John R. Prince

CULTURAL CONFLICTS IN THE TIME CONCEPTS OF NEW GUINEAN SPEAKERS

An Educational View

Introductory

The only claim I can have for being in this rarefied group of linguists is that I try to use words, and have done so in a number of different languages, mainly European ones. My primary interest in the concept of time is that it is one of a number of basic concepts in the Physical Sciences, all of which present greater difficulties for the Papuan and New Guinean student than they do for the European. The scientist can build up his system of units on only the three fundamental quantities of Mass, Length and Time, but from a conceptual point of view, the list of fundamental quantities must be extended to at least six, namely quantity or substance, length, area, volume, weight and time. Of these time seems the most difficult, from two points of view, that of the student's mastery of the concept, and also that of seeking to analyse satisfactorily the overall conceptual structure represented by our word 'time'.

Linguistic Aspects

I make only two comments on the linguistic aspects about which Dr. Balint will be speaking. The first is self-evident. Any linguistic, perhaps more particularly semantic, problem of conceptualisation must affect all disciplines which are verbally communicated, and presumably more heavily affect the most verbally dependent disciplines. Such linguistic effects may mask the underlying problems with which this paper is specifically concerned, and may, of course, accentuate them. It may be, however, that the solution of both the linguistic and scientific problems relating to time conceptualisation will be found along similar lines.

Secondly, Dr. Balint will make the point that time indication in sentences is a linguistic universal. In the sense that it is a basic

requirement which all languages must achieve, I imagine that it will be hard to disagree with him. But I wonder whether the manner of time indication may not vary so much between different groups of languages, that in fact a different pattern of conceptual structure is built up in the minds of people of different language groups. I refer particularly to the Melanesian language group with which we in this University are directly concerned. I am given to understand by the Summer Institute of Linguistics' workers that one of the problems, in at least some of the Melanesian languages, is that there is no time marking system in the verb, and that there are very limited numbers of other time marking words. Verb aspects relating to reality and unreality, or completion and incompletion, enable verbs to be used to give a kind of time indication, thus in one way confirming Dr. Balint's point. At the same time there is a fundamental difference in conceptual basis as between verb structures which are time based, reality based or completion based. I suspect that at least some of our linguistic, and possibly other problems with time among our University students may arise from this source.

Published Work

The appended bibliography of published work on Time Conceptualisation, which lists every reference I have been able to find, represents less than one publication per year over the forty year period and only four publications in the last five years. Most of the work appears, in the harsh light of New Guinean realities, to analyse the understanding of our Western terms, and dating systems, rather than dealing with time conceptualisation in the more fundamental sense. Wallace[1] summarises work up to 1950 thus -

> "An appraisal of experimental studies up to that point indicated that some concept of past as opposed to present is reached at about 8 years, a full understanding of our system of reckoning time at about 11 years, understanding of time lines at about 13 years, and something approaching maturity of understanding of time words and dates at about

16 years of age. Friedman's findings support this reckoning of the rate of development. If true, the great significance of these conclusions for the teaching of history in schools is manifest."

It is worth drawing attention to the significance for us in New Guinea of this slow rate of development, if time conceptualisation here lags behind by the European pattern by a margin of 3 - 5 school grades as other spatial concepts appear to do.

By far the most interesting study reported is one from Finland by Vikainen[3], of which the library has not to date been able to get a copy. The following summary is drawn from the report by Wallace[2]. Vikainen distinguishes time concepts in to three forms - the primary one concerned with experience being attained first. Such time experiences are not independent states of consciousness, but dependent parts of sensory impressions and other mental processes. Attention may be focussed on either the content of the mental process, or to its temporal character, each to the possible exclusion of the other. For longer periods, the secondary form of time concept, with its aspects of sense of duration, and sense of order is required, and linguistic phenomena become relevant, though they can also be misleading.

Vikainen considers that the tertiary time concept comprises all time conception which presupposes the individual's familiarity with the system of counting time, either completely or partly. Duration of time may be expressed by means of units of measure. Describing a point in time precisely is likewise only possible on the basis of the tertiary time concept. The time is measured. Study of the tertiary time concept is complicated by the fact that it can clearly be divided into different levels and, also, by the possibility that a subject may act on a secondary or, even, a primary level although he comprehends the chronological system as a whole.

Vikainen has been treated in some detail because his study is the only one reported to come to grips with what seems to me to be the basic problem. How do the "linguistic", "historical", and "scientific" aspects of time conceptualisation link up? This problem must be

resolved if a unified approach to a solution is to be found. Yet no work to follow up Vikainen's promising lead has been reported.

Elements in the Problem

Let us therefore list some of the elements involved in the development of the time concept, listing them in a quite arbitrary order-

1. Time as a uni-directional scale.

The fact that time progresses uniformly without interruption in the positive direction singles it out from all other quantities. However in thought and word we can move in both directions along this scale and stop it at will, this is no doubt one of the sources of confusion. Furthermore, the whole question of scale presents difficulties, as it does with other quantities. The interrelationship between different events and periods within historical time affects the Social Sciences. In the Physical Sciences a range of magnitudes from very small intervals like 10^{-22} seconds, to enormous periods of time like 10^{20} light years presents formidable obstacles to the powers of conception of the human mind. Indeed which of us has a concept of scale adequate really to grasp the significance of these difference.. In the main we achieve it, if we do at all, by resorting to mathematical devices, rather than attaining a conceptual 'feel' for the difference expressed.

