# Linguistic Frame of Reference Reconsidered.

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## 1 Introduction

This paper is concerned with spatial Frames of Reference as they are expressed in language. Frames of Reference (FoR) may be regarded as spatial coordinate systems. In effect they are strategies for locating a referent (or figure) in relation to a relatum (or ground), on the basis of a search domain projected off the relatum. In *the car is in front of/north of the church* the car is located in relation to the church, with *in front of* and *north of* representing alternative strategies for projecting a search domain off the church. *In front of* and *north of* therefore operate in different FoR.

Until the 1990s linguistic spatial reference was generally held to be fundamentally egocentric and anthropomorphic. Referents were understood to be located in relation to relata on the basis of a deictic viewpoint or on the basis of a human-like asymmetry assigned to the relatum and treated as intrinsic to it. The fundamental distinction was thus held to be between deictic and intrinsic. Research over the last decade has shown this assumption to be false. Instead, three FoR have been shown to operate: relative (not necessarily deictic), intrinsic, and absolute, the latter involving systems akin to cardinal directions. These FoR were explicitly defined using definitional primitives by Levinson (1996).

This paper will consider Levinson's typology of FoR and review the definition of absolute FoR on the basis of a consideration of the logical properties of that frame, reconsidering in particular the extent to which the coordinate system of absolute FoR can be thought of as arbitrary, fixed, and binary (involving only the referent and relatum). It will also canvass the possibility of a fourth, unoriented, FoR; and finally suggest a distinction between two types of spatial deixis on the basis of the role of the deictic participant in a given spatial relation.

## 2 What is FoR?

Talmy (1983:229) proposes that a language's spatial system "imposes a fixed form of structure on virtually every spatial scene". This is done as follows:

> *The spatial disposition of a focal object in a scene is largely characterized in terms of a single further object, also selected within the scene, whose location and sometimes also "geometric" properties are already known (or assumed known to an addressee) and so can function as a reference object. The first object's site, path, or orientation is thus indicated in terms of distance from or relation to the geometry of the second object.* (1983:230)

To capture this referential architecture Talmy (1983:232) adopts the terms 'figure' and 'ground' from Gestalt psychology. He employs 'figure' to refer to his "focal object", and 'ground' to refer to his "reference object". Using the same terms, Pederson et al (1998) define Frame of Reference as:

> *the internally consistent system of projecting regions of space onto a figure-ground relationship in order to enable specification of location.* (Pederson et al 1998:571)

Miller & Johnson-Laird (MJL) (1976), employing different terminology, say:

> *In these adjectival constructions* [such as "a boat in the harbour"] *the preposition can be seen as a relation taking an ordered pair of arguments: R (*x, y*), where the referent* x *is a target identified by the head noun phrase, the relatum* y *is a landmark identified by the object noun phrase, and R is a spatial relation. Psychologically, these constructions presuppose the existence of some landmark whose location is known, or easily discoverable, by both participants in the communication – something that can help narrow the domain of search for the target… Spatial locatives in adverbial constructions also narrow the search domain.* (MJL 1976:379)

Following MJL, Levelt (1989) says:

> [In order to indicate a place] *a speaker always needs…a* relatum *– an entity with respect to which the referent object can be localized… The speaker will, in addition, often need a* coordinate system*, which makes it possible to orient the referent object with respect to the relatum.* (Levelt 1989:48)

The terms 'referent' and 'relatum' are adopted here. 'Referent' (MJL's "target") equates to Talmy's and Pederson et al's 'figure' (Talmy's "focal object"); and 'relatum' (MJL's "landmark") equates to Talmy's and Pederson et al's 'ground' (Talmy's "reference object"). The term 'relation' is also used here to refer to the relationship between the referent and the relatum. (See Levinson 1992b, footnote 24.)

A FoR is a coordinate system used to identify locations or objects in locations (ie. referents). It operates on the basis of locating the referent by projecting a search domain off a further location or object (ie. relatum). In the established FoRs, referents are located in a search domain projected off the relatum in a particular direction. To enable a search domain to be projected off a relatum in a particular direction, an asymmetry is imposed on the array. There are, however, different strategies for projecting a search domain off a relatum that involve different bases for imposing an asymmetry on an array of objects and/or locations that includes the referent and the relatum. These different strategies represent different FoRs.

