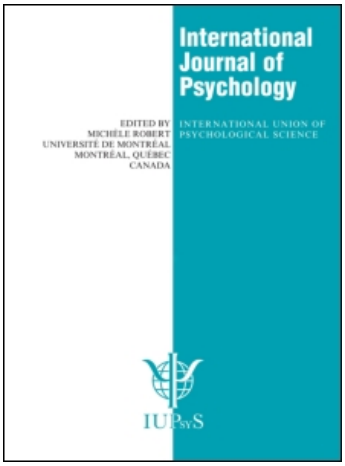

International Journal of Psychology

Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713659663

Time Conservation Across Cultures

Arthur D. Dempsey[a]
[a] East Texas State University, Commerce, USA

To cite this Article Dempsey, Arthur D.(1971) 'Time Conservation Across Cultures', International Journal of Psychology, 6: 2, 115 — 120
To link to this Article: DOI: 10.1080/00207597108247301
URL: http://dx.doi.org/10.1080/00207597108247301

International Journal of Psychology
Journal International de Psychologie
1971, Vol. 6, No 2, 115-120

TIME CONSERVATION ACROSS CULTURES

ARTHUR D. DEMPSEY *East Texas State University, Commerce, USA*

L'auteur tente de déterminer si les enfants appartenant à des cultures non occidentales perçoivent le temps de la même manière que les enfants occidentaux, s'ils se conforment aux stades de Piaget, et si l'âge auquel ces stades se réalisent correspond approximativement à ce que trouve Piaget. Les échantillons ont été tirés de sept cultures : anglo (Blancs), mexicaine-américaine, et indiennes (Hopis, Pimas, Papagos, Apaches et Navajos). Avec un total de 317 sujets, l'étude a porté, dans chaque groupe culturel, sur quinze enfants de sept, neuf et onze ans respectivement. Quatre épreuves ont été utilisées pour mettre en évidence la conservation du temps : deux épreuves sur la conservation de l'ordre des événements, et deux épreuves sur la conservation de la simultanéité. Les résultats font apparaître une très grande variabilité avec l'âge; dans le cas de la simultanéité, aucun groupe culturel n'atteint le critère, proposé par Piaget, de 3/4 de réponses correctes, même aux âges où cette capacité, selon Piaget, est atteinte. En ce qui concerne la conservation de l'ordre nécessaire des événements, seuls les enfants mexicains-américains, anglos et pimas ont acquis cette capacité à l'âge de onze ans. En ce qui concerne la conservation de l'ordre naturel, seuls les Navajos et les Apaches n'ont pas cette capacité à l'âge de onze ans.

One of the many areas which Jean Piaget has studied is that of the awareness of time or time sense (1955, 1964, 1966, 1970). However, peoples of non-Western cultures sometimes appear to perceive time in a different manner than peoples of Western cultures. One anthropologist has even gone so far as to say : " It is impossible to assume that man is born with any innate " temporal sense ". His temporal concepts are always culturally constituted " (Hallowell, 1955). Another anthropologist said in a recent meeting concerned with time : " Actually, a man's concepts of time are bound to the cultural system within which he exists..." (Metraux, 1967). Thus, the study of conservation or the transitional ages between preoperational thought and concrete operations across cultures has a great importance to psychologists and anthropologists as well as educators.

Actual studies of the conservation of time appear to be severely neglected by researchers outside of Piaget's immediate Genevan circle. Lovell and Slater (1960) compared " normal " and mentally retardates in Great Britain and Murray (1969) has worked with grade school children in the United States. There has been a mounting interest in the United States concerning the education and psychology of American Indians. However, little work has been done utilizing

Piagetian tests within the various Indian cultures which still exist in the United States. Havighurst and Neugarten (1955) reported inconclusive results on tests of immanent justice while Laura Thompson (1969) concluded from the same data : " Interestingly, the perception patterns of all the tribes (Hopi, Papago, Navajo) resemble the three levels of perception that Jean Piaget found to characterize development of the Swiss child's mental approach. " Another study, done at the University of Arizona (Sams, 1969), found that when Pima Indian children were matched by age and IQ with Anglo (white) children there was no significant difference in the ability to conserve the volume of a solid between the two groups. In the area of time, Hall (1968), Zintz (1963), Burger (1968) and Whorf (1967) all indicate that " Indian time " is different from Anglo or " white man's " time. Zintz and Burger also indicate this to be true for Mexican Americans.

