

Linguistic Representation of Spatial and Temporal Orientation  
Author(s): Clifford Alden Hill  
*Proceedings of the 4th Annual Meeting of the Berkeley Linguistics Society* (1978), pp. 524-538

Please see “How to cite” in the online sidebar for full citation information.

Please contact BLS regarding any further use of this work. BLS retains copyright for both print and screen forms of the publication. BLS may be contacted via <http://linguistics.berkeley.edu/bls/>.

---

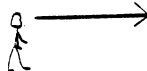
*The Annual Proceedings of the Berkeley Linguistics Society* is published online via [eLanguage](#), the Linguistic Society of America's digital publishing platform.

Linguistic Representation of Spatial and Temporal Orientation \*  
 Clifford Alden Hill  
 Teachers College  
 Columbia University

In most languages the lexical resources used for representing orientation along the front/back axis in horizontal space are also used for representing temporal orientation. In certain languages, the lexical items that represent 'front' and 'back,' whose referential functions are anchored in human anatomy itself, are directly used in expressing temporal orientation. In Kikuyu, for example, mbere functions as an equivalent to temporal before as well as spatial in front of, thutha as an equivalent to temporal after as well as spatial behind. In many other languages, however, the lexical items for 'front' and 'back' do not directly function in both domains. The lexical roots found in this basic pair, however, are often extended in quite complex ways into the temporal domain as well as the spatial. In English, for example, spatial in front of and temporal before can be viewed as reflecting the same lexical root, at least from a synchronic vantage point.<sup>1</sup> Moreover, before can function spatially as illustrated in the familiar nursery verse: 'Wasn't that a dainty dish to set before the king?' And behind, the primary resource for expressing spatial orientation, is often used to express temporal orientation: 'We're behind one week in our schedule.' Furthermore, the -ward(s) suffix, expressing a semantic feature analogous to aspectual [-complete],<sup>2</sup> may be joined to either for or back to create a lexical resource for expressing either spatial or temporal orientation:

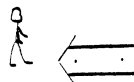
SPATIAL: 'Would you please move your chair forward just a bit?'  
 TEMPORAL: 'We have to move the meeting forward a week.'

Hence all languages that anchor time in horizontal space presuppose a line along which either movement or static relationships between fixed points can be measured. It is as if time is pictured as a straight line stretching out into the visual field:

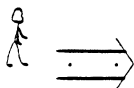


Such a line may be identified as a spatio-temporal line.

In this article, I would like to examine two prototypes<sup>3</sup> used in processing linguistic representation of movement or static relationships between fixed points along this spatio-temporal line. In using one prototype, an orientational field is constructed in which the points are viewed as aligned toward the point from which they are observed:<sup>4</sup>



This prototype will be referred to as the mirror-image prototype (i.e., the face-to-face one). In using the other, an orientational field is constructed in which the points are viewed as aligned with the observer(s) toward some further point:



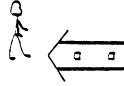
This prototype will be referred to as the in-tandem prototype.

It will be assumed that these prototypes are derived from two basic perceptual patterns in which physical entities conceived as possessing an intrinsically marked front/back axis are oriented in contrasting ways.<sup>5</sup> These contrasting prototypes may be illustrated by the ways in which human beings relate to each other as well as to non-human objects. For example, in the most basic forms of social experience, one person is ordinarily oriented toward the other, thereby reflecting the mirror-image prototype: people are ordinarily in a face-to-face relation as they eat together, talk together, etc. But there are other social experiences in which persons are aligned with each other toward some further point: marching in line, waiting in line, watching a movie, etc. With respect to the latter set of experiences, it may be noted that a certain dynamic element is introduced, whether or not actual motion is in the field, by virtue of this common orientation toward a further point. With respect to human relations with non-human objects, this dynamic element is particularly important in distinguishing the two kinds of orientational fields. For in static modes of interaction with a physical object possessing an intrinsically marked front/back axis, that object is ordinarily oriented toward the person interacting with it. Consider, for example, the face-to-face relation a person establishes with a clock or a typewriter as he interacts with it. In dynamic modes of interaction, however, a person and an object are ordinarily oriented in concert toward some further point. Consider, for example, the in-tandem relation that a person establishes with a bicycle or a car as he uses it.<sup>6</sup>