## 3 The three FoR

Levinson (1996) identifies and explicitly defines three FoRs: intrinsic, relative and absolute.

Intrinsic FoR (Levinson 1996:140-142) is a binary relation with two arguments: a figure (or referent), and a ground (or relatum). The figure is located in a search domain extending from the centre of the ground through a named facet of the ground. In *the car is in front of the house* the referent (the car) may be located within a search domain projected off the facet of the relatum (the house) identified as its front.

Relative FoR (Levinson 1996:142-145) is a ternary relation with three arguments: a figure (referent), a ground (relatum), and a viewpoint. The figure is located in a search domain extending from the ground in a direction determined by the location of the viewpoint. In *the red ball is in front of the blue ball* the referent (the red ball) may be located within a search domain is projected off the relatum (the blue ball) in a direction determined not by any characteristics of the relatum other than its location, but between by the spatial relationship between the relatum and the viewpoint.

Levinson (1996:145-147) defines absolute FoR as a binary relation with two arguments: a figure (referent) and a ground (relatum) in which the figure is located in a search domain extending from the ground in a direction determined by "arbitrary fixed bearings". (Levinson 1996:145) In *the car is south of the house* the referent (the car) may be located within a search domain projected off the relatum (the house) in a direction indicated by the arbitrary culturally agreed bearing 'south'. (See Levinson 1998:13 quoted below.)

The three FoR can be represented in the following way:

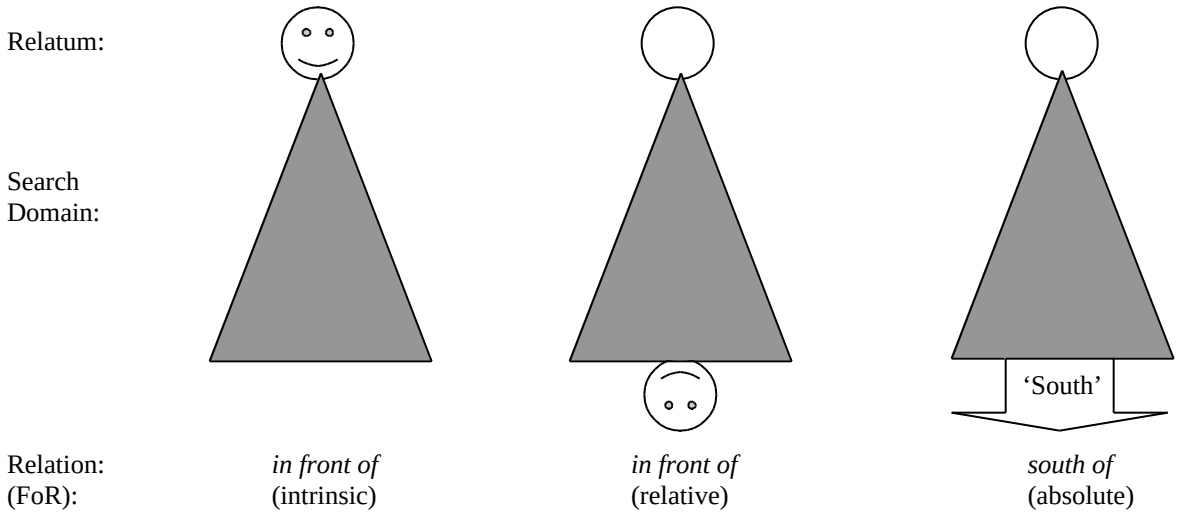


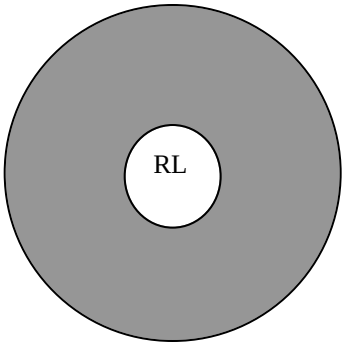

**Figure 1: Examples of projected search domains for relations in Levinson's three FoR**

To enable a search domain to be projected off a relatum in a particular direction, reference must be made to an asymmetry connected in some way with what I will term the referent/relatum dyad. The three FoR described above are in effect alternative strategies for assigning an asymmetry to an array to allow a search domain to be projected off a relatum. In

intrinsic FoR the asymmetry is assigned on the basis of some perceived feature of the relatum itself. In relative an asymmetry imposed on the referent/relatum dyad by a viewer's perspective. In absolute an asymmetry is also imposed on the referent/relatum dyad, this time on the basis of a set of coordinates independent of and external to both the referent/relatum dyad and any viewpoint.

