8   Cross-cultural studies in language and thought: is there a metalanguage?

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For any discipline that seeks to understand human nature, a necessary goal is the defining of boundaries between those aspects of humanity that are culturally universal, and those that are elaborated only in particular cultural contexts. This is so whether the researcher is more interested in celebrating diversity by describing the particular, or in emphasizing unity by identifying the universal. As scholarly pursuits, both are at the outset, and, of necessity, comparative activities.[1]

Within anthropology, however, the explicitly comparative enterprise is largely out of fashion. A justified anthropological wariness has grown up about the possibility of any genuinely culturally sensitive comparative research. The commitment to thinking in terms of systems rather than units makes anthropology reluctant to compare individual fragments of what may be very different conceptual complexes. And, at the methodological level the use of standardized tasks for exploration becomes suspect. What is the nature of the activity that each such task represents in different cultures, and therefore what sort of knowledge is being tapped in each case? Yet if tasks are not standardized – not at *any* level the same – surely comparison cannot even begin.

It is critical that psychological anthropology, in particular, once again take up the comparative challenge. Cross-culturally comparative questions are now being addressed in the new discipline of cognitive science, and anthropology has a crucial role to play. The tenets which to anthropologists seem mere background assumptions – that things might be different elsewhere, that what appear intuitively to be basic and natural categories of analysis ought to be questioned on cultural grounds – constitute rare and precious insights in the workaday world of the psychologist and the linguist. Anthropology offers a necessary caution to cognitive science against ethnocentric intuition. It is important that anthropologists turn once again to the elaboration of perspectives and techniques that will allow us to determine when comparison is justifiable – if only in order to be able to say when it is not. At the same time, the careful search for comparative data in domains that are frankly acknowledged to be circumscribed by the interests

of a particular research community is an antidote to the existential malaise currently afflicting anthropology. Although one response to the realization that there is no such thing as decontextualized knowing is to cease to desire to know, another is to seek an identifiable context for one's own intellectual program, and to accept the contextualized nature of one's discoveries without rejecting them because they are contextualized.

As an illustration, I outline below the recent history of cross-cultural investigation into the domain of spatial expression and cognition. This domain has recently become a focus of interest for scholars in psychology, linguistics, and now anthropology (Levinson 1996, Miller and Johnson-Laird 1976, Talmy 1983). Questions as to the universality of organization of this domain – both in language and in thinking – have been of great concern. The relationship of linguistic variation to possible variation in habitual thought has once again been taken up. But a close look at the nature of the domain, in light of cross-cultural and cross-linguistic evidence, reveals that it has itself not been sufficiently problematized. The domain as proposed simply does not exist universally across languages and cultures. Far from serving merely to structure perceptions within a necessary domain of space, it can be argued, linguistic (and therefore cultural) expression serves actually to *create* the domain as a relevant one in the minds of speakers. If recognized and carefully handled, however, this fact need not render comparison impossible in all cases.

The question is investigated with respect in particular to observations from speakers of Mopan Maya. Mopan is a Yucatecan language, spoken by about 5000 people in southern Belize and in the Peten region of Guatemala. Belizean Mopan are shifting cultivators of maize, beans, and rice. They live in a small and intimately known region within which access to spatial resources (such as those necessary for hunting, residence, animal husbandry, and agriculture) is negotiated through prayer and offerings directed to the supernatural owners (Mopan *u yumil*) of the landscape (Danziger 1998, Thompson 1930). [2]

Spatial expression and spatial cognition

When cognitive scientists enquire as to the universality of linguistic expression in space they are usually talking about the translational equivalents of relations encoded in English expressions such as *in front of, to the right of, behind*, and so on (cf. Jackendoff 1987). That is, interest has centered on terms that specify the relationship of one object to another within a matrix of surrounding space, and on the nature of the reference points that are invoked to state this relationship. Initial formulations (Clark 1973, Olson and Bialystok 1983) proposed that the universal reference points for this

domain in language and in conceptualization were, as observable in the English expressions, those of the physical body. Recent work in cognitive and linguistic anthropology has shown that this is not the case – at least not for the ways that spatial relations are expressed in language. John B Haviland (1979, 1993, 1998), working with speakers of Guugu Yimithirr in Northern Australia, reports that these speakers do not make their own bodies the reference points for locutions about spatial locations or regions. Instead, the cardinal directions provide such reference points – even when distances are very small. According to Haviland (1979: 75) these people

routinely use such words [i.e., cardinal point terms] to give immediate and local directions. Instead of saying "There on your right" or "right behind you" they employ a term like *gungga=gunggaarr* "a bit Northwards".

Again, Brown and Levinson (1993) show how Tzeltal Maya regularly use expressions translated as *uphill* and *downhill* rather than equivalents of *left* and *right* to locate objects in space. Does this kind of variation in the ways that people talk in fact mean something for the way that these people conceptualize spatial relationships? If, as is increasingly the case in modern theoretical linguistics (Jackendoff 1983, Langacker 1986), linguistic cognition is understood to be linked to other kinds of cognition, issues of classic linguistic relativity will have to be seriously considered once again. We find ourselves again asking the old anthropological question: what does it mean for thinking, if languages vary?

The writings of Benjamin Lee Whorf (esp., 1956a) are traditionally associated with the twentieth-century formulation of this intriguing question. Whorf suggested that the different linguistic structures of individual languages might influence speakers' everyday habits of thinking and acting at levels well outside our awareness. Given the perceived difficulties of designing appropriate psychological measures, especially in the behaviorist environment of mid-century psychology, work on the Sapir–Whorf hypothesis proceeded for some time in a largely suggestive vein (see, for example, Bright and Bright 1969, Lee 1959, Trager 1959). More recently, however, new studies of Whorfian issues using the experimental methods of cognitive psychology began to appear (Bloom 1981, Heider 1972, Kay and Kempton 1984, Lucy 1992b, Lucy and Shweder 1979; Lucy 1992a provides a fuller review and discussion of some of the critical past research on Whorfian issues). The field of language and thought studies is now seeing something of a revival, with cognitive psychology (Hunt and Agnoli 1991) and linguistic anthropology (Hill and Mannheim 1992, Lucy 1997) both finding new interest in the issues.