2. Conservation of Time.

One of the most significant elements in the conceptualisation of physical quantities is the achievement of conservation, by which is meant the invariance of the quantity in relation to various changes, such as those of position or shape. In other words, if I pour water into a differently shaped vessel it remains the same quantity. If I move a ruler into a different plane it remains the same area. There have been many studies of conservation of the various fundamental physical quantities, but none that I know of in regard to conservation of time. This may not be surprising, for an effective study would present formidable difficulties. However, there seems little

doubt that failure to conserve time is a part of our problem in New Guinea, as illustrated by the following story, which could be repeated many times over. A relatively well-educated Papuan told me at the beginning of a long walk that a particular intermediate point was an hour's walk away. An hour later we had not reached the point in question, and upon being asked how much further, he stated 'an hour'. Relaxed discussion elicited that he clearly meant a further hour, and that he saw no conflict between the earlier statement and this new one. Whether we had walked more slowly than anticipated or not was of no interest, there was simply nothing to explain. In other words, one hour plus one hour could perfectly well equal one hour. He was clearly not conserving time. I wonder how many of our students are like him, and what problems follow in the train of non-conservation.

3. Time related to other quantities.

The point that Rogers[4] makes that "time, in the Newtonian sense, is only accessible to the sense in terms of space" means that there is difficulty in disentangling what is strictly the time concept from the the other measures of space, and from compound quantities such as speed with which time is found in association. Lovell and Ogilvie[5] have found the same difficulty in their investigations, and this is true of New Guinea. When questioned about the length of path of a truck following a windy road, and an aircraft flying by a direct route to achieve the same total displacement, students produced many responses which showed that in this context the displacement achieved, the speed of travel, and the time taken for the journey, were mixed up together in often very confused patterns. This need not surprise us when we recall the frequency with which we ourselves are trapped into giving an inverse answer, because our minds have latched on to time when we should have thought of speed or vice versa.

4. Simultaneity and Synchronous Intervals.

Lovell and Slater[4] investigated the question of simultaneity, equality of synchronous intervals, and order of events. Using a

board with two dolls starting simultaneously at different points, moving on parallel courses at different speeds and finishing simultaneously at different points, they demonstrated clearly that the intrusion of other variables, in this case displacement and speed, confuses the time concept. While the perception of simultaneity improves steadily through the primary school grades, the recognition of the equality of synchronous intervals between two pairs of simultaneous events developed much more slowly, with only 43 per cent of normal 9 year olds responding correctly on this point.

This problem is obviously with us here, not only in the simple form in which Lovell investigated it but also in the related question of understanding that the time interval which is passing here in Port Moresby is synchronously passing in Goroka, London and New York.

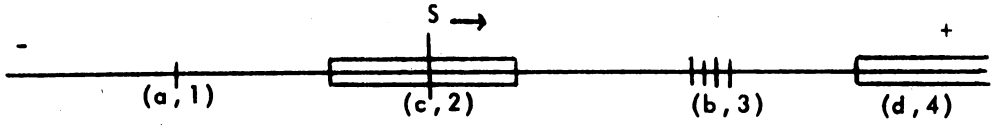
Having made this naive statement, I must qualify it immediately by saying that philosophically it is probably quite untenable in the light of Einstein's "Relativistic Development of Time". So is an earlier statement about the uniform progression of time. Fortunately the conditions, under which Einstein's facts begin to be felt in actual experience, are still sufficiently unusual for us to have been able to side-step this problem in practical educational situations to date.

A Possible Solution

I would like to suggest that the physical model of a linear scale could perhaps help to overcome many of the problems that have been mentioned. Time Charts used in History and Social Studies class rooms are in fact just such a device, and are proving effective in many Territory schools. I doubt whether we should be above using them at University level. Initially, the scale of the chart is probably not important but it represents a concrete model of the order of events or periods, which may be associated with visual images and thus fixed in the mind of the student. As the educational level rises the time chart may be refined into a strict linear scale with lengths representing proportionate time intervals, and thus developing the concept of scale more quantitatively. The same devices would be applicable to the scale

aspect of the problem in the Physical Sciences, and sets of parallel scales could be used to develop the idea of simultaneity and synchronous intervals.

It seems to me, and I conclude with another foray into the linguistic area in which I am gloriously unqualified, that the same physical model could help to carry the various linguistic devices which have to be mastered.