## 4 An unoriented FoR?

Each FoR described above represents a strategy for projecting a search domain off a relatum in order to locate a referent. In the light of this, how are we to understand the logical process employed in locating referents in expressions such as *the red ball is with the blue ball*, in which the search domain is specified only as a region adjacent to the relatum? This relation can be represented as follows:




*with*

**Figure 2: The projected search domain for the relation *with***

FoR are coordinate systems for projecting a search domain off a relatum. *With* clearly projects a search domain off a relatum. If the term 'coordinate system' is understood to inherently involve a resulting oriented direction, then the relation diagrammed above does not operate within the scope of the spatial parameter of FoR. If so, FoR must be understood as a system of projecting an oriented search domain off a relatum on the basis of an assigned or imposed asymmetry.

Alternatively, if 'coordinate system' is understood to refer only to a system of locating a referent in relation to a relatum by projecting a search domain off it, without a definitional requirement for orientation, then the relation diagrammed for *with* operates within a FoR, as do relations expressed by terms such as *at*, *near* and so on. However, the unoriented nature of the search domain precludes any of the three FoRs defined above. This relation must therefore represent a fourth FoR we might call 'Unoriented Frame of Reference'.

No claim is made here as to which of these hypotheses is correct. However, I draw attention to the need to more precisely define FoR with respect to the notion of 'coordinate system', and the implications of that for unoriented relations such as *with*.

## 5 The logical properties of absolute FoR

Levinson regards directions indicated in absolute FoR as inherently arbitrary and fixed, saying that languages make use of an absolute FoR "by fixing arbitrary fixed bearings, "cardinal directions"…". (1996:145) He later restates this position:

> *An alternative solution* [to relative FoR] *is to fix the directions once and for all, like our North, South, East, and West. It matters not at all where the angles or directions are fixed, just so long as everyone in the community adopts the same solution… an absolute, arbitrary fixed direction is necessarily a social artifact… True, such systems may arise from abstractions out of seasonal movements of the sun around the solstices, or from prevailing wind directions, drainage of major rivers, or overall inclinations of terrain – but they are culturally fixed abstractions. A child must learn whatever the local, systems is and treat it as an arbitrary invariant for purposes of spatial reckoning.* (Levinson 1998:13. See also 2000:276)

Other members of the Nijmegen school appear to take a slightly less strong position on the arbitrary and fixed nature of absolute FoR, saying:

> [Absolute FoR] *uses information external to both the speech participants and to the figure-ground scene (whether this is from abstract fixed bearings like 'north' or from concrete features of the larger surrounding landscape such as 'inland side').* (Pederson et al 1998:572)

To what extent can absolute directions be regarded as arbitrary and fixed?

### 5.1 Arbitrariness

Looking first at the notion of arbitrariness, the literature is not entirely clear on exactly how the term is intended to be understood. Are absolute vectors themselves claimed to be arbitrary? Or is it the choice of which possible vectors to employ that is arbitrary?

A claim that the actual vectors are arbitrary seems difficult to sustain. Languages have absolute directional axes that correspond to the path of a river, coastline, direction of an overall fall of land, or path of the sun. No languages have directional axis that run at 45 degrees to these external phenomena. Instead, axes correspond to these, or cross them at roughly right angles. This is because these features in the external world are the orienting features for the axes. Orientation in respect to absolute directional axes is maintained by constant monitoring of environmental clues. As Levinson says, "we may presume that a heightened sense of intertial navigation is regularly cross-checked with many environmental clues." (1996:145.)

For example, absolute directions in Balinese are assigned differently from village to village depending on the direction of orienting features such as mountains. In Map 1, the arrows marked "1" show the direction indicated by the term *kaja* in various villages of north-east Bali. In cardinal terms the variation is dramatic, however in each instance *kaja* points to the

most prominent visible mountain. Moreover, speakers consciously associate *kaja* with the direction of the mountain. It would therefore seem implausible to claim that *kaja* is assigned a vector arbitrarily in each village.

