7 *Mental images of the familiar: cultural strategies of spatial representations in Tonga*

GIOVANNI BENNARDO

1 Introduction[1]

Drawing a map of a familiar environment is revealing about habitual patterns of mental representations of spatial relations (Downs & Stea 1977; Tversky 1981 and 1993; van Sommers 1984; Gould & White 1986; Monmonier 1991; Taylor & Tversky 1992; Wood 1992). Characteristics of the drawing process and of the final map are equally relevant as windows into the drawer's mind. During my stay in the Kingdom of Tonga, South Pacific, I asked 16 informants from the village of Houma to draw a map of their island named Vava'u.[2] Most of the informants (14/16 or 87.5 per cent) started their drawings from Neiafu, the major town of the island, and then drew villages and other geographical features in relation to it. When drawn, the border of the island—its coastline—was added last. This is a typical example:

[1] A first version of this paper was read at the 96th American Anthropological Association Meetings, Washington, DC, November 19–23, 1997. For an extensive treatment of the drawing activity see Bennardo, in press.

[2] Notice that Vava'u is the name of the northern Tongan Archipelago (there are three archipelagoes in Tonga) as well as the name of its major island.

Giovanni Bennardo, ed., Representing space in Oceania: culture in language and mind, 159–177.
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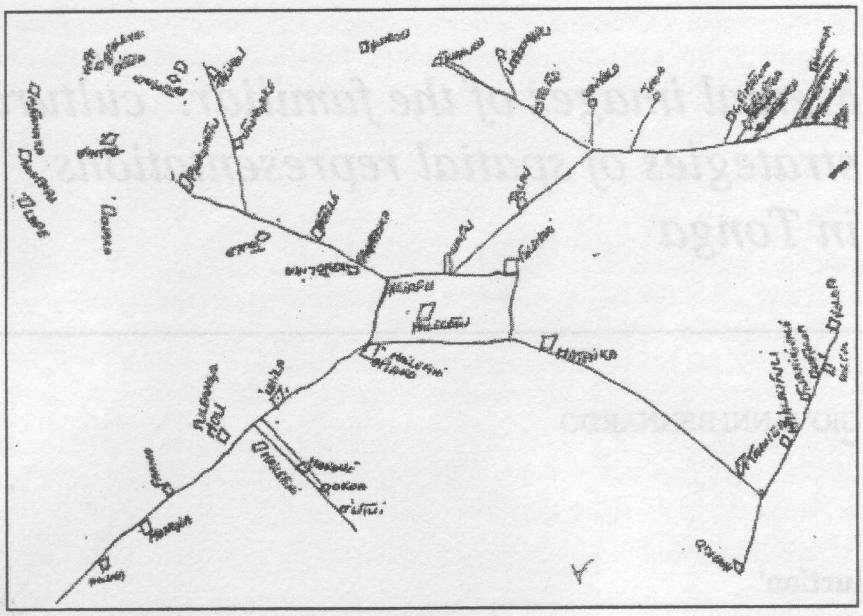

Figure 1: Drawing of the island of Vava'u by Salote

In most of the maps (10/16 or 62.5 per cent), the town of Neiafu was drawn in the middle (inland) of the island. In real geographical terms the town of Neiafu is on the southern coast (see Figure 8 below). A good example of this type of distortion is provided below in Figure 2:

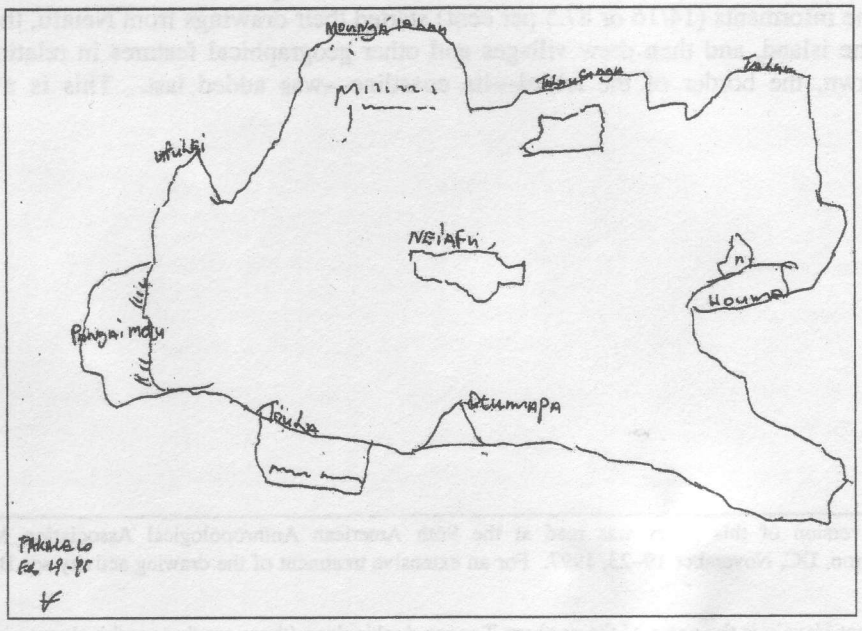

Figure 2: Drawing of the island of Vava'u by Fakalelo

The results of the analysis of the drawing process and of the maps produced allowed me to formulate the following hypothesis:

Tongans privilege a 'radial' representation of spatial relationships, that is, first, a fixed point of reference or a centre is chosen, then, objects are represented centripetally or centrifugally from it. In other words, they privilege a 'radial' subtype of the absolute frame of reference.[3]

In support of this hypothesis I will discuss three different types of data: linguistic, psychological, and ethnographic. Before I start with the presentation of the data, however, let me clarify briefly what is meant by a frame of reference (FOR), an absolute FOR, and what the major subtypes of an absolute FOR are.