As an instance of the new kind of linguistically oriented cognitive anthropology which is now taking up these classic questions of linguistic

relativity, Levinson (1998) undertakes an explicitly comparative experimental investigation of the differences in non-linguistic spatial problem-solving between individuals whose language calls for habitual use of *north/south* translation equivalents (Guugu Yimithirr), and those whose language calls for *right/left* translation equivalents (Dutch). Levinson's experiment exploits the fact that spatial relations that have been encoded using systems that are based on the physiological body (left/right) are reversed when the individual rotates. That is, when you turn around 180 degrees, the region you now call *left* is precisely that which a moment ago you called *right*. This is not the case for the region you call *north*.

In the experiment, consultants were asked to contemplate a simple schematic map (Figure 8.1 shows the version of this task for which Mopan results are reported below). Participants were told that this was a diagram of an incomplete route, and they were asked to decide upon the kind of path that would complete the route. The contour of the (imaginary) path that would complete the route was quite distinctive and highly constrained – it had to avoid pools of water, thickets of brush etc., that were depicted on the map. Having indicated that he or she was ready, the consultant was then led into another room, at 180 degrees rotation from the first. He or she was asked to choose, from among three route-completions displayed on cards there, the one that represented the completion for the route that he or she had just seen. One of the three route-completion cards, called the Relative solution, showed a path that would only fit the original map correctly if the consultant had maintained a physiological encoding of it as he or she rotated (that is, if he or she had mentally carried the original map along, and now imagined it as it would appear if laid out in front of him or her – therefore rotated 180 degrees from its actual position). A second route-completion card, called the Absolute solution, showed a path that would only fit the original map if the consultant had maintained a non-physiological encoding of it as he or she rotated – that is, if he or she imagined the original, still in place in the first room, unrotated. The third route-completion card, the Distractor or non-solution, showed a path that would never fit the original map under any rotation. Over five trials, Levinson found that every one of fifteen Dutch-speaking subjects preferred to select the Relative route-completion card. By contrast, of twelve Guugu Yimithirr-speaking subjects, eight preferred to select the Absolute route-completion card in a majority of trials.

More recent collaborative work in the same vein (Pederson *et al.* 1998) expands the range of languages examined, using a slightly different experimental technique.[3] Here, predictions were made for the choices of consultants who were first-language speakers of Arandic (a Central Australian language using *north/south* translation equivalents to express spatial
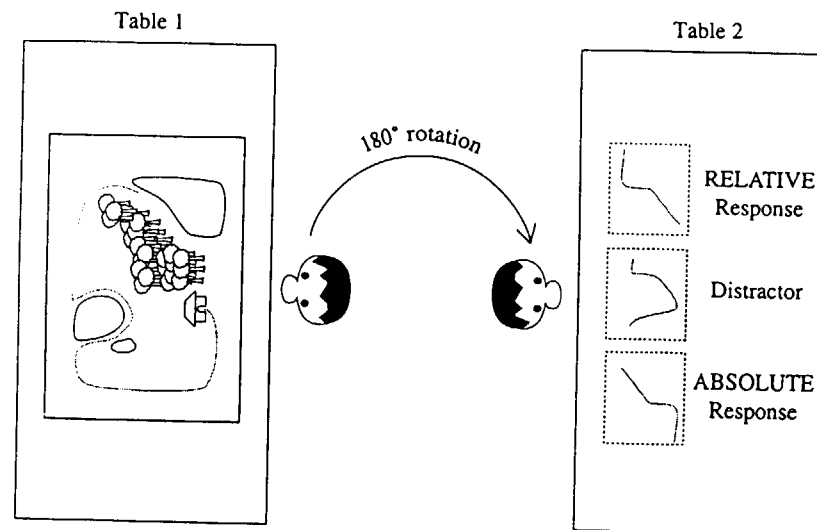
Figure 8.1 The Route-Completion task (Copyright of the Max Planck Institute for Psycholinguistics and reprinted with permission.)

relations), of Tzeltal (a Mayan language using *uphill/downhill* translation equivalents to express spatial relations), of Longgu (an Austronesian language using *seaward/inland* translation equivalents to express spatial relations), of Dutch, and of Japanese (languages using *left/right* translation equivalents to express spatial relations). Consultants were shown a row of three toy animals (three of cow, sheep, pig, and horse), lined up nose to tail and with all three noses pointing either left or right across the consultant's line of vision. Consultants were asked, in their own language, to contemplate this arrangement carefully. When the consultant was ready, the arrangement of animals was destroyed. After a 30 second interval, the consultant was led to a second experimental area, at 180 degrees rotation from the first. Here, he or she was supplied with toy animals identical to those just observed, and was asked, again in his or her own language, to "make it again, just as it was." The consultant was expected to line the animals up in an arrangement that would preserve either the left/right orientation of the original with respect to his or her body (the Relative solution, actually reversing the environmental direction that the animals were facing in the original display) or in one that would preserve the north/south orientation of the animals in the original (the Absolute solution, reversing the original left/right relations).

It had been hypothesized that individuals who spoke a language that expressed spatial relations with reference to the body (Dutch, Japanese)

would also choose to solve this non-linguistic problem in such a way as to preserve the orientation of the arrangement to their own bodies – even under rotation (the Relative solution). It had been further hypothesized that individuals speaking a language in which spatial relations were encoded nonphysiologically, would not do so: instead these individuals would solve the problem in such a way as to preserve the environmental orientation of the arrangement under rotation (the Absolute solution). Results showed solid support of this hypothesis. In all five samples, the number of individuals employing the solution predicted as favored for their language community, relative to the number employing the one predicted as disfavored for the language community, was a proportion of at least four to one (see Levinson and Nagy n.d.).

