The Role of Shape in the Acquisition of Tzeltal (Mayan) Locatives

PENELOPE BROWN

Max Planck Institute for Psycholinguistics

SHAPE IN LOCATION

Is shape 'unnatural' in locative expressions? Landau and Jackendoff (in press) claim that the neurological distinction between 'what' and 'where' systems is directly reflected in language: shape-discriminations are restricted to names for objects (the 'what' system), while locative relations (the 'where' system) encode 'only very coarse geometric object properties', as in English *in* and *on* which distinguish only container from surface.

But this strict separation does not apply to languages like Tzeltal, a Mayan language spoken in the Chiapas highlands of Mexico, nor indeed to many Mesoamerican languages where shape distinctions are highly grammaticalized (Friedrich 1970). In Tzeltal, spatial relations are not expressed by adpositions or cases, but by nominal and verbal forms in which shape is a crucial feature. Consider the adult language:

ADULT TZELTAL

Tzeltal has only one all-purpose preposition, and location of a Figure in relation to a Ground is expressed by essentially two systems. The first is a system of DISPOSITIONAL PREDICATES encoding semantic distinctions of shape, position, orientation, and form of attachment, etc. The second is a system of possessed BODY-PART TERMS (locating a Figure which is contiguous with a named part of a reference object, regardless of its orientation). For example:

<1> lechel	ta	y-it	k'ib	te xalten-e
flat-lying	PREP	its-butt	pot	the fryingpan
DISPOSITIONAL		BODYPART	GROUND	FIGURE

'The fryingpan is at the waterpot's butt.'

Let us look at the role of shape in each of these two systems.

System I: The predicate

There are several hundred of these dispositional predicates in everyday adult use, and they carry the bulk of the functional load in static locative descriptions.

Many of these put constraints on the shape of the Figure, of the Ground, or of both:

bowl PACHAL TA table
be-located of wide-mouthed container
canonically 'sitting'

bottle WAXAL TA table
be-located
of tall oblong-shaped container or solid
object canonically 'standing'

dough PAKAL TA table
be-located
of blob with distinguishably flat
surface lying 'face'-down

fryingpan LECHEL TA table
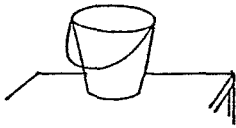be-located
of wide flat object lying flat

netbag CHEPEL TA table
be-located
of a full (bulging) bag supported
underneath

cat MOCHOL TA table
be-located
of animate object lying curved on its
side

Some predicates ambiguously constrain either Figure or Ground, showing that an IN vs. ON interpretation is not part of the semantics of the predicate:

waxal ta mexa balti
standing AT table bucket
"The bucket is on the table."

waxal ta balti ixim
standing AT pail corn
"The corn is in the bucket."

pachal ta mexa bojch
sitting AT table gourd bowl
*"The gourd is on the table."*

pachal ta bojch te mantzana
sitting AT gourd the apple
"The apple is in the gourd bowl."

In such cases the dispositional description applies equally well to a Figure object which is located IN an internal region of an object of the specified shape/orientation, and to a Figure of the specified shape/orientation which is itself located ON the Ground object.

System 2: Body parts

In the Tzeltal body part system, shape determines the productive assignment of body parts to inanimate objects (e.g., clouds, mountains, beans, lumps of dough). A Figure is AT a specified body part regardless of the orientation of the Ground object.

s-jol "its-head"

s-jol

s-jol →

s-jol

s-ni' "its-nose"

s-ni'

s-ni'

s-ni'
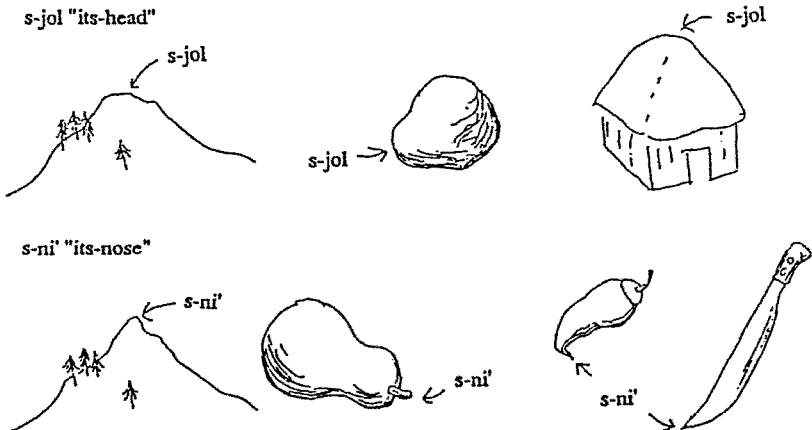
So locatives will differ, depending on both shape of Figure and shape of Ground, as in these examples expressing where the bucket, bowl, and frying pan are in relation to the corndough:

<2> waxal   ta y-it   matz'   te balti-e
    sitting-vertical+oblong   AT its-butt   dough   the pail
    'The pail is at the butt-end of the lump of dough.'

