LOCATIVE CONCEPTS AND EXPRESSIONS AND WARLPIRI ACQUISITION DATA

Edith L. Bavin

Cognitive complexity is a major factor in the acquisition of locative terms, but other factors such as saliency and complexity of linguistic structure have also been found to influence the order of acquisition. In Warlpiri, locative terms are nominals and they are used in combination with a locative case marker on the reference object; directional affixes may be added to them. Data from a series of tests of Warlpiri children's comprehension and production of the Warlpiri expressions that may be translated as 'in', 'on, 'under', 'in front of, 'behind' and 'between' indicate that the locative case forms are used first without the more specific locative nominals; young children do not distinguish 'in', 'on' and 'under'; the reference object influences how the locative term is interpreted; *kamparru-pirdandirli* (front-behind) is not one dimension for children aged 4-5 years; *kulkurru* 'between' is understood before *kamparru* 'front' and *pirdandirli* 'behind'; the use of features on a reference object for orientation develops at around 6, but the orientation of the reference object, as well as features on the placed object may affect interpretation. Patterns in comprehension and production support the view that language specific properties influence the acquisition of locative expressions.

1. INTRODUCTION[1]

The paper focuses on the role of language specific properties and other variables that may influence a child in interpreting locative expressions in the course of their acquisition. Some of the claims that have been made in the literature about concept development and the acquisition of locative expressions are discussed and data from the acquisition of Warlpiri locative expressions are presented and discussed in terms of these claims.

In line with the conceptual view of the acquisition of locative terms, it is assumed that a child maps a linguistic term onto an existing concept. For example, H. Clark (1973: 62) states that the child "acquires English spatial expressions by learning how to apply them to his prior knowledge about space". Concepts of containment, support and occlusion are generally considered to be less complex than other spatial relations, and this suggests that the terms *in, on,* and *under* will be acquired before locative terms that name more complex concepts (e.g. Johnston & Slobin 1979: 530). This view suggests that there is something privileged about the concepts of containment, support and occlusion that assist the child in extracting the appropriate linguistic marker from the linguistic input. However, it does not follow that because young children have early perception of spatial relations between objects this assists them in picking out the appropriate linguistic markers; even if a perceptual distinction can be made, there may be a time span before the distinction is mapped onto a linguistic form.

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Johnston & Slobin (1979: 531) suggest that 'if basic cognitive complexity were the sole determinant of acquisition, we would expect locatives to appear in the order given below:

IN/ON/UNDER < BESIDE < $BACK_f$/$FRONT_f$ < BETWEEN < BACK/FRONT"

The subscript f represents featured, that is the position is associated with an object that has a back or front (e.g. an animal but not a ball).

Johnston & Slobin (1979) argue that 'front' and 'back' in relation to a reference object (henceforth RO) with no intrinsic front and back are more complex than in relation to a RO with an intrinsic front and back (henceforth FRO); so for example, *in front of the cow* is less complex than *in front of the stone* for which the speaker's perspective will have to be adhered to. Other studies (e.g. Cox 1985) do show justification that 'back and 'front' are acquired before 'back' and 'front'. Hill (1982) points out that a positioned object may be viewed in relation to a RO using the viewer's own orientation, in which case a deictic strategy is used by the viewer: a positioned object may be referred to as *in front* of the RO if the RO is between the viewer and placed object (deictic aligned), although if the positioned object is hidden, it may be referred to as behind (deictic facing). If the RO has its own orienting features (e.g. the face of an animal or the face of a clock = 'front'), these can be used for locating the positioned object; this is a non-deictic strategy.

Harris & Strommen (1972) found that English speaking adults used the features of the FRO to place objects *in front of* and *in back of.* For non-featured ROs, most adult used the strategy of placing objects between themselves and the RO for *in front of* and away for *in back of* (although a few adults consistently did the reverse). Children followed the general adult pattern. Cox (1979) found that by 4-years of age, English speaking children had acquired the dimension 'front-back'; most of the children tested placed an object on the far side of a non-featured RO; responses for *in front* were not as consistent. Cox *et al* (1981) report that children from three language backgrounds (English, Bengali and Hindi) all used the features of a RO to determine *in front of* and 'behind' regardless of its orientation (p. 470); by 6/7 years of age, there was general agreement that the space between the RO and self was *in front of;* the position on the far side of the RO was interpreted as 'behind'. However, the study only used ROs facing the child or facing away, not positioned sideways. Tanz (1980) also found that the orientation of the RO was not significant in her study of *in front of* and *in back of* for English speaking children (p. 21).

