SOCIAL TIME: A METHODOLOGICAL AND FUNCTIONAL ANALYSIS

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ABSTRACT

The category of astronomical time is only one of several concepts of time. Such concepts differ in the fields of philosophy, psychology, and economics. An operational definition of expressions of time in common usage shows that social phenomena are frequently adopted as a frame of reference so that units of time are often fixed by the rhythm of collective life. The need for social collaboration is at the root of social systems of time. Social time is qualitatively differentiated according to the beliefs and customs common to the group. Social time is not continuous but is interrupted by critical dates. All calendrical systems arise from and are perpetuated by social requirements. They arise from social differentiation and a widening area of social interaction. It is possible that the introduction of social time as a methodological category would enhance the discovery of social periodicities.

No concept of motion is possible without the category of time. In mechanics, for example, time is considered the independent variable which is a continuous function of the three co-ordinates which determine the position of a particle. Time is likewise a necessary variable in social change. The adequacy of the concepts of astronomical or calendrical time in the study of the motion or change of social phenomena thus represents a problem of basic importance. Are periods of years, months, weeks, days the only, or even the most readily applicable, temporal measures in a system of social dynamics? Most social scientists have proceeded on the tacit assumption that no system of time other than those of astronomy or the imperfectly related calendar is possible or, if possible, useful. They have assumed a time, the parts of which are comparable, which is quantitative and

possessed of no qualitative aspects, which is continuous and permits of no lacunae. It is the object of this paper to demonstrate that in the field of social dynamics such restriction to a single conception of time involves several fundamental shortcomings.

Newton's formulation of the concept of a time which is uniform, infinitely divisible, and continuous probably constitutes the most definite assertion of the objectivity of time. In the realm of astronomy the modern doctrines of relativity have shown, from one point of view, the contingent nature of Newtonian time. From another angle such philosophers as Bradley, Berkeley, and Kant, and, more recently, Spencer, Guyau, James, and Bergson, have leveled criticism against the universal applicability of such a concept. In the field of sociology, with the exception of certain members of the Durkheim school, very little attention has been devoted to this fundamental category.

That the astronomical is not the only possible concept of time is evident after a brief consideration. In philosophy there exists what may be called an "ontological time." Aristotle and Zeno, to choose at random, both conceived of a time which is non-material, completely subjective. For Kant, time is the formal a priori condition of all perceived phenomena.[1] Berkeley and Bradley condemn time as a mere appearance having no objective reality. James, on the other hand, sees the concept of an "objective" time as a useful fiction. Bergson holds that "imaginary homogeneous time is an idol of language, a fiction."[2]

Concepts of time in the field of psychology are also quite different from that of astronomy. Time is here conceived, not as "flowing at a constant rate, unaffected by the speed or slowness of the motion of material things,"[3] but as definitely influenced by the number and importance of concrete events occurring in the particular period un-

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[1] It should be stated at the outset that we are not concerned with the controversy of the a-prioristic or empiristic derivation of time as a category. Much of Durkheim's analysis of this problem is vitiated by his efforts to insert it within this controversial context, so that he tends to raise issues not amenable to scientific treatment. The present discussion has some bearing on contemporary problems of *Wissenssoziologie*, particularly those which Scheler has designated as "formal problems" of the sociology of knowledge.

[2] Henri Bergson, *Matter and Memory* (London, 1919), p. 274.

[3] J. Clerk Maxwell, *Matter and Motion* (New York, 1878), p. 28.

der observation. As James pointed out: "In general, a time filled with varied and interesting experiences seems short in passing, but long as we look back. On the other hand, a tract of time empty of experiences seems long in passing, but in retrospect short."[4]

Thus, in actual perception, we are far from experiencing the ideally conceived time which *aequabiliter fluit*. Experiments in the field of psychology have found a difference between the individual's estimate of duration and the actual duration of astronomical time elapsed.[5] In the experience of the individual, time is far from being "infinitely divisible," Zeno's age-honored paradox of Achilles and the tortoise notwithstanding. Various experiments have shown that individuals cannot distinguish time differences of less than one-hundredth of a second.[6]

The very introduction of the concept "mental age" in psychology is evidence of the methodological inadequacy of astronomical chronology in this field. It is found empirically that there is no constant relation between chronological and mental age, so that many psychological considerations of human behavior in relation to "age" demand a temporal frame of reference different from that ordinarily employed. As we shall see, this indictment is even more telling in the social field.