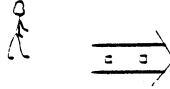
Although both prototypes appear to be used in processing spatial or temporal orientation within all languages, there has accumulated strong evidence that they are differentially distributed in the processing of spatial and temporal constructs in different languages. However, it is not only that they are used in contrasting ways by speakers of different languages; they are also used in contrasting ways by speakers of the same language. This latter kind of contrast is particularly evidenced in developmental research (Harris and Strommen, 1972; Kuczaj and Maratsos, 1974; Hill, Donnell, Pearsons, and Aronowitz, in preparation). For example, in Harris and Strommen's research, four-to-seven-year-old children used both prototypes in responding to tasks such as the following:

'Put the red block in front of the green one.'

More than two-thirds of the children made placements on the near side, thus reflecting a mirror-image prototype:



Nearly one-third of the children made placements on the far side, thus reflecting an in-tandem prototype:



However, when a similar task is given to adult speakers of standard English, their responses reflect much greater use of the mirror-image prototype. For example, in a study with more than one hundred graduate students at Columbia University, over ninety percent made use of the mirror-image prototype by identifying a further object as 'behind/in back of' a nearer one, a nearer object as 'in front of' a further one.

It has been shown, however, that adult speakers of other languages tend to use the in-tandem prototype in responding to a similar task. For example, in a study carried out in West Africa, a substantial majority of Djerma and Hausa speakers identified the further object as 'in front of' the nearer one, (using constructs based on gine and gaba, the lexical items representing the front part of the human body), the nearer object as 'in back of/behind' the further one, (using constructs based on banda and baya, the lexical items representing the back part of the human body).<sup>7</sup>

It is important to note, however, that the distribution of these prototypes is considerably less stable in situations where speakers in one linguo-cultural domain are subject to influences from another. For example, in the western hemisphere native speakers of creolized English and French whose cultural heritage lies in West Africa tend to make considerable use of the in-tandem prototype (Hill, Donnell, Pearsons, and Aronowitz, 1978a; Hill and Vivolo, 1978b; Hill, 1978c); and conversely, westernized speakers of Hausa and Djerma tend to make considerable use of the mirror-image prototype (see Hill, 1975b, for the account of a study in which it was found that girls make consistently greater use of the mirror-image prototype than boys on a variety of tasks in a secondary school setting).

Although the use of prototypes by adult speakers of English and adult speakers of Hausa contrast sharply on tasks like the one above, it coincides on other tasks. Consider, for example, the ways in which the two sets of speakers encode the relation between the tree and the stick in a situation like the following:

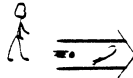


Both construct an orientational field aligned toward themselves, thus describing the stick as "behind" the tree (baya da is used in Hausa). A Hausa speaker tends to use a mirror-image prototype, whenever the visual field is closed rather than open.

Moreover, there are other situations in which an English speaker as well as a Hausa one tends to use an in-tandem prototype. If an English speaker is in motion, then he tends, like a Hausa speaker, to use the in-tandem prototype. Consider, for example, the following utterance by a person driving a car to a fellow passenger: 'Oh, look at that lovely pine grove there in front of the boulder.' An informal experiment with native speakers of English indicates that the majority visualize the following configuration, thus reflecting use of the in-tandem prototype:



This tendency to use the in-tandem prototype in decoding appears to be considerably strengthened if either up or out precedes in front of. Moreover, an English speaker also tends to use an in-tandem prototype when he perceives motion away from the point where he is located. If, for example, a ball rolling away from him is used as a reference point, then any object located on the far side of the ball tends to be identified as in front of, as illustrated below:

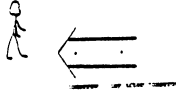


'Is that your bat in front of the ball?'

It may thus be concluded that the two basic prototypes are available to both speakers of Hausa and speakers of English but that they tend to be distributed in contrasting ways. Table I following the notes summarizes the different patterns of distribution that have been outlined here.

