

the body changed randomly, but these conditions do not obtain at present on this planet,¹⁷ thus we may safely assume that

There are invariant features of the semasiological body and its spatio-linguistic environment that provide strong lines of continuity upon which culture-specific semanticities depend.

Having said that to Ardener in June, 1971, he said, "Good. Now prove it."

My task was to find a way of defining the space/time environment in which dancers (and everyone else) moved. Once I'd done that, I had to define the human body's *capacity* to move.¹⁸ Then, I had to state what "a unit of movement" amounted to. Since I already knew from conversations and tutorials that "Social anthropologists have long been forced to realise that there is no universal unit of 'action' in society" (p. 141, this volume), I tackled the canonical coordinate space first.

Set Theory and Semasiology

I used set theory in semasiology because sets provide a simple, precise means for defining certain classes of objects such as types of numbers, classes of human actions, etc.¹⁹ Sets are convenient devices that sort out information illustrating the relations that exist between groups of objects, things, names, symbols or whatever. Set theory is important in modern mathematics because the basic laws of arithmetic, algebra and geometry can be derived from the axioms of set theory.²⁰ The best example of the convenience of using sets in ethnographic description is to be found in the description of 'spaces' in the Tridentine Mass (Williams 1994: 39).

I had to identify the space *internal* to the Mass to contrast it with the geographical space in which all Masses exist because the liturgical space of the rite doesn't derive its semantic characteristics from geographical space. Geographical space is a metric space which is defined by virtue of distance, lines of latitude and longitude and the magnetic poles of the earth. In fact, we can say that geographical space itself constitutes a 'set', G , which is composed of directional elements, i.e. 'north' [N], 'south' [S], 'east' [E] and 'west' [W].

Instead of having to say all of that every time I want to talk about geographical space, I can simply write (or say): $G = [N,S,E,W]$. In mathematics, the word, 'set' means "a collection (or grouping) of objects." These objects can be names, numbers, symbols, species -- in fact 'objects' of any kind, countable

¹⁷ Astronauts in outer space have a changed relationship to the coordinate 'up/down', of course, but it was not my purpose to include those conditions in this research.

¹⁸ Owing to spatial limitations, the analysis of degrees of freedom of the semasiological body and the law of hierarchical motility are not included here.

¹⁹ In this context, there is no difference in meaning between the statements "a set of objects" and "a class of objects."

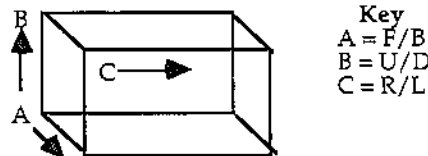
²⁰ This fact was demonstrated by Bertrand Russell and Alfred North Whitehead in their work, *Principia Mathematica* (1910).

or uncountable, real or imaginary. In ordinary life, we call a collection of knives, forks and (table or tea) spoons a "set of tableware." We refer to collections of chess pieces a "chess set." Both of these collections have 'sub-sets'. That is, we can identify (and talk about) only the 'forks' of the set of tableware, or, (for example) the pawns in a chess set. A sub-set uses curly brackets to identify its elements, i.e. $F = \{\text{forks}\}$ or $P = \{\text{pawns}\}$.

On the whole, semasiologists deal with rites, dances, sign languages, etc. that are *sub-sets* of geographical space.²¹ Dealing with the Tridentine Mass, I had to cope with a sub-set of geographical space which uses the same directional elements (i.e. north, south, east and west), but in a different order. In other words, I talk about the *liturgical space* of the Tridentine Mass; the space *internal to* the rite. Using set theoretical notation, I could write (or say), $L = \{e,w,n,s\}$.²² I could discuss "the L set" of elements of the Mass.²³ Semasiology eradicates the possibility of confusion about these spaces.