This study compared children from five Indian tribes in Arizona, Mexican Americans and " middle-class " Anglos in an attempt to determine differences between the members of these different cultures in their ability to conserve certain aspects of time.

METHOD

The samples

The samples were drawn from elementary schools which were located in areas which had a majority of the ethnic groups represented. The ages selected for study were seven, nine and eleven. Fifteen children from each age group were selected for a total sample of 315 children. Age was defined as having had a birthday not more than one year preceding the day of the test.

The population tested included Hopi Indian children from the villages of Shipaulovi, Shungopovi and Mishongnovi, Arizona; Apache Indian children from the community of Cibecue, Arizona; Pima Indian children from Sacaton, Arizona; Papago Indian children from Gu Achi (Santa Rosa), Arizona; Navajo Indian children from the Tuba City, Arizona Boarding School; Mexican American children from Tucson, Arizona and Anglo children from Tucson, Arizona.

Procedure

Each child was seen individually by the examiner and was given four tests for the conservation of time, two for the conservation of simultaneity and two for the conservation of order of events. Prior to the actual testing, each child was given specific instruction in the meaning of the word " same " by the use of concrete examples. This instruction was continued until the examiner was convinced that the subject understood the concept of " sameness ".

The tests

The tasks selected were based on Lovell and Slater's (1960) replication of Piaget's conservation of time experiments.

Simultaneity. The subjects were given two tests for the conservation of simultaneity. In the first task, two dolls were moved along a wooden track. The dolls were anthropomorphic and brightly colored, one red (female) and one blue (male). The subject was told to make the dolls " race " by saying " go ". The experimenter then turned a crank which caused the dolls to move along the track. The male doll moved faster and thus, at the end of the " race ", had moved farther along the track. When the male doll reached the end of the track a sound was made by the experimenter to indicate the end of the race. The subject was then asked, " Did the dolls start to walk at the same time ? " " Did the dolls stop walking at the same time ? " " Has either doll been walking for more time ? " If the subject responded that one doll had been walking for more time he was then asked, " Which doll ? "

The second test of simultaneity consisted of causing colored water to run from a container through an upside down Y tube into two differently shaped containers. The water flowed into a two hundred and fifty milliliter graduated cylinder and a two hundred and fifty milliliter graduated

beaker. Because of the Y tube, equal amounts of water flowed into the two containers at the same time during the experiment. The subject was then asked, " Did the water start to flow into both containers at the same time ? " " Did the water stop flowing into both containers at the same time ? " Finally, the subject was asked, " Did the water flow into either of the containers for more time ? "

Order of events. Two tests of order of events were presented. In the first task, *Simple order of events,* colored water was siphoned from a six hundred milliliter graduated beaker into a five hundred milliliter graduated cylinder. As the water went lower in the beaker it rose in the cylinder. This was done twice. The subject was then given six pictures showing the relative position of the water in the beaker and the cylinder and asked to put the pictures in order, the way he or she saw the water move. The second task, *Hard order of events,* was presented in an identical manner to the first except that the water was siphoned only once. The subject was given a set of pictures identical to the first set, except that the pictures of the beaker and cylinder were separated. Thus the subject had to match the correct pictures of the cylinders and beakers as well as putting the pictures in the correct order showing the relative levels of the water.

The tests were presented in the following order. First, the order of events with the pictures of the cylinders and beakers connected. Second, the test of simultaneity using the dolls. Third, the test of order of events with the pictures of the beaker and cylinder separated. Fourth, the test of simultaneity utilizing water flowing through the upside down Y tube was presented.

The subjects were scored as conserver or non-conserver. If they arranged and ordered the pictures correctly on the tests of order of events they were considered to have conserved on these tasks. If they said the dolls started at the same time, stopped at the same time, then affirmed this by saying something to the effect that both moved for the same amount of time, they were considered as conservers of simultaneity as measured by this task. In the experience utilizing the Y tube if the subjects said that the water started to flow into both containers at the same time and stopped flowing into both at the same time and affirmed this by indicating that the water had flowed into both containers for the same amount of time, they were considered conservers of simultaneity as measured by this task.