Let us now turn to the domain of temporal orientation and consider an analogous pattern of distribution of these prototypes by speakers of English and speakers of Hausa. The domain of temporal orientation, unlike the spatial one, provides examples of linguistic constructs which are necessarily processed the same way by all adult speakers of a language, for a lexical item representing orientation may be used in a construct that identifies a

stable relationship between two points in time. Consider, for example, a construct such as the day after tomorrow in English: all adult speakers of English would agree that this construct identifies a point in time two days later than 'today.' As illustrated by the following diagram, an orientational field is constructed in which the temporal points are viewed as aligned toward the speaker:



In effect, the construct is necessarily processed according to a mirror-image prototype. If an in-tandem prototype were used in processing this construct, then it would refer to 'today.' Although human beings do possess a remarkable capacity for inventing indirection in speech, this particular way of referring to the immediate day in which they are located seems to stretch such a capacity beyond its limits.

It is interesting to compare the strategy that a Hausa speaker uses in establishing an orientational relationship between 'tomorrow' and 'the day after tomorrow.' As in many West African languages, the days immediately preceding and following 'today' are lexicalized in Hausa; that is to say, they are each given separate names rather than defined in relation to each other. Hence it is possible to measure the way in which a Hausa speaker conceives of the relation of gobe 'tomorrow' to jibi 'the day after tomorrow' by use of the cloze procedure:

Jibi yana \_\_\_\_\_ da gobe.

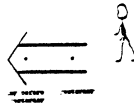
If a Hausa speaker were to place gaba 'in front of/before' in the above blank, then he would be using an in-tandem prototype. If he were to place baya 'in back of/after,' then he would be using a mirror-image prototype. Pilot research indicates that a substantial majority of Hausa speakers select gaba, thus reflecting use of an in-tandem prototype:



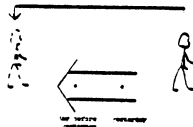
Hence it would appear that just as Hausa speakers make greater use of an in-tandem prototype in the processing of spatial relations, so they make greater use of this prototype in the processing of temporal relations. Indeed, they even view a later day of the week as gaba da 'in front of/before' an earlier one, an earlier day as baya da 'in back of/after' a later one. Hence ranar Talata 'Tuesday' is viewed as gaba da ranar Littinin 'Monday,' ranar Littinin 'Monday,' as baya da ranar Talata 'Tuesday.' By way of contrast, an English speaker views Monday as coming before Tuesday, Tuesday

as coming after Monday, thus reflecting the same mirror-image prototype that is basic in his processing of spatial orientation.

It is important to note that both speakers of English and speakers of Hausa process these relations between days of the week as if they had placed themselves at some point just before the week begins. Indeed, it appears that speakers of all languages process relations between points in a temporal field by virtue of such placement. This strategy appears to operate even when the temporal field is located in the past. Consider, for example, a construct such as the day before yesterday. If an English speaker were to process the relation between 'two days earlier' and 'one day earlier' from the vantage point provided by his actual location in time, then he would be using an in-tandem prototype rather than a mirror-image one:

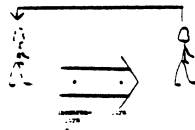


Such switching of prototypes would, however, not be consonant with what is known about linguistic processing of temporal information. If, however, the speaker is viewed as processing the relations from a point immediately preceding the temporal field, then he may be considered as maintaining a consistent prototype:



In effect, he views the temporal field as aligned toward himself, thus reflecting use of the mirror-image prototype.

Furthermore, a Hausa speaker maintains a consistent prototype in processing the temporal relationship between the two points immediately preceding 'today' and the two points immediately following 'today.' By virtue of the same strategy of temporal displacement, he views shekaranjiya 'the day before yesterday' as baya da 'after' jiya 'yesterday,' thus reflecting a consistent use of an in-tandem prototype:<sup>8</sup>

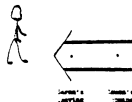


Just as it was earlier posited that a Hausa speaker may use the mirror-image prototype in processing spatial relations when the visual field is 'closed,' so it will now be posited that he may use such a prototype in processing temporal relations when the temporal field is, as it were, closed. When a Hausa speaker identifies, for example, the relation between two events, he sets up an orientational field which is closed and thus makes use of the mirror-image prototype. Consider, for example, the following utterance:

Dauda zai zo bayan Saratu ta fita.

'David will come after Sarah leaves.'

Dauda's coming, the later event, is identified as bayan 'after' Saratu's leaving, the earlier event. Hence a mirror-image prototype is being used:

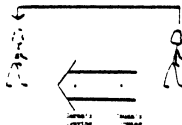


This mirror-image prototype is also used in the processing of the relation between two events located in the past. As we have already pointed out, a Hausa speaker processes the relations within a past temporal field as though he were located at a point in time immediately preceding that field. Consider, for example, the following utterance:

Dauda ya zo bayan Saratu ta fita.