These experimental data seem to support the hypothesis of linguistic relativity in the domain of spatial cognition. A certain variability in the processing of spatial information has been demonstrated that departs from initial European-based claims about the primacy of the physiological body as point of reference. But the problem of the formulation of the comparative question has not yet been addressed. How can it be possible to compare ways of thinking across speech communities, if one of the primary hypotheses of the research is the possibility that conceptual categories might be fundamentally different? Can we be sure, in short, that the domain of spatial relations itself is a valid comparative framework within which to set experimental tasks across cultures?

The work in spatial reference and spatial cognition, like most existing empirical studies dealing with issues of universalism and relativism in language and thought can be characterized as "domain-based" (Lucy 1997). Such studies have started by defining a semantic domain of investigation (like "color," "kinship," "botany" or "space"), and have proceeded to discover how different languages deal with it. This procedure is opposed, for example, to studies like those of Whorf which look first for observable typological differences in language structure and then seek ways to identify correlations in behavior. Previous domain-based studies have been criticized (Dougherty 1978, Hunn 1985, Lucy 1992a: 146–156, Needham 1971, Randall and Hunn 1984, Schneider 1984) – and research in some domains actually abandoned – for lack of attention to the niceties of comparative desiderata. The difficulties stem from the fact that a full reading of the Sapir–Whorf hypothesis must envisage the possibility that any preconceived semantic domain might not be a valid unit in some existing alternative cultural world view. But since the domain is the methodological starting point of the investigation, true differences in global conceptualization are unlikely to appear. Because it defines the framing question which is asked of

every participant, the original domain will necessarily emerge as universal – any discoveries of cultural and linguistic divergence from the original will consist only in differences of *organization* of the same conceptual territory. Radical differences will be invisible except to the extent that certain peoples may appear less proficient than the original group at organizing this same territory. No people will emerge as *more* proficient, since any unexpected complexity in cultural understandings of the elements of the original domain are excluded from consideration by the rules of the game – freshness is not color; function is not taxonomy; solidarity is not kinship.

The recent spate of work in spatial cognition is in danger of falling victim to these same errors. However, by taking full account of the acknowledged problems of this sort of approach, I aim to show here how a domain-based comparison, if cautiously handled, may actually suggest radically relativist conclusions. I will first report the discovery that not all groups of people make the expected linguistic distinctions within the domain of lateral spatial relations as it has been defined to date. I insist however that this observation be taken as evidence of the failure of the proposed domain, rather than a failure of the group in question. I do this from anthropological but also from comparative methodological first principles. A first finding therefore is that the domain of spatial relations as initially conceived by European researchers (myself included) cannot be considered a universal arena of linguistic reference. I then apply that discovery to the question of cognition. To the extent that my experimental investigations do not support a natural nonlinguistic understanding of this same domain of lateral spatial relations on the part of Mopan Maya speakers, they also suggest that, rather than language and culture being factors only in the *organization* of a pre-existing conceptual domain of spatial relations, this conceptual domain is culturally contingent – it is in fact nonobligatorily *created* through cultural and linguistic experience.

The domain of spatial relations

In order to elicit expressions of spatial relationship in what was hoped would constitute a comparable activity context, a standard interactive task, presented as a game, was used across all of the speech communities represented in the Animals-in-a-Row experiment (Pederson *et al.* 1998). In the task, two members of the same speech community sit beside one another, but are separated by a screen so that neither participant can see objects or pictures that the other may be manipulating. Both participants are given an identical set of twelve photographs, each photo only slightly different from the others. One participant is now identified as the "director" and he or she

is asked to characterize, using language alone (i.e., without the aid of gesture), one picture of the twelve. The "matching" participant is asked to try to identify the particular photo by asking questions of his or her partner. This continues through the entire series of twelve photos.[4]

Interactive games of this type have been used in well over a dozen different cultural contexts (Pederson and Roelofs 1995), consulting at least three pairs of native speakers in each community. In all cases, participants engage with the activity, and endeavor to find the right match for the photo being described. The comparative project exploits this fact, using the standardization of game materials, and the acceptance of the imposed motivations of the game, to constitute an artificial but comparable situation in each speech community. It becomes possible deliberately to create contrast sets of very similar pictures, each of which ideally differs from its fellows only in terms of a single spatial-relational property. Whether or not this is actually achieved, the juxtaposition of the particular contrasts embedded in such sets becomes a *de facto* metalanguage for the domain envisaged by the comparative enterprise.[5]

The particular game that is crucial in the context of the experiments described is one in which six different photographs show the same toy man and the same toy tree side by side (see Figure 8.2). The man and the tree are arranged laterally across each photo: from the viewer's perspective they are always beside one another. In the different photos, the man is shown in different postures with respect to the tree: turned sideways, facing it, or with his back to it, for example. In three of the photos the man appears to the left of the tree from the viewer's perspective, and in three he appears to the right, again from the viewer's perspective. In order to distinguish linguistically among the six photos, speakers must articulate and conjoin a variety of contrasts. Of particular interest has been the contrast that distinguishes between the three photos in which the man stands on the left-hand side of the photo (numbers 3, 4 and 7), and the three in which he stands on the right (numbers 5, 6 and 8).