The linguistic and psychological literature as well as the terminology about FORs was thoroughly reviewed by Levinson (1996) (but see also Levelt 1982, 1984; Carlson-Radvansky & Irwin 1993). He proposes a typology of FOR whose terminology I use, but whose content I have modified (Bennardo 1996). What is a FOR, then? A FOR is a set of coordinates used to locate objects (any entity) in space. Three types are defined: relative, intrinsic, and absolute.

A relative FOR is a system of coordinates centred on the speaker/viewer/cogniser. From the speaker 3 axes (or 6 vectors) are constructed, one vertically and two on the horizontal plane (front-back and left-right). Any object (concrete or abstract) in the space defined by these coordinates will be described in relation to the speaker.

An intrinsic FOR is a system of coordinates centred on an object other than the speaker. If the object moves in any direction, the axes will move accordingly keeping their origin on the object and the assigned orientation as well. A good example is the front of a car whose location can be determined without any reference to the speaker.

An absolute FOR is a system of coordinates neither centred on the speaker nor on an object. First, the vertical axis is constructed and kept exactly the same as for the other two FORs. Second, on the horizontal plane one or more objects (areas, points, landmarks) in the environment (or field) of the speaker are chosen as fixed orienting points (socially agreed on). Third, either the speaker or any object in its field is put into relationship with these 'chosen' objects or fixed points. Typical examples of absolute FORs are the four cardinal points system and the Oceanic one-axis system (land–sea).

I consider the strategy used by the informants to construct the map of the island of Vava'u a use of a 'radial' subtype of the absolute FOR. As in the other subtypes of the absolute FOR, a fixed point of reference (but only one this time) is chosen in the environment/field of the speaker, and later, objects (any entity) are located in relationship to this point. Specifically for the 'radial' subtype, relationships to the fixed point are centripetal or centrifugal in nature.

Supporting evidence for the mental habitus detected by the drawing activity can be found in a variety of aspects of the Tongan milieu. I will first look into a specific aspect of Tongan language, that is, how the concept of Direction is realised linguistically in Tongan. Since Direction is a necessary part of the concept of Movement, the conceptual contents of the linguistic expressions of Direction can provide a valuable entry into habitual mental representations of space.

I will later present the results of a series of psychological tests. These tests were administered because they can provide evidence about the preference of a FOR for storing spatial relationships in long-term memory. Finally, I will discuss some ethnographic data about patterns of exchange. The ethnographic data is relevant because mental preferences for representing spatial relationships can find their realisations in a variety of behaviour.

[3] For an extensive treatment of a typology of FORs that includes a 'radial' subtype of the absolute frame of reference see Bennardo (forthcoming).

Linguistic behaviour is certainly an important one. We talk about spatial relationships in the same way we represent them mentally. However, we also move and organise the movement of people and objects in our environment according to the way in which we preferentially represent spatial relationships mentally. Looking at the way in which patterns of exchanges are typically realised in Tongan village life, then, can provide further evidence for any privileged way of representing spatial relationships mentally.

2 Support from language: Tongan directionals[4]

In Tongan there are five lexemes that are associated with the concept of Direction, which I call 'directionals' (Bennardo 1996). These five Tongan directionals can actually be divided into two subsets containing two and three members each. The first subset is made up of two lexemes associated with the vertical axis: *hake* 'up' and *hifo* 'down'. The second subset is made up of three lexemes that are not necessarily associated with any axes, either vertical or horizontal: *mai* 'towards centre', *atu* 'away from centre' and *ange* 'away from centre constituted by speaker and addressee'. In Churchward's (1953) *Tongan Grammar*, these five lexical items are grammatically defined as adverbs. They follow the verb directly and can be followed by a prepositional phrase.

The three members of the second subset of Tongan directionals, namely, *mai*, *atu*, and *ange*, have been defined in various ways by Churchward (1953:193), by Tchekhoff (1990:105), and by Broschart (1996:446). Churchward's definitions are the following:

(a) *Mai*: hither, to or towards me or us, or to or towards the place or the time in which we or our thoughts are.

(b) *Atu*: hence: onward or away from the place or the time in which we or our thoughts are; to or towards you, to or towards the place in which you or your thoughts are; thither, to the place aimed at or journeyed towards.

(c) *Ange*: neither towards me nor towards you, but in some other direction; to or towards him or her or it or them; along, past; to or towards the place where I was or shall be or usually am (but am not at the present moment); to a greater degree ... (Churchward 1953:193).