<3> lechel   ta   s-ni'   matz'   te xalten-e
    flat-lying AT   its-nose dough   the fryingpan
    'The fryingpan is at the pointed-tip of the lump of dough.'

<4> pachal   ta   s-jol   matz'   te bojch-e
    sitting-bowlshaped   AT   its-head dough   the bowl
    'The bowl is at the tip of the lump of dough'

Summary

In adult Tzeltal locatives one must choose among predicates of location according to (especially) shape, body position, orientation of the Figure, and nature of its attachment to the Ground object. Spatial relationships between Figure and Ground objects (for example, containment vs. support) are then often understood by implication.

Tzeltal body parts are not like English prepositions: (a) they are not relational, (b) they do not presuppose orientation, (c) shape is a crucial element in their assignment.[1]

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[1] See Brown 1991, 1993, Brown and Levinson 1993a and b, and Levinson 1992, for more details of these Tzeltal systems. See de León 1992 for the body part system of the closely related language Tzotzil.

CHILD LANGUAGE

If the Tzeltal system is 'unnatural', is it superimposed on a more 'natural' stage? Since children learn distinctions of IN and ON, ABOVE and BELOW, very early in languages which directly encode such distinctions, do Tzeltal children demonstrate early understanding of such supposedly universal concepts in the ways they use Tzeltal?

In fact there are also available in adult Tzeltal some 'natural' direct encodings of containment, encirclement, and horizontal support, with meanings more in line with those presumed to be cognitively primary, and which seem to constitute a basic core in locative systems cross-linguistically (see Bowerman and Pederson 1992). These appear particularly in the Tzeltal MOTION VERBS and their associated DIRECTIONALS (derived, for example, from the intransitive verb roots *och* 'to enter', *mo* 'to ascend', *ko* 'to descend') but also in the system of RELATIONAL NOUNS which encode certain specific spatial regions (for example, *ta s-ba* 'on its top-surface' or 'above it', *ta y-ajk'olal* 'uphillwards of it' or 'vertically above it', *ta y-util* 'at its inside', *ta y-olil* 'at its middle', *ta y-anil* 'at its underneath' or 'downhillwards of it'.

A number of leading questions therefore arise as to whether or not such words are priveleged when Tzeltal children learn to express locative relations. These questions are being explored in an on-going research project which is collecting videotaped data on Tzeltal children's natural speech, the caregivers' input, and some more structured 'space games' (de León 1991) which evoke spatial descriptions in an interactional setting.

i. Do Tzeltal children learn the direct encodings of IN/ON concepts in motion verbs and relational nouns earlier than the specific shaped dispositionals? Preliminary evidence suggests that the answer is 'yes' for motion verbs, but 'no' for the relational nouns *s-ba* and *y-util*, which are marked (rather like English 'on top of' as opposed to 'on', or 'inside' as opposed to 'in'). Stative and directional forms of the motion verbs 'enter' and 'exit' are used by children in many contexts to describe relations of containment which adults tend to describe with the more specific dispositionals (which children, by age 7, are also using). Here are some examples drawn from adult and child descriptions of the locative relation depicted in the accompanying pictures:[2]

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[2] The pictures in examples <5> and <7> are from a set designed by Melissa Bowerman for investigating 'topological' spatial relations cross-linguistically; the one in <6> is a copy of a picture in the storybook *Frog, where are you?* by Mercer Mayer, which has been used by Slobin and Berman (in press) and their colleagues in a cross-linguistic study of narrative style. Both of these are part of the 'stimulus kit' used to elicit spatial descriptions by members of the Cognitive Anthropology Research Group at the Max Planck Institute for Psycholinguistics (see Levinson 1992a).
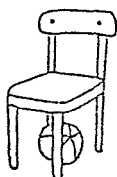
<5> Child (age 5) description:

ochem	bel	tey a
entered	going	there

'It (the ball) has gone in there'

Adult description:

p'ekel	ta	y-anil	xila
low-lying	AT	its-underneath	chair'

(It (the ball) is) lying under the chair'

<6> Child (age 5):

ochem	ta	p'in	te	ala	pokok a
entered	AT	pot	the	little	toad there

'The toad has gone into the pot.'