As we have seen, this contrast can be expressed in different functionally equivalent ways in language. In the interactive game context, speakers of different languages indeed choose different means to do so. The three pairs of Dutch speakers consulted all used translation equivalents of *left* and *right*.[6] Two pairs of Arandic speakers used translation equivalents of *north*, *south*, *east*, and *west*, and the third pair referred to the shadow cast by the tree in order to distinguish between the two series of photos. Two pairs of Tzeltal speakers used translation equivalents of *uphill* and *downhill*, and a third used translation equivalents of *sunrise* and *sunset*. But, in three pairs of speakers of Mopan Maya, this contrast was never made at all.

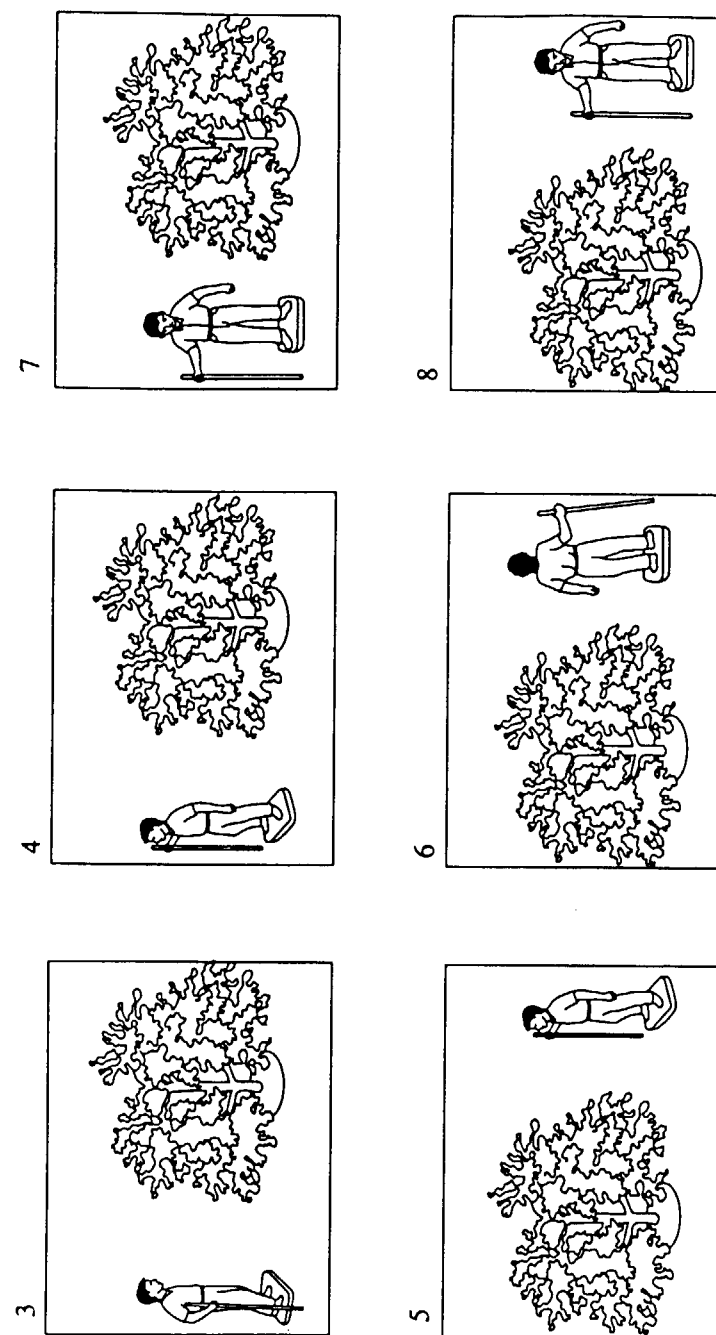The Mopan speakers who were consulted characterized each photo in

Figure 8.2 Various arrangements of man "beside" tree for the Man and Tree Game (Copyright of the Max Planck Institute for Psycholinguistics and reprinted with permission.)

terms of the relations that the parts of the man have to the tree. One Mopan description of photo number 4 for example, was of the following form:

Ka'-a-käx-t-e'   a   nene' tz'ub' a   la-Ø',
You-should-find-him the   little child   who is-here

a   t-u-pach   ke'en-Ø   a   top'-o.
who at-his-back is-located   the bush.

Environmental co-ordinates (e.g., *sunrise, north*) are never used by Mopan speakers playing this game to locate the man and the tree with respect to one another. In only one instance is a translation equivalent of the English words *right* or *left* used by a Mopan speaker to locate either the man or the tree. In a description of photo number 8 (see example below), one speaker states that the tree is to the right of the man. In this photo, the man faces us as viewers of the photograph. The tree is at his right hand – and he is on the right-hand side of the photograph. There is no sense in which, for this picture, 'the tree is at the right of the man' can be taken to refer to anything but the man's own parts:

D: Käx-t-e'   a   tz'ub' a   w-a'an-Ø   yok'ol tunich.
     You-should-find-him the child   who is-standing on   a stone

     ... B'a'al-a'   yan-Ø   top'   t-u-tzeel-i.
     ... Like this exists bush   at-his-side.

M: Ich lef waj ich rait?
     At   left or   at   right?

D: Ich rait   ke'en-Ø   a   top'-o.
     At   right is-located   the bush.
     A-käx-t-aj-Ø waj?
     Did-you-find-it?

M: In-käx-t-aj-Ø.
     I-found-it.

The fact that Mopan speakers do not make a global contrast between these two sets of photos means that apparent underdifferentiation of certain photos occurs in Mopan. In two photos (number 3 and number 5), for example, the man faces the tree; in photo number 3 the man stands on the left side of the photo. In photo number 5 he stands on the right. Mopan speakers, who otherwise appear well motivated and engaged in the task, systematically do not produce language which will distinguish these two photos from one another. The example below is the full description of photo number 5 given by one Mopan player. Her partner did not question the description, and confidently matched it with photo number 3. Note that, in light of the description that was offered, this is not an incorrect match. Both photo number 5 and photo number 3 fit a description in which

the bush is located [at his chest]. What is noteworthy here is that neither Mopan player found it necessary to distinguish these two photos any further from one another.