Factors other than conceptual difficulty must affect the order of acquisition of locative terms. Salience in the communicative setting needs to be considered. Tanz (1976) claims that since it is more plausible to use a locative expression when something is not immediately perceptible to the addressee, *behind* and *in back* of are more likely to be used than *in front of.* Johnston (1984) also discusses salience as a factor in the acquisition of the locative terms *behind* and *in front of.* Tanz (1980) found that the actual reference object influenced children's responses in a placing task; performance on *in front of* and 'in back of from children aged between 2;6 and 5;3 was worse with "human" reference objects than with other animates (1980:20). However, I am not aware of any study that discusses the effect on performance when featured placed objects are used.

Another crucial factor that must be addressed in the study of the acquisition of locative terms becomes apparent when we investigate languages other than English. Language specific factors may have an influence; the complexity of the actual linguistic forms used to express the locative concepts may facilitate or hinder their acquisition. For example, in their study of the acquisition of locative terms in (American) English, Italian, Turkish and Serbo-Croatian, Johnston & Slobin (1979) and Slobin (1982) consider five linguistic factors that may affect

the acquisition of the language specific terms. These factors are: the position of the locative marker (prepositional or postpositional), lexical diversity, clear etymology, morphological complexity and homonymy. So the language itself may add complexity to the mapping task. Dromi's study (1979) of the acquisition of Hebrew locative terms illustrates well that morphological complexity adds complexity to the acquisition process.

Johnston (1984) points out that when locative terms are first acquired they may not have the adult meaning. Using a production task with a puppet play, she tested children aged between 2;7 and 4;7 on their use of *in front* of and *behind.* One of the interesting aspects of her results is that the children used *behind* in relation to large items without intrinsic front/back features (e.g. a tree, a can, and a large block) even before they used *behind* in relation to featured RO. In other words, the meaning of *behind* for the young child seems to be 'hidden', and the meaning for *in front* of could be 'visible', rather than a particular spatial relation between two objects. Johnston hypothesizes a developmental sequence in which the meanings of *behind* and *in front* of gradually approximate the adult meanings as the child "apprehends some new relational attribute in the spatial configurations he has been describing with 'behind' and *in front* of; this new understanding leads to new dimensions of meaning and new opportunities for use" (Johnston 1984:420).

That the terms *in, on,* and under are mapped onto preverbal conceptual organization of spatial relations is questioned by van Geert (1985/1986:7). He suggests a modular theory: that knowledge of spatial relations is represented mentally in three structurally distinct forms: perceptual, praxic and linguistic. According to this view, the child must learn which lexical contexts belong with which preposition (he discusses English and Dutch, both of which use prepositions to mark spatial relations). Van Geert (1985/1986) points out that there are no theoretical grounds for claiming that *in* is less complex than *on* or that *on* is less complex than *under.* All of these terms refer to topological relations, while *in front* and *behind* refer to projective relations (van Geert, 1985/1986:14). However, there are **praxic** differences associated with the terms. In order for an object to be placed under another, the RO must be lifted, and when an object is *in* a container, it is also *on* (the bottom of) the object. In addition, van Geert (1985/1986) claims that perceptually something that is *on* is more salient than something that is *under*.

According to van Geert's view, the concepts represented by the prepositions are, from the beginning, based in the lexical distribution rules. This suggests that if the child first hears the word *on* in relation to shoes on feet, or gloves on hands, the child will use this experience as the basis for her meaning of *on.* In addition, the child may first produce the word *on* in relation to clothing items. It is not clear that the child would associate *on* with a surface in these contexts; rather the meaning of *on* to the child may include the notion of 'containment', and forms such as 'let's go in" may lead the child to map *in* onto a notion of motion rather than a static position.