RESULTS

The results of the tests of conservation of time were analyzed in two different ways. First, the Fisher Yates Exact Probability Test (Siegel, 1956) was utilized. Differences were noted only when the probability of the difference occuring were five or less chances out of one hundred on a one-tailed test. Second, Piaget has stated in Ripple and Rockcastle (1964), " In our research we say that a problem is solved by children of a certain age when three-quarters of the children of this age respond correctly. " The data were also analyzed utilizing this convention (*cf.* Table 1, p. 132).

Simultaneity : *Dolls*

Age 7 : No significant differences were noted between the groups.

Age 9 : Differences were noted between Anglo and Mexican American, Pima, Navajo and Hopi.

Age 11 : No significant differences were noted between the groups.

Simultaneity : *Y-tube*

Age 7 : Differences were noted between Anglo and Mexican American, Navajo and Apache; Papago and Pima; Pima and Navajo.

Age 9 : Differences were noted between Anglo and Mexican American, Papago, Navajo, Hopi and Apache.

Age 11 : Differences were noted between Anglo and Hopi.

Simple order of events

Age 7 : Differences were noted between Anglo and Mexican American, Papago, Navajo, Hopi and Apache; Papago and Apache; Pima and Navajo and Apache; Hopi and Apache.

TABLE 1

NUMBERS OF CONSERVERS (C) AND NON-CONSERVERS (NC) BY GROUP, AGE AND TEST

Group	Age	Simultaneity				Order of events			
		Dolls		Y-tube		Simple		Hard	
		C	NC	C	NC	C	NC	C	NC
Anglo	7	2	13	8	7	12	3	8	7
	9	7	8	9	6	15	0	10	5
	11	5	10	10	5	15	0	12	3
Mex.-American	7	0	15	0	15	4	11	2	13
	9	1	14	3	12	15	0	10	5
	11	1	14	7	8	15	0	14	1
Papago	7	2	13	5	10	6	9	2	13
	9	2	13	3	12	12	3	5	10
	11	3	12	7	8	14	1	6	9
Pima	7	2	13	6	9	9	6	6	9
	9	0	15	4	11	15	0	10	5
	11	2	13	6	9	15	0	13	2
Navajo	7	0	15	1	14	2	13	0	15
	9	0	15	2	13	10	5	4	11
	11	1	14	6	9	14	1	11	4
Hopi	7	0	15	3	12	7	8	4	11
	9	1	14	2	13	13	2	9	6
	11	1	14	3	12	15	0	11	4
Apache	7	0	15	2	13	1	14	1	14
	9	2	13	3	12	7	8	4	11
	11	3	12	5	10	11	4	5	10

Age 9 : Differences were noted between Anglo and Navajo and Apache; Hopi and Apache.

Age 11 : Differences were noted between Apache and Anglo, Mexican American, Pima and Hopi.

Hard order of events

Age 7 : Differences were noted between Anglo and Mexican American, Papago, Navajo and Apache; Pima and Navajo and Apache; Hopi and Navajo.

Age 9 : Differences were noted between Navajo and Anglo, Mexican American and Pima; Apache and Anglo, Mexican American and Pima.

Age 11 : Differences were noted between Anglo and Papago and Apache; Mexican American and Papago and Apache; Pima and Papago and Apache; Apache and Papago, Navajo and Hopi.

Using Piaget's criteria of three-quarters correct responses provides a much different picture. No group tested was able to conserve simultaneity on any of the tests used at any of the ages tested. On the simple order of events task only Anglo children were able to conserve at age seven. By age nine all except Navajo and Apache had conserved and by age eleven all except Apache children conserved. On the hard order of events test, none of the groups had achieved conservation by age nine and only Anglo, Mexican American and Pima achieved conservation by age eleven.

SUMMARY AND CONCLUSION

The effect of culture on the conservation of time appears to be amply demonstrated by this study. More important, however, are the patterns noticed — that is, significant differences as demonstrated by the Fisher Yates Exact Probability test at two different tests at two different age levels. These patterns were shown to involve both the Apache and Navajo — most commonly in the order of events tasks. This is important because both the Navajo and the Apache share a common history and linguistic background. Both groups are thought to have originated in the area of Lake Athabaska in Canada and to have migrated into the southwestern portion of what is now the United States less than a thousand years ago. The function of specific areas of cultures which cause the differences between groups can only be hypothesized. A review of available literature reveals no specific data on the ordering of events in short periods of time or the concepts of simultaneity. The cultural phenomena of time described in the anthropological literature tends to concern itself mainly with longer, arbitrary units of time sequence such as the parts of the day or months or years and such notions as seasonal rounds.