Ka'-a-käx-t-e'   a   nene' tz'ub'
Let-you-find-him   the   little child

a   t-u-ta'an   ke'en-Ø   top'-o.
who at-his-chest   is-located   bush.

Also outside the interactive game context, in spontaneous discourse, Mopan usage can be observed to show similar characteristics. Cardinal direction terms are rare to nonexistent, and specific orientational information is rarely important in Mopan life. For example, although the form of the cross is important in Mopan ritual procedure (censing with *pom* incense should envelope the four corners and then the center of the object being purified), the four corners are not separately named, and one can proceed through the ritual in any orientational order as long as the final point is the center.

Mopan expressions denoting the coming out and the going in of the sun (Mopan *jok'eeb' k'in* and *okeeb' k'in* respectively) which might be taken to translate *east* and *west* are in fact at best ambiguous as between spatial and temporal meanings. On one occasion, for example, my intended question as to whether one should start an important ritual in the East (*jok'eeb' k'in*) met with a negative answer. My interlocutor then continued to speak, informing me that one should start at 11o'clock at night and not at dawn (*jok'eeb' k'in*) for such an important event. On another occasion, a question which I had phrased more specifically in spatial terms (*tub'a walak u jok'ol a k'in?* [Where does the sun come out?]) received the accurate but non-directional answer "*Tu yit ka'an*" [At the horizon]. Meanwhile, no indigenous translation equivalents of *north* and *south* appear to exist at all: Said one acquaintance in English, expressing the sentiment that such terms may once have existed but have now been forgotten, "Maybe my grandfather in his grave knows!" Terms borrowed from Spanish and English for *north* and *south* are rare in natural speech and not all Mopan informants even recognize these terms.

Translation equivalents of *right hand* and *left hand* do exist in Mopan, and they occur sometimes in elicitation. The indigenous term *seeb'* [speedy, quick] designates the right hand or side of a human or an animal. A term borrowed from Spanish, *suldeero* [deaf] designates the left hand or side of humans and animals. No indigenous Mopan term for the left hand survives. (In colonial Yucatec the term *tz'iik* [angry, malevolent] was used [Barrera Vásquez 1980: 884].) Recently, the terms *rait* and *lef* have been

borrowed into Mopan from English and are used in the same spatial contexts as *seeb'* and *suldeero* respectively. All of these expressions, however, indicate only actual human or animal parts, and not regions of abstract space (Danziger 1996b; see also Levinson and Brown 1994). In the sense that Dutch, Japanese, Guugu Yimithirr and Arandic use them, Mopan Maya uses neither translation equivalents of *left/right* nor translation equivalents of *north/south* to indicate horizontal relations in space.

In order to understand these Mopan linguistic facts, we are led seriously to examine a distinction made in perceptual psychology between ways of encoding spatial relationships that are considered "Orientation-Bound" and those that are considered "Orientation-Free" (Cohen and Kubovy 1993, Just and Carpenter 1985, Takano 1989). Consider an English expression such as *the truck stood at the nose of the plane*; unless either the truck or the plane moves independently of the other, the sentence remains true. The Gestalt configuration of truck-and-plane, the speaker, or even the entire cosmos (north etc.), can rotate without consequences for the truth of the sentence. This defines the use of an Orientation-Free encoding of the relationship between truck and plane. Such encoding in language is characteristically phrased in terms of a part of the first object (*nose*), and it depends upon a construal of strict dyadic contiguity between the two objects related (if the truck is a long distance from the plane, or if a large object stands between the two of them, the sentence loses its felicity). But because it remains true under all external rotation, its applicability in a given situation can be quickly assessed without resort to time-consuming mental rotation (cf. Just and Carpenter 1985). By contrast, so-called Orientation-Bound frames of reference (such as those invoked by English *left*, but also by English *north*) commit the user to some form of fixed orientation, and, as a consequence, to various calculations as to the relationship of the particular point of reference invoked (users of *north* must know where north lies at any given moment; users of *left* must know how the relevant physiological body is positioned).[7]

Just as for speakers of many of the world's languages, for Mopan speakers it is quite usual to specify the relation between two objects in space by stating the proximity of one to some part of the other: locutions making use of the translation equivalents of *head, nose, foot, tooth*, and so on, are common. What is unusual about Mopan in the context of other languages investigated is that it is *not* common to use linguistic expressions of any other kind to encode horizontal spatial relations on the dimension lateral to the speaker's body. Linguistic expressions used in Mopan Maya to specify the kinds of relationships instantiated in the Man and Tree game – even those involving words specifying *right hand, left hand, front, back*, etc. function in the manner of English *nose*.

Experimental results from Mopan Maya

We are now in a position to remark that the alternative solutions in both the Route-Completion and the Animals-in-a-Row experiments instantiate actual alternatives only in Orientation-Bound space: in an Orientation-Free characterization the two solutions are equivalent. (That this is so can be seen clearly by noting that the Relative and Absolute solution cards in the Route-Completion game are identical if either one of them is rotated 180 degrees.) But the data from Mopan Maya indicate that, certainly in language, what is known as Orientation-Bound encoding of the relevant kind of spatial relationships does not occur. What is the case then for Mopan spatial conceptualization?

Given its linguistic profile, could Mopan Maya constitute a natural laboratory in which we could observe the conceptualization of spatial relations untrammeled by the obfuscatory effects of language? Since the Mopan language does not supply a ready-made formula into which individuals might transpose the experimental problems, might we expect the performance of Mopan Maya speakers on our experimental tasks to show us the workings of natural cognition with respect to Orientation-Bound spatial relations in the lateral dimension – unaided, but also unimpeded by facile or superficial facts of linguistic encoding? In August of 1993 I asked a number of Mopan consultants to solve both the Animals-in-a-Row and the Route-Completion puzzles for me.