Although van Geert draws a distinction between the learning of names for things and the learning of propositions (van Geert 1985/1986:25), I suggest that a very similar process must be used in mapping a meaning to a locative form as in mapping a meaning onto a name of a thing. From the situated use of an expression, the child must extract a referent for the word, just as s/he must extract a meaning for the locative term. With experience, the child's earliest meaning of a particular linguistic form may need to be modified.

If there is a universal tendency for 'support and 'containment' to be the concepts which are first mapped onto linguistic forms, we would expect young children from very different language backgrounds to use their language to express these concepts before others. If, on the other hand, we find that children do not distinguish between these, but that observations on

their acquisition are correlated with the way their language divides up spatial relations, we could argue that the child does not just search for ways to express these pre-linguistic concepts; rather the concept development may be influenced by language experience.

In the remainder of this paper, I will discuss the use of locative expressions in Warlpiri, and the patterns found in the use and comprehension of these terms by Warlpiri children. The discussion is based mainly on results from experimental work. The locative expressions discussed may be translated into *in, on, under, between, in front* of and *behind.*

2. WARLPIRI LOCATIVE TERMS

Warlpiri is a Pama-Nyungan language spoken by about 3,000 people in central Australia. A good description of the adult language is available in Hale (1982). The data upon which this discussion in this paper is based was collected in Yuendumu, which is 300 km northwest of Alice Springs, and which has about 800 speakers. Warlpiri is the language of the community; the children all speak Warlpiri as a first language. Children are exposed to English in the primary school, although literacy skills are first taught in Warlpiri. (For further discussion see Bavin, 1987.)

In Warlpiri, locative relations are marked by a case marking on the RO; in addition the specific relation is expressed by a nominal. For example, in (1), the nominal *kankarlu* 'up' shows where the dog is located in relation to the house:

(1)	*Yuwarli-rla*	*ka*	*nyinami*	*maliki*	*kankarlu*
	house-LOC	AUX	sit	dog	up

The dog is on the house.'

However, without *kankarlu* 'up', the interpretation is that the dog is in the location of the house, but the specific location is not mentioned. Compare (2), in which only the locative case suffix is used:

(2)	*Nyinami*	*ka*	*karli*	*yuwarli-rla.*
	sit	AUX	boomerang	house-LOC

'The boomerang is at the house.

In (3), the particular location is expressed with *kankarla-rni* which is a combination of the stem for *up* plus a directional *-mi* 'hither'; it can interpreted as 'on' or 'upwards'. The term *kankarla-rra* could also be used; this is a combination of the same stem plus *rra* thither'. (I am using the terms 'hither' and 'thither' to be consistent with previous descriptions of Warlpiri.)

(3)	*Nyinami*	*ka*	*karli*	*kankarla-rni*	*yuwarli-rla.*
	sit	AUX	boomerang	up-hither	house-LOC

'The boomerang is on the house.'

There are two main stems used to form the specific location words which are translated into English as *in, on* and *under.* These are *kankarlu (kankarla-)* 'up', and *kanunju (kaninja-)* 'down'. *Kankarlu* 'up' and *kanunju* 'down' may be used alone or with directional suffixes, as in *kanunju-nparra* 'down-across'; the forms in parenthesis *(kankarla-* and *kaninja-)* are used with suffixes which give more explicit information about direction, suffixes including *-mi* 'hither' and *-rra* 'thither', e.g. *kaninja-rni* down-hither' and *kaninja-rra* 'down-thither' (Laughren 1978). The terms *kanunju* 'down' and *kankarlu* 'up' express opposites in the vertical dimension. Sentence (1) and (3) could be interpreted as the placed object is 'above

the house', or 'high' in relation to the house, rather than 'on' it. The concept 'in' can be expressed with *kaninja-rni* 'down- hither as in the following:

(4) *Nyinami* *ka* *kaninja-rni* *yujuku-rla.*
sit AUX down-hither shelter-LOC
'(3rd pers sing) is in the shelter.' (= 'It/he/she is in the shelter.')