These definitions are trying to capture not only the basic meanings of the three directionals, but also most of their uses. Tchekhoff's defines these same directionals in the following way:

> Basically, the three are directional adverbs and indicate a movement: *mai* towards the centre; *atu* away from it; and *ange* to and from a place that is not the centre of interest, leaving the centre uninvolved. Thus it may apply to a place where the speaker has been, or will be, but where he is not at the time of speaking. (Tchekhoff 1990:105)

Broschart's definitions are:

> Most commonly, mai is glossed as 'towards the speaker,' atu as 'away from the speaker/towards the hearer,' and ange as 'across to somebody other than speaker or hearer'. (Broschart 1996:446)

The goal of both Tchekhoff's and Broschart's work is to demonstrate how social factors heavily participate in the construction of certain uses of the three directionals. What must be pointed out, however, is that the meanings from which they start are not as rich as the

[4] A similar but more extensive analysis of this issue appeared in Bennardo (1999).

meanings suggested by Churchward, and this is more so for Broschart than for Tchekhoff. Tchekhoff left out from the meaning of *atu* the 'towards the hearer' part, while Broschart left out much of their meanings except for the basic deictic ones.

Both authors later deal with many of the uses of these directionals and show how social and cultural factors contribute to these uses. I subscribe to some of their conclusions, but am compelled to suggest that if we start from a limited meaning of these directionals, our findings may be derived from inappropriate premises. I propose then to find a richer conceptual interpretation of these directionals that will provide a better base for socio-cultural investigations of their uses. In other words, I will use the extensions of these directionals to arrive at their intensions, so that possibly a better interpretation of those extensions may be suggested later.

In the first group of examples below, I provide sentences containing the three directionals with the deictic meaning (toward speaker, to addressee, away from speaker and addressee) indicated by Broschart (1996:446). These meanings are the most commonly used in the literature (see also Shumway 1988), and also, significantly, are the most frequently suggested by my informants.

(1) a. *ka 'oku hanga mai ki mui*
but PRES[5] face to-me to back
'but it faces me to the back'

b. *'Osi tala atu 'oku 'i ai ('a) e fu'u 'akau.*
PERF tell to-you PRES at there (pr.ø) the full.clas tree
'(I) just told you there is a tree.'

c. *'Oku ou hanga ange ki ai.*
PRES I face to-it to it
'I face it.'

It is common, however, to find sentences containing either *mai* or *atu* in which their meanings differ from the deictic ones just illustrated in example (1). Let us look first at *mai*.

(2) *tali mai 'e he tuná*
answer to-him pr.subj the eel
'the eel answered him'

Sentence (2) is from the text of a very old Tongan myth that was narrated to me by an informant. She has just reported that the main character of the myth has asked the eel a question, and she goes on with the sentence indicated in (2). It is easy to see that the meaning of 'towards the speaker' is not intended. In fact, *mai* is used with the meaning of 'towards main focus of our attention at this moment', a meaning that was included in Churchward's definition.

I subscribe here to Tchekhoff's definition of *mai* as 'towards centre'. In fact, her suggestion raises the level of abstraction of the definition, thus allowing one to include in the concept of 'centre' both 'speaker' and 'main focus of attention' as two possible realisations.

As regards *atu*, I would like to introduce a sentence that occurs very commonly in everyday conversations:

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[5] List of abbreviations used in text:
FOR – frame of reference, PRES – present, PERF – perfect, clas – classifier, pr – preposition introducing subject or object, pr.subj – preposition introducing subject

(3) *Hū* *atu.*
enter to-you?
'Enter.'

In order for the sentence in (3) to be produced, the speaker and the addressee must both be outside the place that will be entered. Moreover, the speaker can be facing one of the addressee's sides (either left or right) while the addressee may be facing the entrance of the place. Thus, the centre from which movement is initiated cannot possibly coincide with the speaker and it must refer to the addressee.

The directional, *atu*, then, cannot be glossed only as 'toward addressee'. This is why I gloss it (in agreement with Tcheckoff and Churchward) as 'away from centre'. The centre will be canonically the speaker, thus allowing as a possible constrained instantiation the meaning of 'toward addressee'. However, it can also be any other place, thus allowing as another possible constrained instantiation the meaning of 'away from addressee'.

Relevant support for the meanings assigned to *mai* and *atu* also comes from language externally, that is, from languages spoken in Melanesia, the geographical area considered to be the motherland for Polynesian languages and cultures. Specifically, from research conducted on Boumaa spoken in Fiji (Dixon 1988), on Longgu spoken in the Solomon Islands (Hill 1997), and on many languages spoken in New Caledonia (Ozanne-Riverre 1997), it can be suggested that the Melanesian system for directionals is basically a centripetal–centrifugal one. This system clearly appears to be at work when we consider the meaning of *mai* as 'toward centre' and the meaning of *atu* as 'away from centre' in Tongan. Figure 3 is a graphic representation of the two meanings.

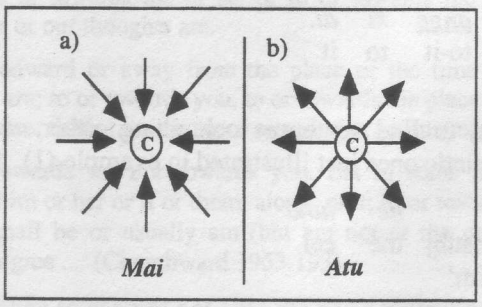

Figure 3: The meaning of *mai* and *atu*

In Figure 3a the meaning of *mai* is graphically represented as centripetal or 'towards the centre' (notice that the arrows do not reach the centre). In the same figure the meaning of *atu* is represented as centrifugal or 'away from the centre' (notice that the arrows start from the centre). In both Figures 3a and 3b the letter 'C' stands for 'centre'.