Alternatively it may be that the term 'arbitrary' is intended to indicate, not that the actual vector is arbitrary, but that the choice of which vectors to use is arbitrary. Again this seems hard to sustain. Atoll based communities cannot decide to use an upriver-downriver system; communities high in mountainous regions cannot decide to use a landward-seaward system. Palmer's (2002) preliminary cross-linguistic survey of absolute systems suggests a correlation between the topographic environment of the language locus and systems of absolute spatial reference.

However, logically even if the choice of associated external phenomenon were arbitrary, it is still that choice that is arbitrary, not the actual directions within that system. The way directions participate in the operation of a FoR is dependent on axial direction, not axial choice. Let us say a hypothetical mountain community could conceivably use a fall of land OR the path of a river as the basis for their absolute system, and arbitrarily chose the river, speakers would still need to orient themselves on the basis of the non-arbitrary bearing of the river to wield a directional term such as 'downriver'. Arbitrariness is therefore not a logical property of the operation of the absolute FoR.

**Map 1: "The topographic adaptations of the Balinese spatial orientation system around the North-East peninsular." (From Wassman & Dasen 1998)**

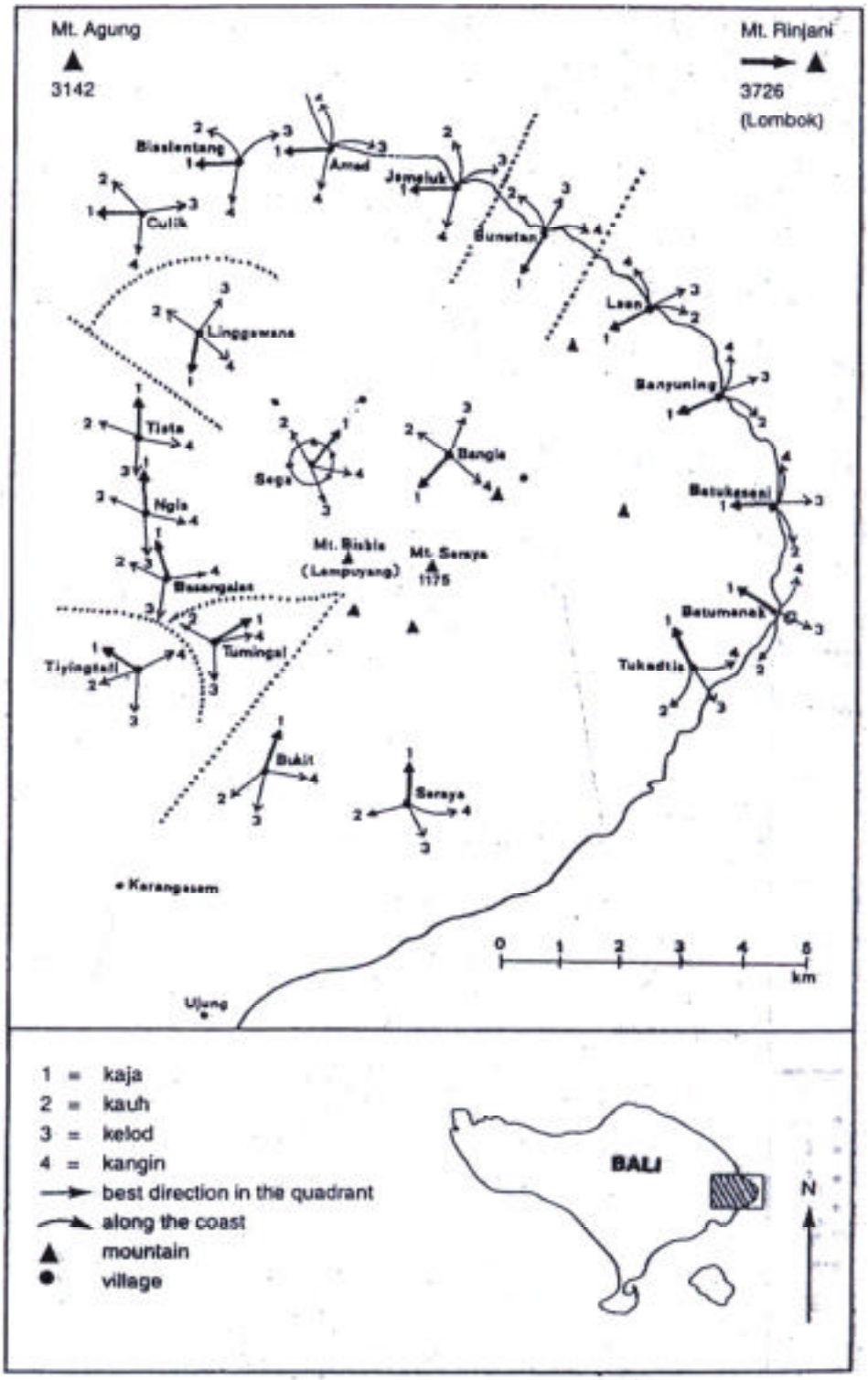


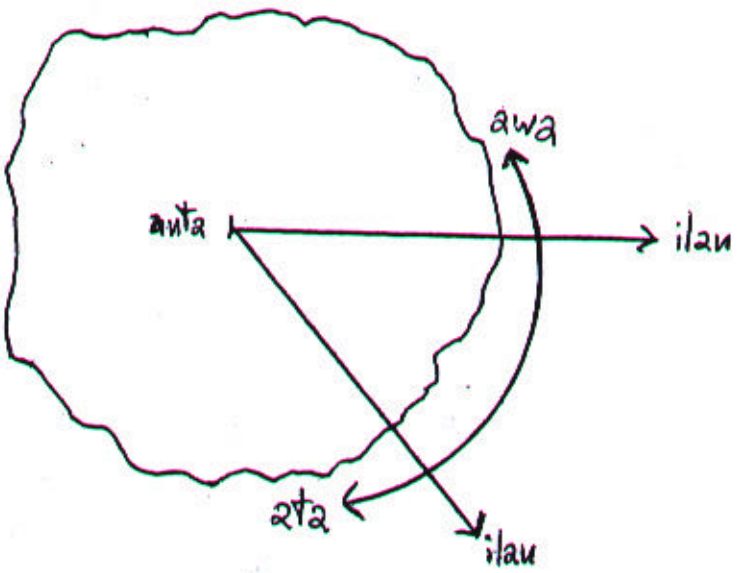

FIGURE 2. The topographical adaptations of the Balinese spatial orientation system around the North-East peninsula.

