higher than that of the Danish children—an important consideration in our subsequent collection of more Zapotec data) the proportion of correct responses produced by the Zapotec children was slightly, but not significantly, higher than for the Danish children.

It is clear that these data cannot be accounted for by a "universalist" cognition hypothesis. Bowerman's "language specific acquisition" hypothesis accounts for the language comprehension results, but does not account for the difference between the two groups of children in their responses in the action imitation experiment. The response patterns of the Danish children in both experiments were similar to those of English children on similar tasks in which the only difference was the specific Landmark and Trajector objects used (a basket and a grain of corn vs. a cup and wooden building brick). It is plausible, then, to interpret the Danish children's response patterns in the same way as the English children's response patterns: the basket (like the cup) is conceptualized as a functional container with a canonical upright orientation, and there is a bias towards instantiating the function by placing the Trajector in the upright container.

How can we account for the absence, in either the language comprehension or the action imitation experiment, of such a bias in the Zapotec children's response patterns? One explanation would involve extending the language specific acquisition hypothesis to a strong Whorfian account, in which the semantics of the language being acquired, rather than functional object knowledge, are responsible for error patterns in both the linguistic (language comprehension) and the non-linguistic (action imitation) tasks. We can hypothesize that the Danish and English prepositions i and in are both organized around a core or "impetus" meaning (Vandeloise, 1991) equivalent to canonical containment. On the other hand, the San Marcos Tlapazola Zapotec body-part term láani ("stomach") is organized around a core meaning that equates to full enclosure, without profiling the orientation of the container. Thus, the Zapotec language does not draw attention to the orientation of the container, and this aspect of linguistic meaning could be hypothesized to influence non-linguistic conceptualization as well as linguistic conceptualization. The difficulty with this explanation is that it is
very difficult to see how it can be stretched to account for canonicality effects in search strategies in the A-not-B tasks discussed earlier, in infants as young as 9 mo. We cannot entirely rule out linguistic effects on cognitive processes in such young infants, but the hypothesis is implausible.

A plausible explanation will, we suggest, need to take account not just of linguistic, but also of cultural differences between the Danish and Zapotec groups (in such a way that it also accounts for the similarities between Danish and English response patterns). The explanation which we tentatively proffer appeals to differences in cultural configuration of the functional properties of containers in the different cultural settings. Could it be that the Zapotec children did not display an “in-bias” in their response patterns for the reason that baskets are not used as canonical containers in the same way that cups are in Danish culture? In support of such a hypothesis, we can make the following observations. The Zapotec culture makes use of a smaller variety of artifacts than the Danish culture, and tends to employ them flexibly and multi-functionally. In the village where the Zapotec study was conducted, baskets are commonly used, in “inverted” orientation, as “covers” for tortillas and other food items, and are stacked for storage in inverted orientation. They are also frequently used in inverted orientation in children’s games, for example in catching chickens. Inverted baskets are sometimes placed over brooding chickens in order to keep them on their eggs, so that the eggs will hatch. If the “core” or impetus containment schema involves constraint by the Landmark of the location of the Trajector, it would seem that in this culture, at least, the schema is not canonically associated with an orientation of the container with its cavity upwards.

Although baskets are not the only containers in use in the Zapotec village (there are also e.g. gourds, bottles and the occasional glass for special occasions), cups are quite uncommon. In contrast, in Danish culture, developing infants are not only exposed at an early age to cups, but their actions with and upon cups are shaped by adults towards drinking from (and not spilling liquids from) and playing with upright cups.

Our suggestion, then, is that a non-linguistic socio-cultural difference regarding canonical artifact use, embodied in the material cultures and exemplified in non-linguistic cultural practices, gives rise to slightly but significantly different conceptualizations of “containment” in the different cultures. This difference is (perhaps motivatedly) reproduced or paralleled in the spatial semantics of the Danish and Zapotec languages. Language-acquiring children are “pre-disposed”, through their experiences of interaction with the material world as this is culturally presented, and through the mediation of
cultural practices, to employ comprehension strategies that are consistent with the specific semantics of the languages they are acquiring. Acquisition of, and experience of using, language subsequently entrenches this socio-culturally based cognitive difference (rather than, as in the conventional reading of the Whorfian hypothesis, causing or determining it).

This interpretation constitutes a hypothesis that can be subjected to test, by attempting to vary language and culture as separate variables; but it also suggests that these will never be true “independent variables”. We are currently extending the languages and cultures under study in order to test the hypothesis, and it cannot be treated as any more than that at present. If, however, our interpretation proves robust to new evidence, it would provide clear evidence of the operation in human development of what Vygotsky called the “semiotic mediation” of higher cognition; a process which he considered, indeed, to be constitutive of higher cognitive functions; and which includes, but is not restricted to, the mediation of thought by language. The hypothesis that we are arguing for is that the everyday artifacts used in the experiments are not “culturally neutral”, not just in the sense that they may be more or less familiar to individuals from different cultures, but also because they embody different conceptualizations or cultural schemas (in this case, of spatial relations). This “extended embodiment” does not exist in a vacuum: it is not, as it were, a property of the objects “in themselves”. Rather, it is constituted and exemplified by the participation of the objects in an entire matrix of cultural practices, some of which are linguistic (or discursive) practices, and some of which are nonlinguistic. Furthermore, cultural schemas find a further manifestation, or expression, in the lexico-grammatical structures of natural languages, and it is from this perspective perhaps no surprise that children should be so adept, as Bowerman and her colleagues have shown, in acquiring the specific conceptualization-expression mappings of their mother tongue.