Animals-in-a-Row

As described above, in this experiment, consultants are asked to consider an arrangement of three toy animals, aligned before the consultant as if traveling across his or her line of vision. The consultant is asked to consider the arrangement carefully, and when she or he has seen enough, the original arrangement is destroyed and the consultant is asked to "make it again" after a 30 second waiting period, and on a surface rotated 180 degrees from the original one.

The first Mopan consultant whom I asked to perform this task arranged the line of animals on the second table in such a way that they faced, not laterally across her line of vision, but roughly toward herself. The second, to my relief, preserved the lateral orientation of the line of animals, but over five trials this person persisted in reconstructing the line of animals in a single orientation. That is, although the original line of animals varied in its orientation on the first table (right-facing or left-facing across the consultant's body), the orientational solution arrived at on the second table took no account of this variation.[8] My third consultant combined both this

"monodirectional" strategy with the indifference to lateral orientation displayed by the first consultant. When the next consultant also chose a monodirectional solution, it was quite clear that something was badly wrong.

I now altered the experimental protocol, and started asking explicitly that consultants pay attention to the orientation of the animals. In the absence of any direct way of expressing this in Mopan I asked consultants, in the initial instruction, to pay attention to the identity of the animals (horse, pig, cow) and also to notice *tub'a tun-cha'an* [where they are looking]. From the point of view of response codability things improved. Of the seventeen consultants who solved the Animals-in-a-Row puzzle under these new conditions [where they are looking], nine showed a preference for an Absolute solution over five trials, and three for a Relative solution.

Fearing that the instructions, and particularly the word *tub'a* [where] were too environmentally oriented, I enlisted twelve more consultants to solve the problem when asked to pay attention to [how] (Mopan *b'ikij*) the animals were looking. Of the twelve, nine showed a preference for an Absolute solution and none for a Relative one.

Route-Completion

The Route-Completion experiment investigates a consultant's preference for a rotated path-completion when they themselves have been rotated 180 degrees (recall Figure 8.1). We have seen that Guugu Yimithirr speakers ([north/south] speakers) often prefer a completion that preserves the orientation of the original, while Dutch speakers ([left/right] speakers) overwhelmingly prefer the rotated completion.

Mopan consultants were asked to consider a diagram like the one shown on the left in Figure 8.1, spread before them on a table top. Consultants were told that certain areas were shaded to represent bush, certain others water, and that the dark line represented a path. Consultants were asked to think of the house shown as their house, and to see themselves as having walked the path shown until they reached its end. On the understanding that woods and water were dangerous, consultants were asked in Mopan "How could there be a new path so that you could get home quickly?"

B'ikij	ka-yan-ak-Ø	a	tumul	b'ej,
How	let-it-exist	a	new	path,

ka-usk'-ak-ech	ti jomol?
let-you-reach_home	soon?

Having seen as much as they wished of the original map, consultants were led over to a different table at 180 degrees rotation from the first. After

a 30 second interval, consultants were asked to choose the right path fo getting home from among three cards showing possible candidates. On card (Absolute solution) showed a path that would complete the maze in i original orientation. One (Relative solution) showed a path that woul complete it if rotated 180 degrees. And one (Distractor, non-solution showed a path that would not complete the maze under any circumstance:

In coding, an individual's choices over five trials were compared Consultants who chose the Distractor solution more than once over fi\ trials were eliminated from further analysis. Those remaining who cho: either the Relative or the Absolute solution at least three times over fi\ trials were coded for their preference.

It was once again extremely difficult to code the preferences of the eigl Mopan consultants who assisted me in solving the Route-Completio puzzle under the conditions outlined above. Of eight consultants, only fot showed a codable (3/5) preference.[9] In hope of achieving a more codab! result, this experimental protocol also was modified. Sixteen consultant were asked to perform the same Route-Completion task, except that thes consultants were asked to draw the new path that they had imagined ont the original (plastic) map with a marker. They were invited to contemplat the resulting configuration for as long as they wished, after which it wa covered with a cloth and an interval of 30 seconds allowed to pass. A before, consultants were then led over to a different table at 180 degree rotation from the first, and were asked to choose the right path for gettin home from among three cards showing the three possible candidates as ou lined above. Consultants were now being asked to remember and matcl not the shape and orientation of an imaginary line, but that of an actue one which they themselves had drawn. Under these conditions, consultant showed more consistency in their preferences across trials. Of sixteen cor sultants, fourteen were codable: nine preferred the Relative solution, an five preferred the Absolute.

Mopan experimental results

Clearly, no monolithic Mopan preference toward Absolute or Relativ nonlinguistic strategies is identifiable. The overall trend is toward preferrin the Relative solution in the modified Route-Completion task, and towar preferring the Absolute solution in the modified Animals-in-a-Row task There seems to be a great deal of influence of the particular task condition and instructions on the solution that an individual chooses.

Most striking of all, however, is the difficulty of implementing, witl Mopan consultants the experiments as they were originally described and as they were administered by other researchers without comparabl

problems among speakers of other languages around the world (Baayen and Danziger 1994). The main result from Mopan is not that under different conditions of instructions and experimental material, responses varied across tasks. It is the fact that without further clues – whether explicit in the instruction to pay attention to where/how the animals are looking, or implicit in the addition of a bodily gesture (drawing in the path) – the issues of spatial relations which the researchers had assumed were incorporated in obvious fashion into the task, did not appear obvious at all to Mopan speakers.