Let the line represent time as a uniform continuum extending infinitely in both directions, in which the speaker, S, is instantaneously at a particular point, but is of course progressing uniformly in a positive direction, i.e. towards the future. There is a need for him to express the location of (a) a single event, (b) repeated single events, (c) a continuous bounded time interval, and (d) a continuous unbounded time interval. These four, and perhaps subdivisions of these categories, may be located in a number of possible ways relative to either (1) his past position, (2) his present position, (3) his future position. Each of the combinations in this simple matrix is presumably represented by a form of linguistic device, although my earlier point would ask whether devices exist in all languages for all locations in the matrix. The suggestion with which I conclude is that all the disciplines concerned could perhaps develop their aspects of the time concepts involved with the help of the same concrete physical model, thus reinforcing one another and, one hopes, achieving a better effect. Taking one example from the linguistic side, the awkward phrase 'I will have done' could be represented to the bounded time interval shown at (c, 2). One hopes that encouraging the guage, with concrete examples drawn from various fields, and the concrete model in front of him, may make a far from easy verb construction more meaningful to him.

References.

1. WALLACE, J.G. Concept growth and the Education of the Child
National Foundation for Educational Research in England and Wales, Slough, Bucks. 1965, p.122.

2. ibid pp.126-7

3. VIKAINEN, I. The Development of Time Concepts and Time Scheme
Report from Ins. of Educ. Univ. of Turku, 1, (1961).

4. ROGERS, K.W Concept of Time in Secondary School Children of above Average I.Q.
Brit J. of Ed. Psych. XXXVIII Pt.1, Feb. 1967

5. LOVELL, K. & SLATER, A. The growth of the Concept of Time: a comparative Study.
J. Child Psychol. and Psychiatry, 1, 179-90 (1960).

BIBLIOGRAPHY

AMES, L. (1946) The Development of the Sense of Time in the Young Child.
J. Gen. Psychol., 68, 97-125.

GERGLER AND ROHEIM (1946) The Psychology of Time Perception
Psychoanalytical Quart., 15, 190.

BRADLEY, N.C. (1947) The Growth of Knowledge of Time in Children of School Age.
Brit. J. Psychol., 38, 67-78.

BUCK, J.N. (1946) The Time Appreciation Test.
J. Applied Psychol., 30, 388-399.

CLAUSEN, J. (1950) An Evaluation of Experimental Methods of Time Judgment.
J. Exp. Psychol., 40, 756.

COURT, SOPHIE R.A. (1920) Numbers, time and space in the first five years of a child's life.
Ped. SemXXVII.

FLICKINGER, A. and REHAGE, K.J. (1949) Building time and space concepts.
Twentieth Yearb. Nat. Coun. Soc. Stud., 107-16.

FRAISSE, P. (1957) Psychologie du Temps.
University of France.

FRIEDMAN, K.C. (1943-4) Time Concepts of Elementary School Children.
Elementary School J., 44, 337-352.

FRIEDMAN, K.C. (1944) Time Concepts of Junior and Senior High School Pupils and Adults.
School Review, 52, 233-238.

FRIEDMAN and MARTI (1945) A Time Comprehension Test.
J. Educ. Res., 39, 62-68.

HUNTER, J.N.W. (1934) An inquiry into the perception and memory of time relations and particularly into the development of the time concept among high school children.
Unpublished PH.D. Thesis, Univ. of Edinburgh.

JAHODA, G. (1963) The child's conception of time and history.
The Educ. Rev., 15.

JOHNSON, Ed. E. (1964) Time concepts as related to sex, intelligence and academic performance. J. Educ. Res., 57, 377-380.

KING, W.H. (1963) Science concepts. Brit. J. Psychol. Nov.

LEWIS, M.M. (1937) The beginning of reference to past and future in a child's speech. Brit. J. Educ. Psychol. VII, 309.

LOVELL, K. (1960) The Development of Mathematics and Science Concepts in Children

LOVELL, K. and SLATER, A. (1960) The growth of the concept of time: a comparative study. J. Child Psychol. and Psychiatry, 1, 179-90.

McAULAY, J.D. (1961) What understanding do second-grade children have of time relationships? J. Educ. Res., 54, 312-4.

OAKDEN, E.C. & STURT, MARY (1922) The development of the knowledge of time in children Brit. J. Psychol. XII 309

PIAGET, J. (1946) Le development de la notion de temps chez l'enfant. University of France.

PISTER, F. (1939) Measuring time concepts of children J. Educ. Res. 33, 293-300

PISTER, F. (1940) How time concepts are acquired by children Educ. Method, 20, 107-12.

RAWLINS, P. (1935) An Enquiry into the Development of the Concept of Time in Children at a Secondary Modern School. Sheffield Institute of Education.

SCHACHTER, SYMONDS and BERNSTEIN (1957) The development of the concept of time in school children. J. Nervous and Mental Diseases, 7, 121

SMYTHE and GOLDSTONE (1947) The time sense. Perceptual and Motor Skills, 7, 49-59.

SPRINGER, D. (1952) Development in young children of an understanding of time and the clock. Ped. Sem. 80, 83-96.

STURT, M. (1922) Concepts of Time

STURT, M. (1925) The Psychology of Time
London: Kegan Paul

VIKAINEN, I. (1961) The Development of Time Concepts and Time Scheme.
Report from Ins. of Educ., Univ. of Turku, 1.

WALLACE and RABIN (1960) Temporal experience.
Psychol. Bull., 57, 213-236.