## 5.2 Fixedness

Grammaticalised directional terms in languages typically refer to fixed directions. This is not to say that the directions are fixed in the sense of Euclidean vectors. They are, however, typically fixed in the sense that they are invariant and constant directions within the system's conceptual framework.

Manam (Lichtenberk 1983) has a four-term absolute system with a pair of crossed axes. On a landward-seaward axis *ilau* indicates a direction from the centre of the island down towards the coast, across the coastline, and out to sea away from the island, while *auta* indicates the opposite direction. On a cross axis *awa* indicates a direction anticlockwise around the island, while *ata* indicates a clockwise direction. (See Map 2.)

**Map 2: The Manam spatial orientation system. (Modified from Lichtenberk 1983)**




If this system is thought of from the point of view of English cardinal points, the direction of, say, *ilau*, does not appear to be fixed: on one part of the island it points north, on another east and so on. However, within the conceptual framework of the Manam system, *ilau* always points consistently in the same direction: seaward. Within this conceptual framework it is

*north* which points in all directions: here it points *ilau*, there it points *awa* and so on. Grammaticalised systems of absolute reference typically make use of directions that are fixed within the systems conceptual framework. However, to what extent is fixedness a logical property of absolute FoR?

### 5.3 'Fixed' and 'arbitrary' as logical properties

In absolute FoR a search domain is projected off a relatum, not on the basis of an intrinsic asymmetry of the relatum, not on the basis of a viewpoint, but on the basis of a set of directional axes that is imposed on the referent/relatum dyad, or in which the referent/relatum dyad is placed.