In understanding this difficulty as a significant Mopan result, it is also important to recall, not just that Mopan people showed difficulty with the tasks as initially implemented, but that it *was* ultimately possible to construct versions of the tasks which Mopan did find comprehensible. The mere fact of the experimental context and the mere appearance of the experimental materials were not the sources of the difficulty. Rather, in both Route-Completion and Animals-in-a-Row, it was the assumption implicit in the experimental materials themselves – that a difference in lateral Orientation-Bound relations alone would appear to all humanity as an obvious one – that constituted the difficulty.

A fortuitous stretch of unintentionally recorded videotape captured the experience of one Mopan woman in her 50s (ES), as she interacted with the materials of the Route-Completion task for a few moments while I was unexpectedly called out of the room. In order to understand her reactions it is important to know that before finalizing the modified version of the Route-Completion puzzle as described above, I experimented with a version in which a first stage of training was conducted with the task materials laid out together in a single orientation. Before being introduced to the fact that they themselves were to be rotated 180 degrees, consultants piloting this version of the task were shown that, in this constant orientation, only the Relative solution card, but not the Absolute or Distractor cards, could be lifted to fit neatly onto the map. ES was one of four consultants with whom I piloted this version of the task (it was partly because of her puzzled reaction that I moved on to the modified version described more fully above). In the moments immediately before I left ES alone in the experimental room, we had just completed several explanatory exchanges during which I had been showing her that only the Relative solution card, but not the Distractor or the Absolute solution card would fit the map. Under this condition of no rotation, she had already twice succeeded – although with some hesitation and diffidence – in picking the Relative solution card as the correct answer from among the three provided. I had not yet introduced the complication of the 180 degree rotation of the consultant to ES. In a way that clearly illuminates her sense of the proceedings, the

video camera records how she contemplated and manipulated the three plastic solution cards during my brief absence.

After I left the room, ES moved to the side of the small table on which we had been working, and she began to handle the three solution cards, comparing them under various spatial rotations. The camera records how she first reached for the Relative solution card, and laid it down in front of herself – upside down. It now would have looked from her perspective just like the Absolute solution card which she was also contemplating (recall that only moments ago she had been told that only one of these was the correct solution). She then rotated the Relative solution card clockwise through 90 degrees, so that it was perpendicular to the other two cards on the table, and she held it alongside them to compare again. Now she pulled the Absolute solution card toward herself (without rotating it) and she compared it more closely to the Relative solution card, giving a short helpless chuckle. Finally, she rotated the Absolute solution card a full 180 degrees, pausing for a moment at the 90 degree point in her rotation (at that point the Absolute solution card would have looked from her perspective maximally different from the Relative solution card which she also continued to contemplate). As she was finishing the full rotation of the Absolute solution card, I returned to the room. ES said to me:

> Ma' jedeek in-b'etiki.
> Not possible I-do-it.

She used at this point a Mopan form of words which does not refer in particular to the individual abilities of the speaker, but (by default) rather to the affordances of the physical world. I replied encouragingly. Turning slightly to me, she now rotated the Absolute solution card another 90 degrees clockwise. This last rotation yielded the Absolute solution card looking identical to the Relative solution card as it appeared at that moment on the table. My sense is that this last rotation was for my benefit; it offered from just outside the channel of explicit spoken interaction the evidence of her difficulty. She now spoke again:

> Ma' patal-en-i.
> Not I-am-capable.

This time, perhaps out of courtesy to me, she used a predicate form which emphasized her own inability rather than the insufficiency of my materials. Once again, I replied encouragingly and she allowed me to guide her through the standardized procedures of further training and of coded trials. During coded trials involving 180 degree rotation of her own body, ES favored the Relative solution over the Absolute one. But although she evidently understood my instructions sufficiently to realize that I was

asking her to take account of orientation in selecting her solution, she had in fact already told me (in a way that I did not fully appreciate until later) that this did not appear to her to be a particularly easy or a particularly sensible request.

As the fortuitous videotaped excerpt shows, and as the quantitative data confirm, the problem of orientation posed in the two experiments does not appear to have made much sense to Mopan speakers. Far from providing a view of any a-linguistic and natural approach to the problem, the Mopan reaction to the experiment is evidence that the problem itself is a culturally relative one – even when posed in the non-linguistic realm. The Mopan results constitute initial evidence that, even nonlinguistically, the domain of lateral Orientation-Bound spatial relations is a cultural construct.

To the extent that languages do not encode Orientation-Bound relations in the lateral dimension, it seems that individuals may also have little sense that they are relevant even in nonlinguistic tasks which, to members of other speech communities, appear to embody aspects of these relations in an intuitively obvious way. If this is true, the particular facts of linguistic encoding not only *structure* conceptualization within the domain of spatial relations – a domain once thought to be invulnerable to cultural influences – they may actually *create* the domain as a functional entity.

Conclusion

Within the proposed domain of spatial relations we can draw the conclusion from the data outlined here that – certainly in language and arguably in conceptualization – Orientation-Free encoding of spatial relations stands as a candidate universal. We now know, however, that – again, certainly in language and arguably in conceptualization – Orientation-Bound encoding of spatial relations in the dimension lateral to the human body is not. Where such encoding does appear in language and in thinking, its structure varies across cultures – yielding differences between what have been called Relative and Absolute patterns of linguistic and cognitive encoding.

The Mopan pattern is rare across speech communities sampled (Pederson *et al.* 1998) and it is not observable to the same degree in all Mopan individuals (Danziger 1999). Nevertheless, its appearance as described here is enough to disconfirm the intuitive assumption that sensitivity to orientation across the lateral dimension of the human body is a *necessary* component in human apprehension of the tasks presented. To that extent, the notion of an obvious and natural domain of lateral spatial relations, appropriately represented for cross-cultural research in the form of these sorts of materials, must come under heavy scrutiny.