It is readily apparent that this study indicates a variety of needs for further research in this area. It is recommended that the study be expanded to include a larger sample, utilize more of the tasks devised by Piaget, utilize trained interpreters where necessary and be carried out in a longitudinal fashion to determine more precisely the intellectual process involved in acquiring the time process and to determine which operations are amenable to training and which are not. It is also recommended that non-anthropomorphic objects be used in the test of simultaneity using dolls as it was noticed that traditionally matrilineal groups (Navajo, Hopi, and Apache) tended to select the female doll as the figure which had " walked for more time " more frequently than did children of the patrilineal cultures. These children also tended to select the beaker as having had the water flow into it for more time. Furthermore, more anthropological research is needed to define the concepts and categorization of order of events and simultaneity held by the members of all of the participating cultures. It is also recommended that studies of adolescents be carried out. The results of this research show that the intellectual processes of the acquisition of formal reasoning as postulated by Piaget may be much later than originally conceived.

Certainly the schools must examine teaching practices in the field of history in order that students receive a background which will insure a greater understanding in this area.

REFERENCES

BURGER, H.G. *Ethno-pedagogy.* Albuquerque, N.M. : Southwestern Cooperative Educational Laboratory, 1968.

FOERSTER, L.M. The development of time sense and chronology of culturally disadvantaged children. Unpublished Ed. D. dissertation, University of Arizona, 1968.

FRASER, J.T. (Ed.). *The voices of time.* New York : George Braziller, 1966.

GALE, R. M. (Ed.). *The philosophy of time.* Garden City : Anchor Books, Doubleday, 1967.

HALL, E. *The silent language.* Greenwich, Conn. : Fawcett, 1968.

HALLOWELL, I. *Culture and experience.* Philadelphia : University of Pennsylvania Press, 1955.

HAVIGHURST, R.J. & NEUGARTEN, B.L. *American Indian and white children.* Chicago : University of Chicago Press, 1955,

LOVELL, K. & SLATER, A. The growth of the concept of time. A comparative study. *Journal of Child Psychology and Psychiatry and Related Disciplines,* 1960, **1**, 179-190.

METRAUX, R. Panel discussion. In " Interdisciplinary perspectives of time, " ed. Edward M. Weyer. *Annals of the New York Academy of Sciences,* 1967, Vol. **138**, Article 2, pp. 207-208.

MURRAY, F.B. Conservation aspects of the concept of time in primary school children. *Journal of Research in Science Teaching,* 1969, **6**, 257-264.

PIAGET, J. The development of time concepts in the child. In P. Hoch and J. Zubin (Eds), *Psychopathology of childhood.* New York : Gruner and Stratton, 1955. Pp. 34-44.

PIAGET, J. Relations between the notions of time and speed in children. In R.E. Ripple and V.N. Rockcastle (Eds), *Piaget rediscovered.* Ithaca, N.Y. : Cornell University, 1964. Pp. 40-48.

PIAGET, J. Time perception in children. In J.T. Fraser (Ed.), *The voices of time.* New York : George Braziller, 1966. Pp. 202-216.

PIAGET, J. *The mechanisms of perception.* New York : Basic Books, 1969.

PIAGET, J. *The child's conception of time.* New York : Basic Books, 1970.

RIPPLE, R.E. & ROCKCASTLE, V.N. (Eds). *Piaget rediscovered.* Ithica, N.Y. : Cornell University, 1964.

SAMS, O.J. The ability to conserve volume of a solid among selected Indian and Caucasian pupils. Unpublished Ed. D. dissertation, University of Arizona, 1969.

SIEGEL, S. *Nonparametric statistics for the behavioral sciences.* New York : McGraw-Hill, 1956.

THOMPSON, L. *The secret of culture.* New York : Random House, 1969.

WEYER, E.M. (Ed.). Interdisciplinary perspectives of time. *Annals of the New York Academy of Sciences,* 1967, **138**.

WHORF, B.L. An American Indian model of the universe. In R.M. Gale (Ed.), *The philosophy of time.* Garden City : Anchor Books, Doubleday, 1967.

ZINTZ, M.V. *Education across cultures.* Dubuque, Ia. : William C. Brown, 1963.