Directional terms in languages could be argued to be at least conventionalised, but this is not a necessary feature of absolute FoR. Absolute relations can readily be constructed where the relation does not depend on a conventionalised direction:

(1) *Find a vantage point upwind from your prey.*

Example (1) involves absolute FoR. The referent (the vantage point) is to be located in a search domain projected off the relatum (the prey) towards the source of the wind. This bearing is not fixed as the wind direction may vary.[1] The hunter will need to get to the location before he can determine which direction is 'upwind'.

Moreover, completely ad hoc absolute relations can be constructed:

(2) *Tom was standing a few meters librarywards from the Dean on the College lawn.*

In (2) the referent (Tom) is to be located in a search domain projected off the relatum (the Dean) towards the location of the library. Although constructed as a one-off reference, this again operates within the absolute frame, and here there can be no question of 'librarywards' indicating a fixed direction.

If fixedness is not a logical property of absolute FoR, then also on that basis 'arbitrary' cannot be a logical property of absolute FoR. If a direction is not fixed, it cannot be arbitrary, since it must be possible to determine the direction on the basis of some evident external factor. Absolute FoR requires that the referent be located in relation to the relatum on the basis of a search domain projected off the relatum in a direction based on a direction external to the array itself, other than the viewpoint. This does not logically require that direction to be fixed, merely identifiable.

### 5.4 How absolute FoR works

In each of the three established FoRs, a search domain is projected off a relatum in a specific direction. For this to work an asymmetry is required, and so intrinsic, relative, and absolute

[1] Some languages employ fixed directions associated with constant prevailing winds such as seasonal monsoons. In English examples such as (1) no such fixed bearing can be assumed.

FoR all involve an assigned asymmetry. With intrinsic FoR a search domain is projected off the relatum on the basis of an asymmetry assigned to the relatum. With relative FoR a search domain is projected off the relatum on the basis of an asymmetry imposed on the referent/relatum dyad by a third participant, a viewpoint. With absolute FoR a search domain is projected off the relatum on the basis of a perceived asymmetry in the wider world in which the array is located. In this sense absolute FoR resembles intrinsic in that it also involves an inherent asymmetry. This asymmetry, however, is not perceived within the array. It is perceived in the wider world in which the array is located.

The 'wider world' upon which absolute FoR operates can vary in size from the entire globe (as with NSEW), to an island and adjacent areas of ocean (as with landward-seaward systems), to the immediate context of an array.

Consider shipboard directional terms like 'starboard' and 'astern'. The domain of a ship has partonyms that do not invoke a FoR:

(3) *They threw the drums off the starboard side.*
*They threw the drums off the stern.*

However, when the ship is the relatum, related terms indicate intrinsic relations:

(4) *The tug waited starboard of the freighter.*
*The tug waited astern of the freighter.*

When neither the referent nor the relatum are the ship, but instead are objects located on the ship, the same terms are employed to express absolute relations:

(5) *The drums were stacked starboard of the hold.*
*The bridge is astern of the hold.*

These examples operate in the absolute FoR. In the first example the referent (the drums) may be located in a search domain projected off the relatum (the hold) in the named direction 'starboard', a direction external to the referent/relatum dyad. In the second the referent (the bridge) is located in a search domain projected off the relatum (the hold) in the named direction 'astern', again a direction external to the referent/relatum dyad.

The overlap between relative and intrinsic terms in languages has been discussed widely (see, for example, MJL 1976:394-405). It is important to note that such overlaps also exist between absolute and intrinsic FoR.

### 5.5 Absolute as a ternary relation

Intrinsic FoR is regarded as a binary relation because the search domain is projected off the relatum on the basis of an asymmetry within the referent/relatum dyad. Only the referent and relatum are required, and no further participant is needed to allow the system to operate. Relative FoR is regarded as ternary because a search domain cannot be projected off the

relatum on the basis of the referent/relatum dyad alone. A third participant is needed to allow the asymmetry necessary to project a search domain in a specific direction.

In this respect absolute resembles relative, not intrinsic. A search domain cannot be projected off a relatum in absolute FoR on the basis of the referent/relatum dyad alone. Instead, an outside basis must be employed: an asymmetry perceived to be characteristic of the world in which the array is located. It is not the location of the viewpoint that provides that outside basis with absolute - it is the location of the stern of the ship, or the mountains, or sunrise. Absolute FoR can therefore be argued to be ternary, not binary. It could be argued that the third participant is the stern, the mountain, or the location of sunrise. Alternatively, it could be argued that the third participant is the ship, the region between the mountain and the sea, or the path of the sun. Either way, the relation operates on the basis of a participant outside the referent/relatum dyad.