'Dauda came after Sarah left.'

As in the previous example, the Hausa speaker may be considered as using a mirror-image prototype for processing this closed field, by virtue of temporal displacement to a point immediately preceding it:



Just as in processing certain temporal relations a Hausa speaker may use a mirror-image prototype, so an English speaker may, in certain instances, use an in-tandem prototype. It may be recalled that in the domain of spatial orientation 'motion' seems to be a critical feature in inducing the English speaker to switch from a mirror-image prototype to an in-tandem one. By the same token, when an English speaker represents movement from one temporal point to another, he tends to make the same switch. Consider, for example, the following experimental task which was given to students at Columbia University:

'The Commission on Equal Rights had originally scheduled its meeting for March 10th. The meeting has now been moved forward one week.'

This statement appeared in this morning's New York Times. If you had read it, when would you have expected the rescheduled meeting to take place?

(note: the students performed this task on February 9th)

Thirty-six out of fifty students selected March 17th, thus reflecting a dominant pattern of use of an in-tandem prototype.

It may, of course, be argued that, in processing this task, these students used a calendric frame of reference and hence viewed the temporal field as intrinsically oriented. Within the calendric frame of reference, a later date would necessarily be viewed as intrinsically 'forward' in relation to an earlier one. Even if this argument is granted, it is still important to remember certain points. First of all, the mirror-image prototype, as already pointed out, is used in relating calendric units such as Monday, Tuesday, etc. Secondly, nearly a third of the students involved in the experimental task used a mirror-image prototype. Moreover, this mirror-image prototype is often used in everyday communication about rescheduled meetings. For example, I recently received, as a faculty member of the university where I teach, a written communication from the Dean of the Faculty in which he used forward to identify an earlier point in time for a rescheduled meeting:

'In order to accommodate earlier discussion of the budget, we shall be bringing the next scheduled Faculty meeting forward by one week.'

Fortunately, the dean used the verb 'bringing' to mark orientation toward his own location in time. Moreover, in the next paragraph he gave the actual date for which the meeting had been rescheduled. If he had not included these additional bits of information, certain faculty members might well have been two weeks late for the meeting (since beginning this work on temporal orientation, I have been told stories by a number of people about such misunderstandings).

Furthermore, the experiment did provide certain evidence that a calendric frame of reference was not particularly salient in determining which prototype would be used. When the linguistic construct on the calendar was placed after forward one week in the text, the use of the in-tandem prototype was not noticeably strengthened.<sup>9</sup>

There is, however, an additional factor, one best understood as pragmatic, which I believe strongly influenced the choice of a later date. In general, people assume that any rescheduled event will be moved to a later date rather than an earlier one, as a consequence of the human tendency to run behind schedule and hence to postpone events. This pragmatic factor may account for a certain imbalance in the experimental results when back one week was introduced in place of forward one week. If the in-tandem prototype that dominated the processing of forward one week were used in the processing of back one week, then a majority of the students would have selected an earlier date. The students were, however, evenly split, thus reflecting the strength of the conflict in choosing between the in-tandem prototype for representing movement in time and the pragmatic factor that rescheduled meetings tend to be postponed (the tendency to favor the pragmatic

factor may have been strengthened by the fact that such a choice would be consonant with the use of a mirror-image prototype; as has already been observed, such a prototype is particularly dominant for speakers of English in static domains of spatial and temporal predication). It is interesting to note that a Hausa speaker appears to experience no conflict in using an in-tandem prototype in processing such linguistic representation of movement from one temporal point to another.<sup>10</sup>

It may thus be concluded that the two basic prototypes are available to both speakers of Hausa and speakers of English in processing temporal orientation as well as spatial orientation. Table II following the notes summarizes the different patterns of distribution for the use of the two prototypes by Hausa speakers and English speakers in the domain of temporal orientation. If Table II is compared to Table I, the one summarizing such patterns in the domain of spatial orientation, then certain analogies can be clearly discerned between the patterns of distribution in the two domains. The Hausa speaker, whether processing spatial or temporal orientation, may be viewed as normatively using the in-tandem prototype, switching to the mirror-image only when the field is closed. An English speaker, on the other hand, may be viewed as normatively using a mirror-image prototype, switching to an in-tandem one only when he himself experiences motion or perceives it within the spatial or temporal field. In effect, an English speaker appears to match quite closely