Other examples of locative expressions in adult Warlpiri are given below (from Laughren, 1978):

(5) *Kankarla-rra* *nyinaya*
up-thither sit(IMP)
'Sit up!'

(6) *Kankarla-rra-purda-rna* *wantija.*
up-thither-towards-1sgSUB fall(PAST)
'I fell down (on my back) facing upwards'.

(7) *Ngunami* *ka* *kaninja-rra* *rdaku-ngka*
lie AUX down-thither hole-LOC
'He is lying at the bottom of the hole (deep down).'

Note that the locative morpheme is *-ngka* for two syllable words, and *-na* for longer words.

Examples from children's conversations are given below. (The age of the child in years and months is given in brackets)

(8)*a.* *Karnta,* *kankarla-rra*
woman, high-thither
'The woman, high up' [3;31 ('The child is lifting a doll up'.)

b. *Jurnta* *kankarlu* *jarrija-ria*
away up become(PAST)-Dat
'It's going away up.' [3;101

(-na here is dative, required *by jurnta)*

c. *Nyina* *ka-pala* *nyampu-jarra*
sit AUX-DuSUBJ this-DU
kankarla ka-pala nyinami
up AUX-DuSUBJ sit
nyampu kanunju ka-pala nyina.
here down AUX-DuSUBJ sit
'These two are here; two are up; here they are down. [3;6]

It should be clear from these examples, that there is not a one-to-one correspondence of Warlpiri lexical items with the English *in, on* and *under*. *Kankarlu* can express the equivalent of *on,* but its more general meaning is 'up' in relation to some point of reference.

The Warlpiri nominal for the English term *between* is *kulkurru,* for *in front* it is *kamparru* and for *behind, pirdandirli.* However, all these terms have a wider denotation than the equivalent English terms. In certain contexts *kulkurru* can also mean 'middle', so it is not restricted in use with two ROs. Laughren (1978) illustrates that the terms *kamparru,*

pirdandirli and *kulkurru* involve a progressive spatial perspective. *Kamparru,* for example, in relation to a circular journey, a round trip, can be used to refer to the point or path that "remains to be traversed or lies ahead of the speaker in his travel, whether or not it is equated with the point of departure or path already traversed' (Laughren 1978:17). So *kamparru* can be used in situations for which English would use *ahead, in front, behind* or *back.* Similarly, *pirdandirli* is translated sometimes as *ahead* and sometimes as *behind.* In fact, there is similar ambiguity in using English *first* (consider *the first in line* and the task of circling the *first letter of the word).*

3. THE DATA COLLECTION

It was hypothesized that data collected from young Warlpiri children would indicate any core/basic meanings of locative nominals. Based on the papers cited in section 1 of this paper, it was also hypothesized that children of four years would distinguish 'in', 'on', and under', but would still be mastering the other locative relations. However, the Warlpiri language lexicalizes an 'up-down' dimension, and the linguistic form used for 'up' is also used to express 'on' and the expression for 'down' can also be used for 'under', so the initial work was exploratory. A series of tests were designed and conducted to find out which terms the children knew at different age levels, and to find out whether the children used a deictic strategy in interpreting *pirdandirli* 'behind' and *kamparru* 'front' with non-featured ROs, as reported for other languages.

The series of tests were completed over a nineteen-month period. The first test used 27 subjects (aged 3;11 to 8 years) to test comprehension; the children were required to place objects in particular locations. For example:

(9)	*Yirraka*	*watiya*	*kankarla-rra*	*yujuku-rla.*
	put	stick	up-away	shelter-LOC

'Put the stick on the shelter.'

Production data was elicited from some of the same subjects. Three months later, the 'in', 'on', 'under' locations were examined in more detail (test 2). A selection task was used rather than a placing task, to see if the results from test 1 were task-specific. The children were asked to pick out which object was in a particular location. For example,

(10)	*Pirli*	*nyiya*	*ka*	*nyina*	*kankarla-rni*	*yujuku-rla?*
	stone	which	AUX	sit	up-hither	shelter-LOC
	Pirli	*nyiya?*				
	Stone	which				

'A stone is on the shelter. Which stone?'