The Tongan directional system goes beyond this 'basic' Melanesian system and introduces a new lexical item. This new lexical item is the third directional, *ange*.[6] The meaning of *ange* has to be considered a subcase of the meaning of *atu*. In fact, it has been typically glossed as 'away from speaker and addressee'. In other words, its meaning is 'away from centre' as for *atu*, but the centre considered is a very specific one, that is, constituted by the speaker and the addressee.

[6] Ken Cook (pers. comm.) pointed out to me that Hawaiian does not have a cognate of *ange*, but that Samoan does (*ane*). So it is possible that some Eastern Polynesian languages may have lost it. This, however, does not deny the possibility of a Tongan innovation over Melanesian languages.

These three Tongan directionals may be graphically represented in this way:

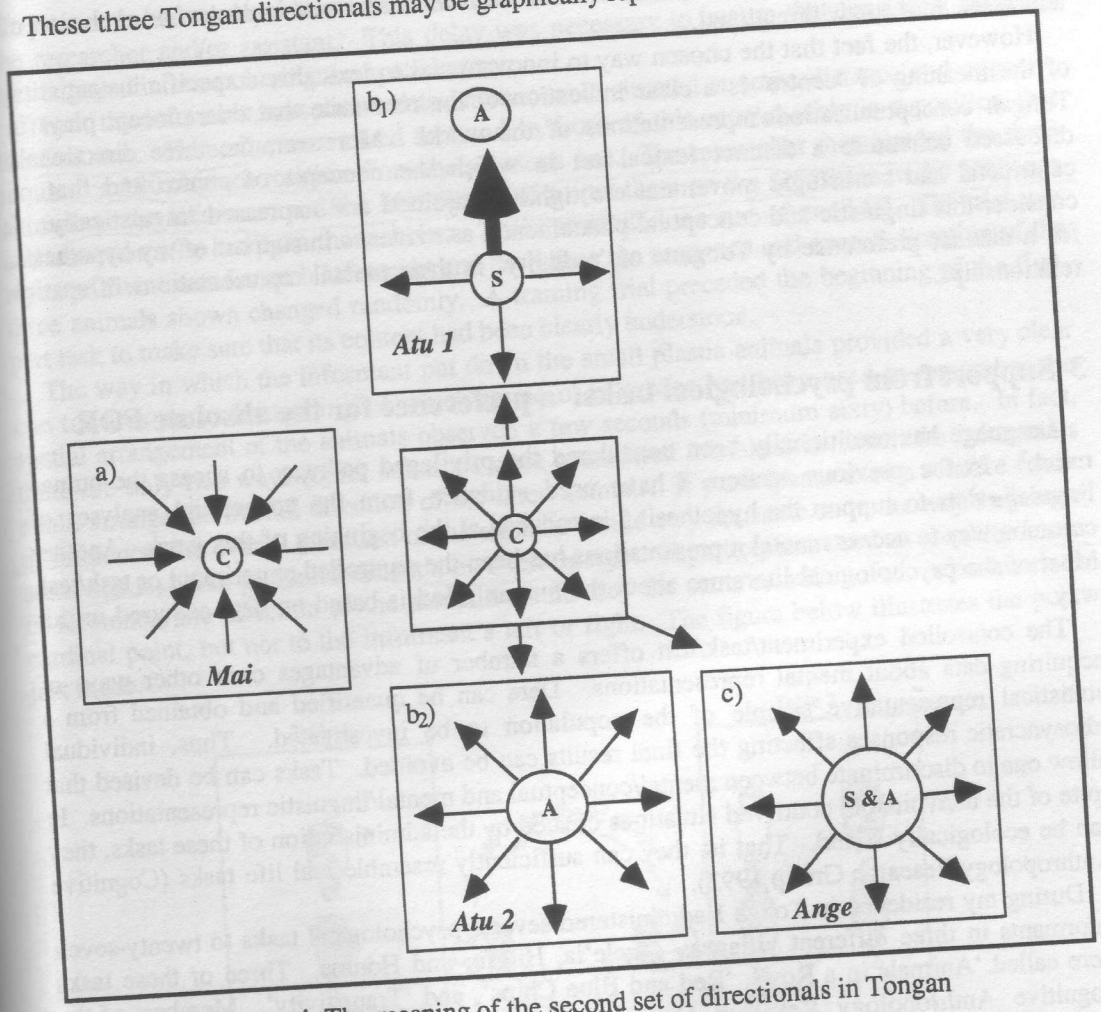

Figure 4: The meaning of the second set of directionals in Tongan

The conceptual content of the linguistic innovation evident in this set of directionals is present in other parts of the Tongan language. In fact, Tongan has a system of demonstratives based on a triadic distinction: *eni* 'this', for object/s close to speaker; *ena* 'that', for object/s close to addressee; and *é* 'that', for object/s close to neither of the above. Melanesian languages also show a similar triadic system for demonstratives (see Pawley 1974; Hill 1997; and Ozanne-Riverre 1997).

Furthermore, if we look at the system of personal pronouns, we can see that the inclusive- or exclusive-of-addressee parameter is a very productive one in Tongan. There are in Tongan singular personal pronouns, dual ones and plural or more-than-two ones. Both the dual and the plural (more-than-two) for the first person have distinct forms for the inclusion or exclusion of the addressee (see Churchward 1953).