- (1) the mirror-image prototype, largely generated by static patterns of interaction with human and non-human entities possessing intrinsically marked orientation, with static experience of spatial and temporal fields which possess no intrinsically marked orientation;
- (2) the in-tandem prototype, largely generated by dynamic patterns of interaction with human or non-human entities possessing intrinsically marked orientation, with the dynamic experience of spatial or temporal fields which possess no intrinsically marked orientation.

The question naturally arises as to why a Hausa speaker tends to use an in-tandem prototype, largely generated by dynamic patterns of interaction, in linguistic representation of a static relationship between objects. An appropriate response to this question would require more space than I am allotted here, but let us briefly consider two lines of inquiry along which such a response might be constructed. First, whenever the spatial or temporal field is experienced as open rather than closed, there may be a natural orientation toward the vanishing point on the horizon, hence providing a kind of incipient dynamism. Secondly, the use of an in-tandem prototype in representing front/back orientation is consonant with the use of this prototype in representing the

orientation along the other horizontal axis, the left/right one. In addition, this in-tandem prototype may also be conceived as operative in representing orientation along the vertical axis (see Hill, 1978c for an extended discussion of the above points).

In concluding this article, let us briefly return to the framework of development research. Since contrasting prototypes are used by adult speakers of any language in the processing of spatial terms such as in front of and behind and temporal ones such as before and after, the task that the child faces in acquiring the adult patterns of distribution for these prototypes in a particular language is formidable. Just as children experience difficulty in acquiring the appropriate adult pattern in processing spatial orientation (as illustrated by development research in children's use of in front of and behind/in back of), so they experience difficulty in acquiring the adult pattern in processing temporal orientation (as illustrated by the research on children's use of before and after [Clark, 1971, 1972; Donaldson and Wales, 1970; Eilers, Oller, and Ellington, 1974; Friedman and Sealy, 1976]). It is hoped that the preceding analysis, based largely on cross-cultural research, might provide a useful framework for understanding some of the difficulties children experience in acquiring the adult use of prototypes in the linguistic processing of temporal orientation.

#### Notes

\* I would like to acknowledge that many of the fundamental concepts in this article come from Franklin Horowitz. During the past two years he has generously provided not only provocative ideas, but also useful descriptive terms (e.g., mirror-image and in-tandem), stimulating facts about language, and practical stylistic suggestions. In addition, I would like to thank Eric Larsen for helpful comments on an earlier version of this article.

<sup>1</sup> From a diachronic point of view, the word front derives from Latin frons 'forehead,' the word (be)fore from Old English fore/foran, which, in turn, comes from an Indo-European root reflected in Sanskrit pra, Greek pro, and Latin per/pro (all expressing, in some sense, 'forward motion').

<sup>2</sup> See Bennett, 1975:91 for further elaboration of this point.

<sup>3</sup> The term prototype is used roughly as it is defined by Fillmore in the first volume of this series (1975:123). In presenting the need for using the concepts 'prototype' and 'frame' in semantic analysis, Fillmore makes the following point with respect to human orientation in space:

...we know, without knowing how we know, the prototypic ways in which our bodies enable us to relate to our environment: this is knowledge we might

speak of as part of our body image. Our language provides us with orienting and classifying frames--such as UP/DOWN, FRONT/BACK and LEFT/RIGHT--which we could not understand, or could not easily understand, if we lacked bodies or if we lacked a body image. (1975: 123)

<sup>4</sup>In previous articles, I have focused on the orientational properties ascribed by language to a single reference point along this line, by means of which other points could be located. For example, the propositional base of an utterance such as 'The stick's in front of the rock' has been taken as establishing the rock as the center of an orientational field with respect to which the location of the stick is to be determined. Or to use Talmy's cognitive-semantic categories, the stick is established as a 'FIGURE-object...whose...site is conceived as a variable the particular values of which is the salient issue,' the rock as a 'GROUND object...with respect to which the FIGURE's...site received characterization' (1975:419). There is certain experimental evidence (Harris and Strommen, 1972), however, to suggest that the language user does not simply locate the site of the FIGURE object with reference to the GROUND object; he also ascribes to the FIGURE object the same orientation that he ascribes to the GROUND object. Hence, although language may be viewed as ascribing orientational properties to only the GROUND object, the language user apparently ascribes them to the FIGURE object as well as to the GROUND one.