5. Conclusion

In this article, we have argued that the Embodiment thesis needs to be extended to take account of the role of cultural meaning in motivating linguistic structure and, more widely, the socio-cultural grounding of language. We also argue that the so-called “linguistic relativity hypothesis” also requires reformulation and extension, to take account of non-linguistic expressions and embodiments of culture. The vehicle we choose for “extending embodiment beyond the human body” is Vygotsky’s socio-cultural, or cultural-historical, developmental psychology. We offer an empirical example of a
cross-cultural and cross-linguistic difference in the development of language and cognition, and offer an explanation of these differences in terms of language “entrenching” cognitive differences induced by cultural embodiment and cultural practice. In conclusion, we believe that a serious theoretical and empirical dialogue between cognitive linguistics and socio-cultural approaches to language and mind can only be of benefit to both; this article is intended as a contribution to such a dialogue.

1 University of Southern Denmark, Department of Language and Communication, Campusvej 55, 5230 Odense M, Denmark. E-mail Chris.Sinha@language.sdu.dk.
2 We are grateful to Andrew Lock for this apt quotation (Lock, 2000).
3 We do not intend to distinguish here between “culture”, “society” and “socio-cultural context”. Although they are not the same, for our purposes the “socio-cultural” embraces social structures and practices which may or may not be typical only for a particular given culture or group of cultures, as well as symbolic and material cultures and their associated practices.
4 Body part terms are also recruited for lexical and grammatical usage in other cognitive domains, notably numeral systems.
5 The BP-locative and the Body Part Noun from which it is derived can be distinguished on grammatical grounds, and precisely this distinguishability is evidence for the grammaticalization of the BP-locative. The Landmark of which the spatial relation expressed by the BP-locative is predicated can be expressed either by a NP or by a “personal pronominal” clitic suffix identical to person marking on verbs (Munro and López, 1999). The general point about morphological indistinguishability in many contexts stands however. Where the Landmark is expressed by a NP, the Body Part expression may be ambiguous as between usage as Object Part and usage as Locative, e.g. quia yuu (“head house”) may refer either to the roof (part) of the house or to the location on or above the roof of the house (there is no alternative lexicalization of “roof” to the use of the BP term).
6 It is worth noting that the body-part term lo, “face”, also occurs in dative constructions, and this construction also figured amongst the early usages of the term in Jensen de López’s corpus.
6. References

Boas, Franz

Bowerman, Melissa

Bruner, Jerome

Bruner, Jerome

Brugman, Claudia
1983 The use of Body-Part Terms as locatives in Chalcatongo Mixtec. Survey of California and Other Indian Languages 4, 239-290.

Casad, Eugene

Casad, Eugene and Ronald Langacker

Choi, Soonya and Melissa Bowerman

Chomsky, Noam

Clark, Eve
Cromer, Richard

Damasio, Antonio

Elman, Jeff, Elizabeth Bates, Mark Johnson, Annette Karmiloff-Smith, Dominico Parisi & Kim Plunkett

Freeman, Norman, Sharon Lloyd & Chris Sinha

Freeman, Norman, Chris Sinha and Stephen Condliffe

Gumperz, J. and Stephen Levinson

Heine, Bernd

Humboldt, Wilhelm von

Jensen de López, Kristine

Jensen de López, Kristine

Johnson, Christopher


Johnson, Mark


Lakoff, George


Lakoff, George and Johnson, Mark


Lee, Penny


Levinson, Stephen


Lloyd, Sharon, Chris Sinha and Norman Freeman


Lock, Andrew


Lucy, John

Lucy, John

MacLaury, Robert

Mandler, Jean

Munro, Pamela and Felipe López

Neisser, Ulric

Palmer, Gary
1996 *Towards a Theory of Cultural Linguistics.* Austin, University of Texas Press.

Palmer, Gary and Dorothea Neal Arin

Pederson, Eric, Eve Danziger, David Wilkins, Stephen Levinson, Sotaro Kita and Gunter Senft

Piaget, Jean

Piaget, Jean

Piaget, Jean


Plunkett, Kim & Chris Sinha


Slobin, Dan I.


Sinha, Chris


Sinha, Chris


Sinha, Chris


Sinha, Chris and Tania Kuteva


Sinha, Chris, Lis Thorseng, Mariko Hayashi and Kim Plunkett


Talmy, Len

Thorseng, Lis
1997 Acquisition of spatial relational terms in Danish and English: A cognitive linguistic analysis. PhD dissertation, Aarhus University.

Vandeloise, Claude

Vygotsky, Lev

Vygotsky, Lev

Wilcox, Stephen and David Palermo
Figure 1. English and Zapotec Lexicalizations of Two Schematic Spatial Relations

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