21 subjects were used: the age range for one group was 4;5 to 6;1 and for the other 7;1 to 10;4. Production data also was collected from some of the subjects. The third test, based on production, used the same subjects as used in test two. The fourth test, carried out fifteen months later, investigated the 'front-back' dimension in more detail than in test 1. Both featured and non-featured ROs and placed objects were used to test whether the children would use the orientation of the RO regardless of its position if there was competition from placed objects. Test items were of the form:

(11) *Maliki nyiya ka nyinami kamparru yuluku-rla.*
dog which AUX sit front cow-LOC
'Which dog is in front of the cow?
Jiily-ngarrika. Jinta mipa.
choose one only
'Choose one.'

33 subjects were used, aged from 3;6 to 7;11. Detailed discussions of the test designs and analysis of the results are given in Bavin (ms).

4. RESULTS

Results from the first test indicated that the youngest children were able to interpret the locative expression *kankarla-rra* as 'on'; the core meaning for *kanunju-nparra* was found to be 'down', but the actual location depended on the RO. The results from both comprehension and production indicate that *kulkurru* 'between' is acquired before *kamparru* 'front' and 'back'. The younger children tended to produce just a case marker on the RO to name a location, rather than using a specific nominal in combination with a case marker on RO.

The results from test 2 confirmed that the children have a meaning 'down but not necessarily covered' for *kanunju;* while *kaninja-rni* also includes the meaning component 'down' it is more likely to be 'covered', which can be extended to a general notion of 'containment' (for which 'covered' is not a necessary component of meaning.) The children are more likely to interpret *kaninja-rni* 'down-hither' as *in* and *kanunju* 'down' as *under,* but this very much depends on the RO. For example, a truck as a RO received different responses than a *yujuku* 'humpy'. The production data indicates that 'in' is the hardest concept for the children to name, but the expression *yinjayiti* from English 'inside' has been adopted by some of the children.

Test 3 results support the earlier findings: Warlpiri children under 6 tend to use only the locative case marker on the RO. Overall, *kankarlu* 'up' (or *kankarla* 'up' + directional suffix) is used by the children for 'on' (once they use a specific location word in addition to the case marker). *Kanunju* 'down' is used for 'down' particularly if the object is on the ground. When the child adds a suffix to the locative stem (which means that the child has acquired three forms: the case form, the locative stem, and the direction form), *kaninja-rni* 'down-hither' is used for 'covered', but is not reserved for 'inside'. The test results supported the earlier finding that some children have borrowed the English term *inside* and use it with Warlpiri pronunciation to refer to an object 'inside' a container. *Yinjayiti* is used for the concept of containment particularly with 'new' things such as cups, and trucks. This finding is supported by naturalistic data; *yinjayiti* is more likely to be used in connection with cans, boxes and other closed items, including school buildings, than open items such as wind breaks, open-ended shelters or a coolamon (= *parraja,* an open, shallow oval wooden container for carrying food and babies). The generalization, then, is that for the young child an early distinction between 'on', 'in', and 'under' is not evident. However, a distinction between 'up' and 'down' is, and 'covered' is a later distinction. Recall that in the examples in (8), children of 3.5+ produced the uninflected locative nominals, but not in combination with a RO with case marking, and these were used to express the 'up-down' dimension.

The results of test 4 show that the terms *pirdandirli* behind' and *kamparru* 'front' are not opposite poles of one dimension for the young Warlpiri child (4/5 years). The terms are comprehended as opposites as the child gets older. In addition, the young child does not use the FRO for orientation; this strategy develops. A conflict over using the FRO for orientation

or not occurs when the front of the FRO is not in the space closest to the viewer. This indicates a bias towards a deictic facing strategy, but a deictic strategy is not used overall by the youngest children tested (4/5 years). Overall, more variation in responses was found for *kamparru* 'front' than for *pirdandirli* 'behind'. It was found that the case marker and locative nominal could be interpreted independently, so that a sentence such as (11) could be interpreted as 'the front dog in the vicinity of the cow'. The case marker on the RO delimits a general area. The results showed a preference for 'right' over 'left' as *kamparru*, indicating that the orientation of the RO affects decisions.