<sup>5</sup>From the cognitive point of view, orientational properties ascribed to the physical world are more aptly described as derived than intrinsic; for an entity is viewed as possessing intrinsically marked orientation if it is characterized by asymmetrical properties, either formal or functional, which are perceived as analogous to those which express the corresponding orientation in our own bodies. Hence we say that a car possesses an intrinsically marked 'front' because part of its body can be analogized in form to our own front (e.g., its headlights are like our eyes). From a functional point of view, its front, like our own, is the part that characteristically leads as it moves.

<sup>6</sup>In actual processing of spatial constructs, intrinsically marked orientation often conflicts with prototypically established orientation. Consider, for example, the following utterance: 'Can you hand me the eraser there in front of the typewriter?' If the typewriter is 'facing to the side,' then the eraser can be located with reference to either the intrinsically marked orientation or the prototypically established orientation. If the latter is used, it is as though a certain normative orientational alignment between the typewriter and the observer (i.e., a face-to-face one) is superimposed upon the actual one.

<sup>7</sup>The details of this cross-cultural research were reported in the first volume of this series (Hill, 1975a). It is important to note that the reliability of this cross-cultural research derives from the stable fields of reference provided by human anatomy for the lexical items for 'front' and 'back' in all languages. For example, English front parallels Kikuyu mbere in referring to the part of the human body with eyes, nose, mouth, and toes; and English back parallels Kikuyu thutha in referring to the opposing part that lacks salient sense-organs.

<sup>8</sup>The morph shekara, prefixed to jiya 'yesterday,' basically means 'to go round.' When shekara is used as an isolated nominal form, it means 'year.' As in other languages, temporal terms in Hausa may be based on a circular image as well as a linear one.

<sup>9</sup>The notion of 'intrinsic orientation' in time seems to derive less from the calendric frame of reference than from the orientation ascribed to the observer within the temporal field. If he is viewed as oriented toward the future, then a later point in time may be conceived as 'intrinsically forward' in relation to an earlier one. If, however, as in some Asiatic languages, he is viewed as oriented toward the past, then an earlier point in time may be conceived as 'intrinsically forward' in relation to a later one.

<sup>10</sup>The above analysis does not deal with two other fundamental kinds of motion which language ascribes to the human experience of time. As analysts such as Kimball (1974) and Bennett (1975) have observed, certain linguistic expressions picture the individual himself as moving through time, others picture time itself as moving through the individual. The contrasting verbs of motion, go and come, can be used to mark both kinds of motion. In French, for example, an individual may view himself as venant 'coming' from a past act (Je viens de manger 'I have just eaten') and as allant 'going' to a future one (Je vais manger 'I'm going to eat'). In effect, the individual views himself as moving through time. By way of contrast, he may picture time as moving through himself in his use of the verbs come and go. In English, for example, the next week may be viewed as the coming week or the week to come and the past week may be viewed as the week gone by (see Traugott, 1975 and 1978 for a detailed analysis, one involving verb tense and aspect, of these contrasting kinds of motion).

TABLE I  
DISTRIBUTION OF CONTRASTING PROTOTYPES USED IN  
THE LINGUISTIC REPRESENTATION OF SPATIAL ORIENTATION













FEATURES OF FIELD	LANGUAGES	IN-TANDEM PROTOTYPE	MIRROR-IMAGE PROTOTYPE
[OPEN FIELD] [STATIC]	HAUSA	Ice yana <u>gaba</u> da dutse. ‘The stick’s “in front of” the rock.’ 	∅
	ENGLISH	∅	The stick’s in <u>back</u> of the rock. 
[CLOSED FIELD] [STATIC]	HAUSA	∅	Yana <u>baya</u> da itace. ‘The stick’s in back of the tree.’ 
	ENGLISH	∅	The stick’s in <u>back</u> of the tree. 
[OPEN FIELD] [DYNAMIC]	HAUSA	Itace yana <u>gaba</u> da dutse. ‘The tree’s in front of the rock.’ 	∅
	ENGLISH	The tree’s (out/up) in <u>front</u> of the rock. 	∅