When they are unpacked, the L set of elements provides the conceptual and semantic map of the rite's territory. This space identifies the rite as itself and no other, because $\{e,w,n,s\}$ are based on the fact that $\{e\}$ is *the focal point* of the L space of the Mass. The L set of elements is *embedded* in the G set, but, *the L space is not the same as the G space* (see Williams 1994: 40). "But," you say, "neither $G = [N,S,E,W]$ or $L = \{e,w,n,s\}$ describes the canonical coordinate space of a human being." And you are right. I am leading up to that. Look at the diagram of the canonical coordinate space on p. 144 again.

The elements of the set 'CCS' (for Canonical Coordinate Space) is composed of three dimensions, up/down, right/left and front/back. The elements of the CCS had to be translated into set theoretical terms, i.e.



The set of which the canonical coordinate space is composed,
i.e. $CCS = [A,B,C]$.

The set, 'CCS' was originally developed step-by-step through the application of Klein groups (see 1975: 97-100). Although tempted to go through the process implied by the above diagrams, in the interests of brevity, I will not do so here. Students can either consult relevant appendices in the doctoral thesis (Williams 1975), or, they can look up a two-part essay published in 1976 that puts the *product* of the process in full view.

²¹ This is not always the case: the Chinese exercise technique, Tai Chi Ch'uan, for example, uses the G set for its referents. It is not, like the Mass, an 'embedded' set (Williams 1995: 59-62).

²² Notice the different notation, i.e. $G = [N,S,E,W]$ while $L = \{e,w,n,s\}$.

²³ The units which make up a set or sub-set are called the "members" or the "elements" of the set or sub-set.

For now, I want to emphasize the fact that mathematics are connected with semasiology first, because of Ardener's challenge (i.e. "prove it"). "How," he wanted to know, "are you going to deal with the problem of identity?"²⁴ After all, change exists: all things become other than what they were. Spoken languages and sign languages change, dance idioms change. People change; habits, manners, customs -- nothing remains the same."

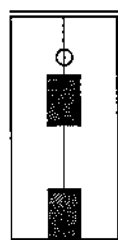
"That's as may be," I replied, "however, from a dancerly standpoint some things do *not* change. The law of gravity, for example, and the fact that knees and elbows only bend one way and facts like having only two legs. No matter how complex dance steps may be, humans only have two feet and legs with which to perform them. It is this kind of thing that makes human movement *rule-based*, although very few people think of it that way." The second reason why semasiology is connected with mathematics turns around the complexity of the rules that govern human movement in any of its manifestations.

Transformational Rules and Semasiology²⁵

Over the years, I've become increasingly aware that the notion of 'rules' presents serious obstacles for some. Because of this, I ask that readers put aside images of injunctions issued by judges or courts and/or codes of discipline such as those prevailing in schools or religious orders because this is not the kind of rule to which I will draw attention. We are concerned here with the 'meta-rules' that are 'principles' or 'laws' to which all human actions conform. They are 'intransitive' that is, they are not man-made. Some of the knowledge in semasiology is, therefore, knowledge of things that are givens.²⁶

Sometimes, however, it is necessary for an investigator to examine what transformational rules characterize the data they have collected. They might want to work out specific syntactical features that govern how a particular dance form is organized (for an example, see Myers 1981). This kind of analysis is based on the fact that human beings only have two legs and there are only so many underlying ways of moving them. There are five meta-rules that can be used for this purpose.

RULE 1



Where $X = R$ leg and $X' = L$ leg,
then $[X+X'] \rightarrow [X+X']$

In common English, a jump or
hop from both feet to both feet.

²⁴ Notice that I had to deal with the connected ideas of 'continuity' and 'identity' in semasiological theory.

²⁵ The transformational rules I explain partake of the intransitive nature of, for example, the set of degrees of freedom for the semasiological body, not explained here owing to their complexity and lack of space.

²⁶ Up/down, right/left and front/back (hereafter U/D, R/L and F/B respectively) are the intransitive meta-rules of the *spatial environment* in which movement takes place (see p. 144).