To draw a more general conclusion, it seems that certain intuitively natural domains of cognition may in fact be cultural constructs facilitated by language. They are not necessary components of human cognition, and can be expected to vary in their organization across cultures and languages. Indeed, they need not even appear in all cultural cases. The domain of lateral spatial relations as instantiated in the contrasts embedded in the Man and Tree game appears to be one such case. Mopan linguistic patterns, and Mopan responses to the experimental tasks designed to investigate this domain, indicate that comparison of Mopan with other cultures with respect to this postulated domain is not justifiable. Mopan speakers do not readily make linguistic distinctions in Orientation-Bound space in the lateral dimension. While it may be initially illuminating to note that all human groups are not alike – nor even functionally equivalent – in their treatment of these materials, further comparison of Mopan speakers with speakers of languages in which such distinctions are obligatory or even habitual is an error of metalanguage. Comparison among communities that can be shown to make Orientation-Bound distinctions in lateral space, however, but which make use of different ways of doing so (as in the case of the five-community experimental study described above), remains defensible.

Finally, it is significant that the cultural relativity of the domain of Orientation-Bound spatial relations appears at first glance to be highly counterintuitive. His many demonizers and mythologizers to the contrary, Whorf's main pessimism in outlining his linguistic relativity principle (Whorf 1956b) was not over any belief that he had discovered that humans were unable to think in any manner not dictated by their language. On the contrary, it was over the fact that he believed he had uncovered in language a mechanism which ensured that most speakers would believe they didn't need to. He warned that culturally variable and language-borne habits of thought could make their way into intuitive conceptualization so early and so easily that they were likely to take on the character of an unexamined second nature. Whorf's primary warning was to science, and not to the layman, lest culturally and linguistically constructed domains should appear so natural as to pass unexamined in scientific investigation. This is a lesson which anthropology is uniquely placed among the cognitive sciences to understand and convey. Collaborating with other students of human nature in such a way as to do so constitutes a context for anthropological inquiry in which anxieties about claims to knowledge can actually become a truly scientific contribution.

massively collaborative, both in its origins and in its continuing development. Where possible, individual contributions have been mentioned in footnotes. But the work of intellectual creativity is as much in unrecorded argument as in the final product. I would therefore like to acknowledge a general debt to all of the members of the Cognitive Anthropology Research Group from 1991 to 1997. I would also like to thank the Department of Archaeology in Belmopan, Belize, and to extend my gratitude to my Mopan consultants, especially those who obliged me by grappling with the different standardized games and puzzles described. This research was funded by the Cognitive Anthropology Research Group of the Max Planck Institute for Psycholinguistics. Figures 8.1 and 8.2 are copyright of the Max Planck Institute for Psycholinguistics and are reprinted with permission.

NOTES

1 As has been very often remarked, exactly what any cultural researcher finds reportable is always a matter of implicit comparison both with the researcher's own cultural experience, and with existing-previous reports in the particular intellectual tradition to which he or she belongs (cf. Munroe and Munroe, this volume).
2 Throughout this chapter, all non-English words and expressions are italicized. English words and expressions cited purely as language examples are also italicized. Glosses for non-English expressions appear in square brackets. Quotations within text citations appear in single quotes. Double quotes are reserved for actual quotes in English or other languages, and for the first presentation of technical or specialized terms in the text. Mopan orthography follows the conventions outlined in England and Elliott (1990). Lengthier Mopan examples appear with their English glosses in dedicated example paragraphs. In these paragraphs, I have provided neither exact morpheme by morpheme glosses nor free translation into English. Instead I have preferred to translate closely into English, retaining Mopan syntax and word formations where possible. In the English translations, a hyphen indicates that the conjoined items are represented by separate parts of a single word in Mopan. An underscore indicates that the conjoined items are inseparable parts of the same lexical unit in Mopan. For more detail on the Mopan language the reader is referred to Danziger 1994, 1996a, and Ulrich *et al.* 1986.
3 The specific design of this experiment was piloted by Stephen Levinson, and finalized by Stephen Levinson and Bernadette Schmitt, under brainstorming conditions in which various members of the Cognitive Anthropology Research Group participated in early 1993. Linguistic analysis and experimental implementation in the various locations was carried out by Penelope Brown and Stephen Levinson (Tzeltal), Deborah Hill (Longgu), Kyoko Inoue (Japanese), and David Wilkins (Arandic). Misja Schroeder Peters implemented the Dutch version of the experiment.
4 This interactive game technique was pioneered in cognitive anthropology by

Lourdes de León (1991), on the model of work by Clark and Wilkes-Gibbs (1986). The particular series of photos eliciting contrasts on the horizontal plane was designed by Eve Danziger and Eric Pederson, and the analysis in terms of functional equivalence was developed by David Wilkins.
5 In many domain-based comparative studies, the physical apparatus and the controlled procedures through which the domain is presented to speakers of different languages become the implicit third term with respect to which the comparison is actually effected. The interactive games described here are designed to elicit particular contrasts that have struck the researchers as interesting or valid; they are therefore ill-equipped either to uncover unexpected contrasts within the domain as proposed, or to provide expansions to the researchers' own understandings of the scope of the domain. Researchers cannot rely exclusively on these games as ethnographic tools.
6 Note that the interactive game context allows us to make the crucial distinction between resources potentially available in language and those actually used in a given context. Dutch, after all, has a word corresponding to English *north*. It simply is not used in this, the designated comparative context.
7 Although habitual users of Orientation-Bound frames of reference become very skilled at this, it is worth pointing out that children in general master left/right and north/south systems only long after truly part-based systems of spatial expression (De León 1994: 880, Johnston and Slobin 1979, Piaget 1928). The properties of Orientation-Free frames of reference (dyadic, non-transitive, stable under rotation), are very much those which characterize Piagetian early-acquired "topological" space (Piaget and Inhelder 1963; see also Levelt 1984).
8 Other researchers elsewhere in the world have also reported this kind of choice.
9 Of these, three chose the Relative solution and one the Absolute.

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