The conceptual apparatus is in place both in Melanesian languages and Tongan, but the linguistic instantiation of this conceptual content in directionals occurs only in Tongan. Then, this instance of innovation in Tongan is exclusively about instantiating some pre-existing

conceptual material, such as closeness or distance from centre and inclusion or exclusion of addressee, into a new directional.

However, the fact that the chosen way to innovate was to lexicalise a specific instantiation of the meaning of 'centre' is a clear indication of the relevance that this concept plays in Tongan conceptualisations/representations of the world. Moreover, the three directionals discussed constitute a distinct lexical set in which the concepts of centre and that of centripetal and centrifugal movement are tightly conjoined and expressed linguistically. I consider this linguistic and conceptual phenomenon as evidence in support of my hypothesis for a distinct preference by Tongans of 'radiality' in their mental representations of spatial relationships.

3 Support from psychological tasks: a preference for the absolute FOR

Language has traditionally been considered the privileged pathway to access the human mind.[7] In the previous section, I have used evidence from the conceptual analyses of linguistic data to support the hypothesis I introduced at the beginning of this work. Another common way to access mental representations has been the controlled experiment or task/test. Most of the psychological literature about the human mind is based on data acquired in this way.

The controlled experiment/task/test offers a number of advantages over other ways of acquiring data about mental representations. Data can be quantified and obtained from a statistical representative sample of the population to be investigated. Thus, individual idiosyncratic responses affecting the final results can be avoided. Tasks can be devised that allow one to discriminate between mental/conceptual and mental/linguistic representations. In spite of the unavoidable contrived situations created by the administration of these tasks, they can be ecologically sound. That is, they can sufficiently resemble real life tasks (Cognitive Anthropology Research Group 1992).

During my residence in Tonga I administered several psychological tasks to twenty-seven informants in three different villages: Ngele'ia, Hihifo, and Houma. Three of these tasks were called 'Animals in a Row', 'Red and Blue Chips', and 'Transitivity'. Members of the Cognitive Anthropology Research Group at the Max-Planck Institute, Nijmegen, The Netherlands prepared them.[8] The goal of these tasks was to collect data about possible preferences of use (or habituation) of a specific FOR within a long-term memory activity that required no explicit use of language. Since the structure of the three tasks is very similar, I describe below only the task called 'Animals in a Row'.

An informant who was administered the 'Animals in a Row' task was required to stand in front of a table (in some cases, a box, a trunk, or an elevated surface). On the table s/he was shown a set of three small plastic farm animals—a cow, a pig, and a horse. The objects were shown standing in a row, all facing the same direction, either to the right or the left on the transverse axis in front of the informant. The informant was then asked (in Tongan) to memorise the position of the animals. When the informant declared him/herself ready to go to the next step (typically, after a few seconds) the animals were taken away and a minimum of

[7] See Dougherty (1985) for an historical treatment of this point.

[8] For a full description of the tasks see Cognitive Anthropology Research Group (CARG) (1992), and Bennardo (1996).

sixty seconds had to elapse in which some conversation took place between the informant and the researcher and/or assistant. This delay was necessary to ensure that long-term memory was engaged in remembering the spatial array.

Then, the informant was directed to another table situated at some distance and opposite the first one. Here s/he was asked to stand in front of this second table in a position that required a 180 degrees rotation from the previous one. The researcher then handed the three animals to the informant and the informant had to put them on the new table in the sequence and direction s/he had seen them earlier. This constituted the end of one trial. The trial was repeated five times for each informant and each time the sequence and overall direction of the three animals shown changed randomly. A training trial preceded the beginning of the five-part task to make sure that its content had been clearly understood.

The way in which the informant put down the small plastic animals provided a very clear cue towards an understanding of which frame of reference had been used to remember the spatial arrangement of the animals observed a few seconds (minimum sixty) before. In fact, there are only two ways (other solutions were considered mistakes) in which the informants could arrange the overall direction of the three animals. If participants used a relative frame of reference, the overall direction of the animals would stay the same as in the way they were seen, that is, either to the informant's own left or right. If participants used an absolute frame of reference, the direction of the animals would stay the same relative to some landmark or cardinal point, but not to the informant's left or right. The figure below illustrates the point just made.

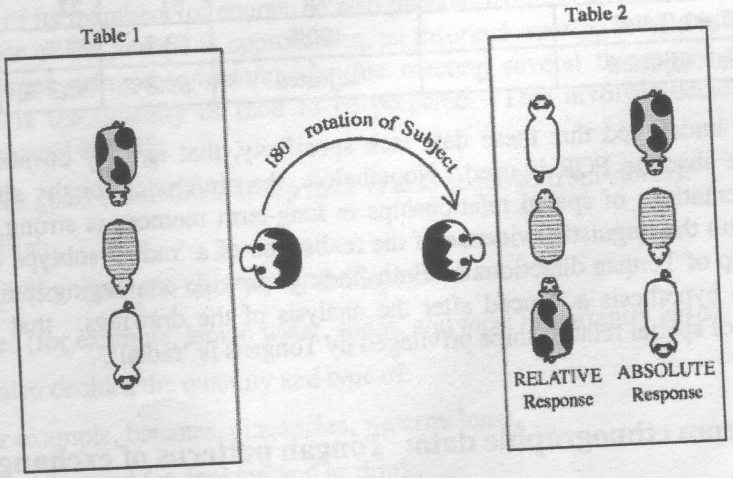

Figure 5: Possible responses for 'animals in a row' task (from Levinson 1996:113)

The content of Figure 5 shows how the choice of one of the frames of reference, relative or absolute, for coding in memory eventually determines the responses given by the informant.