TABLE II  
DISTRIBUTION OF CONTRASTING PROTOTYPES USED IN  
THE LINGUISTIC REPRESENTATION OF TEMPORAL ORIENTATION

FEATURES OF FIELD	LANGUAGES	IN-TANDEM PROTOTYPE	MIRROR-IMAGE PROTOTYPE
[OPEN FIELD] [STATIC]	HAUSA	Ranar Talata tana <u>gaba</u> da ranar Littinin. ‘Tuesday is “before” Monday.’ 	∅
	ENGLISH	∅	Tuesday is <u>after</u> Monday. 
[CLOSED FIELD] [STATIC]	HAUSA	∅	Dauda zai zo <u>bayan</u> Saratu ta fita. ‘David will come after Sarah leaves.’ 
	ENGLISH	∅	David will come <u>after</u> Sarah leaves. 
[OPEN FIELD] [DYNAMIC]	HAUSA	An sa ranar taro mako daya a <u>gaba</u> . ‘One put the meeting forward one week.’ 	∅
	ENGLISH	The meeting was moved forward one week. 	∅

REFERENCES

- Bennett, D.C. 1975. Spatial and Temporal Uses of English Prepositions. London: Longmans Group.
- Clark, E.V. 1971. "On the Acquisition of 'Before' and 'After.'" In Journal of Verbal Learning and Verbal Behavior, 10, 266-275.
- \_\_\_\_\_. 1972. "On the Child's Acquisition of Antonyms in Two Semantic Fields." In Journal of Verbal Learning and Verbal Behavior, 11, 750-758;
- Donaldson, M. and R.J. Wales. 1970. "On the Acquisition of Some Relational Terms. In Cognition and the Development of Language, edited by J.R. Hayes. New York: Wiley.
- Eilers, R.E., D.H. Oller, and J. Ellington. 1974. "The Acquisition of Word Meaning for Dimensional Adjectives: The Long and Short of It." In Journal of Child Language, 1, 195-204.
- Fillmore, C.J. 1975. "An Alternative to Checklist Theories of Meaning." In Proceedings of the First Annual Meeting of the Berkeley Linguistics Society, 123-131.
- Friedman, W.J. and P.B. Seely. 1976. "The Child's Acquisition of Spatial and Temporal Word Meanings." In Child Development, 47, 1103-1108.
- Harris, L. and E. Strommen, 1972. "The Role of Front-Back Features in Children's 'Front,' 'Back,' and 'Beside' Placements of Objects." Merrill-Palmer Quarterly, 18, 259-271.
- Hill, C.A. 1975a. "Variation in the Use of 'Front' and 'Back' by Bilingual Speakers." In Proceedings of the First Annual Meeting of the Berkeley Linguistics Society, 196-206.
- \_\_\_\_\_. 1975b. "Sex-based Differences in Cognitive Processing of Spatial Relations in Bilingual Students in Niger." In Working Papers in Linguistics: Patterns in Language, Culture, and Society, Ohio State University, 19, 185-198.
- \_\_\_\_\_, P. Donnell, E. Pearsons, and R. Aronowitz. 1978a. "Sociolinguistic Variation in the Linguistic Processing of Spatial and Temporal Orientation," in preparation.
- Hill, C.A. and R. Vivolo. 1978b. "Sociolinguistic Variation in the Linguistic Processing of Spatial Orientation in Haitian Creole," in preparation.

- Hill, C.A. 1978c. "Linguistic Processing of Spatial and Temporal Orientation: Participant-Based and Field-Based Strategies," in preparation.
- Kimball, J. 1974. "The Grammar of Facing." Bloomington, Ind.: Indiana University Linguistics Club.
- Talmy, L. 1975. "Figure and Ground in Complex Sentences." In Proceedings of the First Annual Meeting of the Berkeley Linguistics Society, 419-430.
- Traugott, E.C. 1975. "Spatial Expressions of Tense and Temporal Sequencing: A Contribution to the Study of Semantic Fields." In Semiotica, 15 (3), 207-230.
- \_\_\_\_\_. 1978. "On the Expression of Spatio-Temporal Relations in Language." In Universals of Human Language, edited by J.H. Greenberg, C.A. Ferguson, and E. Moravcsik. Stanford: Stanford University Press.