5. DISCUSSION

The four studies provided no support for the view that the young child has separate concepts for 'in', 'under' and 'on', and searches for a way to express these as separate concepts in the language being acquired. Evidence was found that the 4-year-old Warlpiri child distinguishes an 'up-down' dimension, which we could predict on the basis of the language input. The nominal for 'up' is acquired before the nominal for down'. However, there was no evidence that *kankarla* 'up' was overextended to cover the opposite end of the dimension (H. Clark, 1973).

The results from the studies suggest that directional suffixes on *kaninja* 'down' can be used to distinguish 'down' from 'covered'. The subtle differences in meaning that can be conveyed with the directional suffixes is illustrated in the following example from a child at play. The child, consistently used *kanunju* 'down' for a stone in a box standing up, and *kaninja-rra* 'down-thither' for a stone in the box lying on its side. This is the only example I have of a systematic distinction being made with affixes for different orientations of the same container from a child. Directional suffixes other than *-mi* and *-rra* are late acquisitions; they do not occur frequently in the data for children under 9 years of age, either in test or naturalistic settings. They are not apparent until the child has mastered the locative case forms and the locative nominals, as well as the more frequent suffixes *-mi* and *-rra*

The Warlpiri child does not assume that *kamparru* and *pirdandirli* represent opposites on a line between two points, even after 6. The space between child and RO may still be interpreted as *kamparru*, even with a FRO, but any position can be *pirdandirli.* The child is not biased towards a 'hidden' meaning for *pirdandirli* as has been found in studies on other languages, as mentioned in section 1.

Comparison of the order of acquisition of Warlpiri locative terms with other acquisition studies shows some similarities and some differences in terms of the concepts expressed. 'On/up' is an early acquisition and is contrasted with 'down'. However, there is no linguistic evidence that 'in' is a separate concept. By 6 years, the term *yinjayiti*, from English *inside* seems to be appropriate for some children for the concept 'containment' particularly in relation to objects that have been recently introduced into the culture. In contrast with studies on other languages (see section 1), it was found that *kulkurru* 'between' was acquired before *pirdandirli* 'behind' and *kamparru* 'front'. Warlpiri children did not use an early deictic strategy in determining locations for *pirdandirli* 'behind'. However, 'space close to self is the most general understanding of *kamparru* before the children start using the features of a RO for orientation. Although the use of a FRO for orientation develops at around the age of 6, the child seems to develop an awareness of ambiguities and may use the case marker on the RO to delimit a general space, and the locative nominal may be related to the placed object rather than the RO. No other study, as far as I know, has even considered the features of the placed objects as a variable. More variation in responses was found if a RO faced left or right rather than away or towards the child, so the orientation of the RO is significant.

That the language structure itself is a factor in the acquisition of forms to express locations is perhaps best illustrated by the fact that the Warlpiri child first uses the locative nominal alone or the locative case marker on a RO before the case marker and nominal are used in combination. Johnston & Slobin (1979) argue that the complexity of linguistic structure for Serbo-Croatian affects the rate of acquisition of location expressions; in Serbo-Croatian, a preposition is used in combination with a case marker on the RO. In Warlpiri, the case marker on a RO is the only marker of location that is necessary; the use of specific nominals allows for more specific information, but it is the speaker's decision to add these. In addition, the nominal may be used alone rather than for expressing a position in relation to some stated RO.

Lexical diversity has been claimed to delay acquisition (Johnston & Slobin, 1979). For the acquisition of Warlpiri locative expressions, lexical diversity is not a problem. However, there are many affixes available that can be added to the nominal stems to extend their meaning. These are optional and the child does not use them in the early years.

In conclusion, although more work needs to be conducted on the acquisition of the locative expressions, the results of these preliminary tests reveal some interesting aspects, and confirm that in order to advance our understanding of concept development and the acquisition of linguistic forms to express these concepts, we must consider acquisition data from a wide range of languages so that language independent principles may be distinguished from the language specific.

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