Beyond understanding instructions in the native language, there was no other role assigned to language in performing this task. The stimulus involved only visual perception and the response only motor activity. Of course, between the exposure to the stimulus situation and the response some coding of spatial relationships by means of a frame of reference in non-perceptual memory was involved. The nature of this coding—as distinct from a linguistic encoding—was exactly the target of this task.

The results obtained by these psychological tasks point toward a specific preference by Tongans in mentally representing spatial relationships. The responses showing a preference by the informants for the absolute FOR are from 2 to 3½ times larger than those showing a preference for the relative FOR. When considering the total of the responses for all three tasks, the preference for the absolute FOR is on average 2½ times larger than the preference for the relative FOR. I consider these results as a clear indication of a Tongan preference to represent spatial relationships by means of an absolute FOR.

The results for the 'Animals in a Row' task and for all the three tasks combined are shown in Table 1 below:

Table 1: Results for the 'animals in a row' task

TASK	SITE	# OF INFORMs	ABS	REL	???
Animals in a Row	Ngele'ia	9	6	3	
	Hihifo	8	7	1	
	Houma	10	8	2	
Sub-Total		27	**21**	**6**	
		100%	**78%**	**22%**	
3-Task Informants		81	**51**	**22**	**8**
3-Task Total		100%	**63%**	**27%**	**10%**
Total Adjusted		adjusted	**69.8%**	**30.2%**	

It must be underlined that these data lack specificity, that is, they do not tell us which subtype of the absolute FOR is used. Nonetheless, the preference for the absolute FOR in mental representations of spatial relationships in long-term memory is strong. Moreover, it blends well with the linguistic evidence of the realisation of a 'radial' subtype of the absolute FOR in a group of Tongan directionals. Both findings provide converging indications for the validity of the hypothesis advanced after the analysis of the drawings: that is, the mental representation of spatial relationships privileged by Tongans is 'radial'.

4 Support from ethnographic data: Tongan patterns of exchange

If preference is given to the 'radial' subtype of the absolute FOR, we should also be able to detect this phenomenon in behaviour that requires the

Finally, the meeting closes over the assignment of specific tasks to each individual or group of individuals. However, most of these tasks are so intertwined with traditional daily gendered tasks that they almost go unmentioned if not for any special, specific one that may occur out of unforeseen circumstances. Consequently, men will typically, among other things, harvest root crop and slaughter animals as well as prepare the underground oven and gather a sufficient amount of coconuts and fruit. Women will typically, among other things, collect shellfish from the close-by reef and prepare the non-meat food to be put in the underground oven, bake pies, and clean and decorate the house and the area around it. Children and young people will also take part in the preparation, but their tasks may vary according to need.

By the following Saturday evening, all the food to be cooked is already gathered within the premises of the household involved. The whole day is marked by young boys chasing and seizing free-ranging animals such as pigs or fowls, or the arrival of men from their garden with a variety of crops and/or fruit, and the feverish cleaning activity of the house and its surroundings. Finally, the day closes with the usual *kava* drinking by the men in the hall next to the church.

Very early on Sunday morning, between 3 and 4 o'clock, noise of people getting up and starting a variety of activities is perceptible in the household still embraced by a thick, humid dark blanket. The first light of dawn sees an underground oven already full of burning wood filling the air with its pungent smell. The bell which calls people for the 5 o'clock early morning service has no job to do since everybody is already up by this time, fulfilling their tasks. Everything will be ready by approximately 12 o'clock when, after the end of a slightly longer 10 o'clock second morning service, the *'ulumotu'a* 'head of family' comes back home with his guests.

In fact, not only the person giving the sermon is invited for lunch, but also the *'eiki* 'chief', the *ofisa kolo* 'town officer', the *faifekau* 'minister', and any other person, man or woman, who has accepted the repeated invitation made to people at the end of the service in front of the church. Usually, however, almost everybody declines the invitation, with the exception of a few persons who may be part of another long-term exchange not specifically related to the present event.

Meanwhile the food has been laid out on the best mats in the main room of the house. When everybody arrives in the room they sit on the floor crossed-legged and their location is determined in a fashion similar to the *fono* 'village meeting' and formal *kava* ceremony (see Gifford 1929; Bott 1972; Ferdon 1987). This time, however, th[illegible]

follows immediately after the partitioning and before people leave to go back to their houses. If no person is present from a specific *fāmili*, usually a youngster is sent with a portion of food to the house of that specific *fāmili*. This distribution of food closes the event and all the people who have contributed to it hurry home to a deserved rest. After all, it is Sunday, and no working activity is legally permitted on Sundays in Tonga, not even car driving![10]

A successful realisation of a *fakaafe* requires the organisation and smooth movement of a variety of people and objects—especially food—between a number of locations. These movements follow specific patterns that are represented mentally. The nature and form of

In part (a) of Figure 6 two moments before the actual *fakaafe* are shown together: the establishing of a 'centre' and the pooling of resources from the *fāmili* and the *kāinga*. Part (b) of the same figure shows the section of the event in which resources gathered in the 'centre'—food—are offered to a fixed point of reference, that is, the visiting minister. The visiting minister is a 'constituted centre' or focus of the congregation in the Sunday service. He has given to the assembled people the gift of his sermon. We may, then, also consider the offering of the food to him as a centripetal movement towards a 'centre', embodied in this case by the visiting minister. Finally, part (c) shows the centrifugal movement of the leftover resources returning to the periphery—the members of the *kāinga*.