## 6 Deixis and FoR

The parameter of deixis is an entirely separate and independent parameter to that of FoR. Deixis may occur in any of Levinson's three FoR:

(6) *The desk is in front of me.* (intrinsic)
*The red ball is to the left of the blue ball.* (relative)
*The town hall is north of me.* (absolute)

But it need not be present:

(7) *The desk is in front of John.* (intrinsic)
*Tom put the red ball to the left of the blue ball.* (relative)
*The town hall is north of the church.* (absolute)

In expressions like *the desk is in front of me* and *the town hall is north of me* the relations *in front of* or *north of* are not deictic. It is the identity of the relatum that is deictic. The referent is located on the basis of a search domain projected off a relatum that happens to be deictic.

In relative FoR a very different kind of spatial deixis is possible. In *the red ball is to the left of the blue ball* neither member of the referent/relatum dyad is deictic. Instead it is the viewpoint that is deictic. The effect of this is that while neither member of the referent/relatum dyad is deictic, the relationship between them is.

I therefore propose two distinct forms of spatial deixis: 'relatum deixis' and 'relation deixis'. Relatum deixis refers to spatial deixis in which the relatum is deictic. Relation deixis refers to spatial deixis where the relationship between the referent and the relatum is deictic by virtue of a deictic viewpoint.

## 6 Conclusion

This paper has made three points.

First, the nature of relations such as *with*, *at*, and *near* require us to define more precisely what is meant by FoR. Further, if FoR is defined as a strategy for locating a referent in relation to a relatum by projecting a search domain off the relatum, without any definitional requirement for an oriented search domain, then notions such as *with* involve a fourth FoR we can call 'unoriented FoR'.

Second, the properties of arbitrariness and fixedness are not logical properties of absolute FoR, and the way asymmetry is assigned to arrays in the absolute FoR mean that absolute relations depend on a further participant outside the referent/relatum dyad, absolute therefore involving ternary relations, not binary.

Finally, deixis is a separate and independent parameter to that of FoR, in which distinct possible roles of the deictic participant mean that two distinct forms of spatial deixis exist: relatum deixis and relation deixis.

## References

Levelt, W.J.M., 1989, *Speaking. From intention to articulation.* Cambridge MA: MIT Press.

Levinson, Stephen C., 1992, Primer for the field investigation of spatial description and conception. *Pragmatics* 25:1.5-47.

---- 1996, 'Frames of reference and Molyneux's Question: crosslinguistic evidence.' In P. Bloom, M.A. Peterson, L. Nadel & M.F. Garrett (eds), *Language and Space.*

---- 1998, 'Studying spatial conceptualisation across cultures: anthropology and cognitive science.' *Ethos. Journal of the Society for Psychological Anthropology* 26/1:7-24.

---- 2000, 'Language as nature and language as art.' In J. Mittelstrass & W. Singer, eds, *Changing concepts of nature at the turn of the Millennium.* Vatican City: Pontificiae Academiae Scientiarvm.

Lichtenberk, Frantisek, 1983, *Manam grammar.* Honolulu: University of Hawai'i Press.

Miller, George A., & Philip N. Johnson-Laird, 1976, *Language and perception.* Cambridge MA: Harvard University Press.

Palmer, Bill, 2002, 'Absolute spatial reference and the grammaticalisation of perceptually salient phenomena.' In Giovanni Bennardo, ed, *Representing space in Oceania: culture in language and mind.* Canberra: Pacific Linguistics.

Pederson, Eric, Eve Danziger, David Wilkins, Stephen C. Levinson, Sotaro Kita & Gunter Senft, 1998, 'Semantic typology and spatial conceptualization.' *Language* 74/3:557-589.

Talmy, Leonard, 1983, 'How languages structure space.' In Herbert Pick & Linda Acredolo, eds, *Spatial orientation: theory, research and application.* New York: Plenum Press.

Wassman, Jürg, & Pierre R. Dasen, 1998, 'Balinese spatial orientation: some empirical evidence of moderate linguistic relativity.' *Journal of the Royal Anthropological Institute* 4:689-711.