Adult:

waxal ta limete
be-located-vertically-erect-oblong AT bottle
'(The toad) is in the bottle.'

<7> Child (age 5):

ochem	tz'i'	tey a
entered	dog	there

'(A) dog has entered there.'

Adult:

pachal		ta	s-waeb	te tz'i'e
be-located-bowlshaped		AT	its-bed	the dog

'The dog is in its bed.'

ii. A second question is whether there is evidence in the Tzeltal child's overgeneralizations or errors (of labelling or of interpretation) for a primary IN/ON distinction indifferent to shape (other than the gross distinction between hollow container vs. surface). That is, even where the adult language radically diverges from the primacy-of-IN/ON, can we find IN/ON interpretations in children's language of non-IN/ON expressions? For example, do children ever use body parts wrongly (e.g., using 'belly' to convey 'inside' of), or do they overgeneralize dispositionals by shape, or fail to recognize the Tzeltal equivalence between a Figure IN an object of a certain shape, and that object ON a Ground? Is one or the other of these uses primary?

iii. Which shape discriminations underlying Tzeltal dispositionals are learned early? Preliminary evidence suggests that dispositionals encoding certain body positions ('standing-vertically (like human)', 'sitting', 'standing horizontally (like animal)' 'lying face-up', 'face-down', or 'on-one's-side'), and forms of attachment ('hanging', 'stuck-on', 'pierced-through', 'tightly encircling'), may be learned before specialized shape ones.

iv. What is the relationship between the child's developing understanding of shape distinctions in the body part system and in dispositionals, for example the relation between *jukul*, 'squatting' and positioned weight-on-'butt'? All four objects pictured below can be described as being *jukul*:
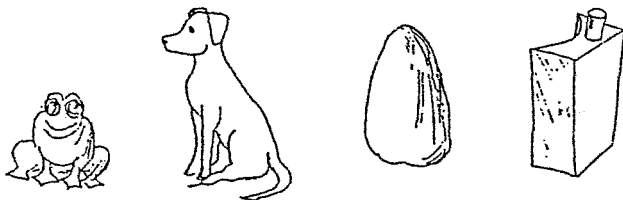
The child has to learn that the position/location only of objects which have a body-part identifiable as a 'butt' can be described as being *jukul*; learning the underlying semantic categories of the dispositionals relies on an understanding of body part attributions to both animate and inanimate objects.

v. What is the role of shape in the Tzeltal childl's understanding of names for objects, as opposed to spatial relationships? Landau and her colleagues (e.g., Landau, Smith and Jones 1988, Landau 1992) have argued that young English-speaking children rely specially on shape when learning labels for novel objects, generalizing names of novel objects to others of the

same shape, a 'shape bias' that increases with age and implies a developmentally early link between names for things and representations of object shape. In Tzeltal (as Lucy (1992) has argued for Yucatec Maya), many (perhaps all) nouns are not intrinsically count nouns, but label generalized concepts or substances (e.g., 'tree-stuff', 'banana-stuff') which is differentiated, if required, by shape-encoding numeral classifiers and/or predicates. This may well affect how children generalize object-names and spatial relations by shape.

CONCLUSION

In Tzeltal location and shape are inextricably linked in spatial descriptions. What sort of an object something is (whether for example it is a certain immutable shape like a stone, or a body jointed so that it can take on specific body positions, or composed of mass stuff which can take on any shape required) constrains what dispositionals can be used to describe it, as well as what body parts it may be taken to have. And in Tzeltal this means that what sort of an object something is is intimately connected to how its location can be expressed.

The difference between this sort of "where" system and that expressed by English prepositions is not simply a matter of Tzeltal using the same spatial dimensions but splitting them finer, distinguishing them for certain categories of figural object, as Landau and Jackendoff (in press) characterise the situation. The very separateness of Figure and Ground objects is what Tzeltal obscures, specificity can apply to one or the other, or indeed to both taken as a unit.

The on-going project examining the role of shape in Tzeltal children's acquisition of spatial reference promises to provide some much-needed cross-cultural and cross-linguistic input to cognitive science claims about the intrinsic separateness of 'where' and 'what' systems and the distinct characteristics of each.

Acknowledgements

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