This schematic description of the behaviour people display in planning, preparing, and performing a *fakaafe* provides further support for the hypothesis introduced at the beginning of this work. In fact, centripetal and centrifugal movements of objects to and from a fixed centre (in the preparation, and during the performing of the *fakaafe* by the giver and the visiting minister—the two 'centres') are possible only by the mental representation of those spatial relationships with a specific subtype of the absolute FOR, that is, a 'radial' representation.

It is important to highlight the fact that the movements of objects, resources, and sermon are made possible by a similar thought pattern. In fact, the thinking pattern that has to be activated to centripetally pool the resources for the *fakaafe* from the *fāmili* and the *kāinga* is 'radial'. Similarly, the thinking pattern behind the centrifugal distribution of the food back to the *kāinga* is 'radial'. In addition, the thinking pattern activated in performing the exchange of the sermon to the congregation for food from one of its members is also 'radial'. In this last case, however, the two movements are reversed, that is, first the centrifugal (giving the sermon) and then the centripetal (receiving the food) movement.

We may conclude this very brief discussion about the *fakaafe* suggesting that this Tongan event displays the realisation of a variety of mental representations of spatial relationships. However, they frequently share a common attribute: 'radiality'. In other words, the FOR that is habitually used in planning, organising, and performing this event is a 'radial' subtype of the absolute FOR.

5 Conclusion

In closing, I introduce two drawings and ask the reader to compare them with the sketch map of Vava'u inserted between them.

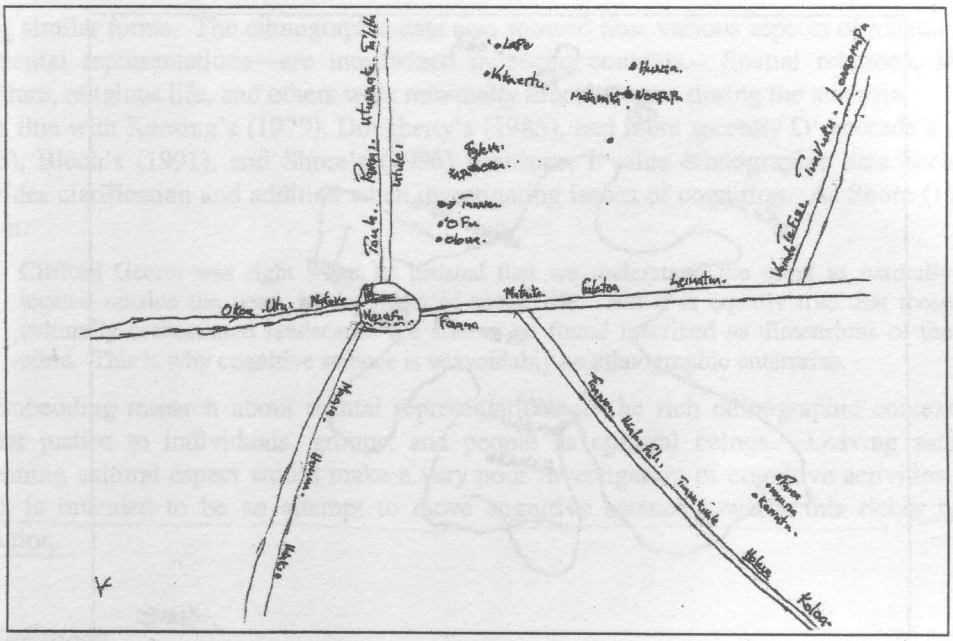

Figure 7: Drawing of the island of Vava'u by Mani, a Tongan man

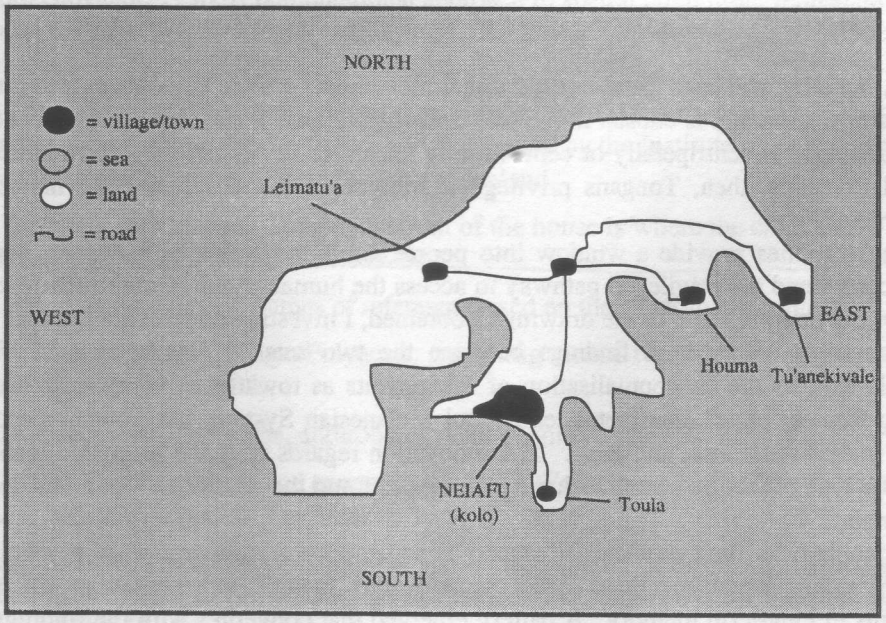

Figure 8: Sketch map of the island of Vava'u by Giovanni Bennardo

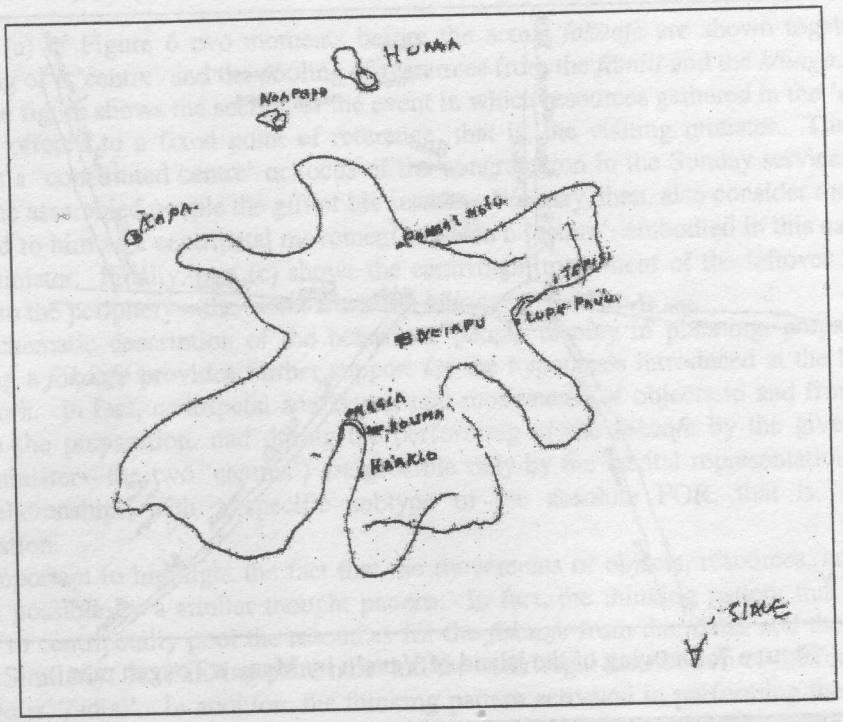

Figure 9: Drawing of the island of Vava'u by Siale, a Tongan woman

Centre, radiality, and centripetal or centrifugal movements are the key concepts to interpret these drawings. A centre is chosen in the two drawings (Neiafu), and any other object (town, village, landmark) is centripetally or centrifugally related to it. When mentally representing spatial relationships, then, Tongans privilege a subtype of the absolute FOR that can be labelled 'radial'.

Drawing activities provide a window into people's mind. Typically, however, language has been considered the privileged pathway to access the human mind. Consequently, to find support for my interpretation of the drawings I obtained, I investigated relevant features of the Tongan language. Congruent findings between the two sets of data emerged. Tongan directionals express the conceptualisation of movements as towards or away from a centre. Innovating from a 'basic' centripetal-centrifugal Melanesian System, the Tongan directional system is triadic—*mai*, *atu*, and *ange*. The innovation regards only the linguistic realisation of a specific type of 'centre'—one including the speaker and the addressee—in a new lexeme, namely, *ange*.

Further support for the hypothesis advanced came from the administration of psychological tasks. Avoiding language, these tasks tapped into mental representations of spatial relationships in long-term memory. A pattern emerged that converges with the findings from language and from the drawing activity. In fact, these tasks revealed a preference for the use of the absolute FOR.

Finally, mental representations are used to act socially and they are learned in social contexts. It was unavoidable then to look into forms of social behaviour to ascertain the validity of the hypothesis proposed. The interpretation of patterns of exchange in a Tongan *fakaafe* converges with the other findings. The patterns of exchange analysed revealed a radial format that was interpreted as evidence of mental representations of spatial relations

along similar forms. The ethnographic data also showed how various aspects of mental life—or mental representations—are intertwined in social contexts. Spatial relations, kinship structure, religious life, and others were minimally touched upon during the analysis.

In line with Keesing's (1979), Dougherty's (1985), and more recently D'Andrade's (1989, 1995), Bloch's (1991), and Shore's (1996) positions, I value ethnographic data because it provides clarification and addition when investigating issues of cognition. As Shore (1996:8) puts it:

> Clifford Geertz was right when he insisted that we understand the mind as naturally located outside the head, in the midst of social life. But it is equally true that these culturally orchestrated landscapes are also to be found inscribed as dimensions of the mind. This is why cognitive science is unavoidably an ethnographic enterprise.

Embedding research about mental representations in the rich ethnographic context does render justice to individuals, groups, and people as cultural beings. Leaving aside the informing cultural aspect would make a very poor investigation of cognitive activities. This work is intended to be an attempt to move cognitive science towards this richer holistic direction.

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