In the field of economics it has likewise been recognized that astronomical or clock time is not always applicable. For example, Marshall, in his famous analysis of economic equilibrium as dependent upon "long" and "short" periods over which the market is taken to extend, early perceived this inapplicability of astronomical time.[7] As Opie puts it:[8]

When he [Marshall] distinguished long and short periods he was not using clock-time as his criterion, but "operational" time, in terms of economic forces at work. Supply forces were given the major attention, and a time was long or

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[4] William James, *Principles of Psychology* (New York, 1922), I, 624; cf. H. Hubert and M. Mauss, *Mélanges d'histoire des religions* (Paris, 1909), p. 207.

[5] Mary Sturt, *Psychology of Time* (London, 1925), chapter on "Duration." This has long been realized. See the experimental analyses by Lotze, Münsterberg, Hemholtz, Bolton, Woodworth, etc.

[6] *Ibid.*, chap. i.

[7] Alfred Marshall, *Principles of Economics* (London, 1925), p. 330.

[8] Redvers Opie, "Marshall's Time Analysis," *Economic Journal*, XLI (June, 1931), 198–99.

short according as it involved modifiability or fixity in some chosen forces on the supply side. The greater the modifiability of the supply forces, the longer the period of time under discussion, *irrespective of clock-time* [italics ours].

The concept of economic time has been expressly singled out for treatment by Erich Voegelin and, somewhat less analytically, by Streller, but it is also tacitly assumed in much of the analysis of Böhm-Bawerk, W. S. Jevons, Otto Effertz, Knut Wicksell, and many other economists.[9]

These various concepts of time and, above all, the revolutionary changes in the astronomical field itself engendered by Einstein's analysis of the notion of simultaneity illustrate the essentially operational criterions of time. If we seek the operations which enable us to determine the time at which social events occur, it becomes manifest that even today all such time determinations are by no means referred to astronomical or even calendrical frameworks. Bridgman has generalized this class of facts, saying that "the methods which we adopt for assigning a time to events change *when the character of the events changes*, so that time may appear in various guises."[10] Thus, social time expresses the change or movement of social phenomena in terms of other social phenomena taken as points of reference. In the course of our daily activities we often make use of this means of indicating points of time. "Shortly after the World War," "I'll meet you after the concert," "when President Hoover came into office," are all related to social, rather than astronomical frames of reference, for the purpose of indicating specific points of time— "time when." Moreover, such references express far more than the nominally equivalent astronomical or calendrical referrents (*"ca.* 1918–19," "11 P.M.," "March, 1929"), for they usually establish an added significant relation between the event and the temporal frame of reference. For example, the very choice of President Hoover's assumption of office as an indication of the time at which, say, two thousand postmasters were replaced by others tells us far more

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[9] Erich Voegelin, "Die Zeit in der Wirtschaft," *Archiv für Sozialwissenschaft und Sozialpolitik*, LIII (1924), esp. 204; Rudolf Streller, *Statik und Dynamik in der theoretischen Nationalökonomie* (Leipzig, 1926), pp. 126 ff.; also his *Die Dynamik der theoretischen Nationalökonomie* (Tübingen, 1928), *passim*.

[10] Percy W. Bridgman, "The Concept of Time," *Scientific Monthly*, XXXV (August, 1932), 97. Cf. the entire symposium on "The Time Scale" in the same number of this journal.

than the statement that such replacements occurred in March of 1929. In other words, the calendrical reference itself becomes significant only when it is transformed into social time. The methodological importance of this will be discussed later.

In a similar fashion we indicate durations of time by such references as "for a semester," "for a working day," "for the duration of Lent." These are references to generally comprehensible time durations without any mention of astronomical phenomena. Moreover, there is no fixed relationship between the first two of these durations and astronomical phenomena, since these social intervals may vary independently. Such designations, if they are not survivals of a very common means of indicating a tract of time among primitive peoples, at least perform the same function.

To indicate the duration of time, primitive peoples make use of other means, *derived from their daily business*, which have nothing to do with time reckoning; in Madagascar, "rice-cooking" often means half an hour, "the frying of a locust," a moment. The Cross River natives say: "The man died in less than the time in which maize is not yet completely roasted," i.e. less than about fifteen minutes; "the time in which one can cook a handful of vegetables."[11]

The time expressions, both of duration and indication, are in reference to social activities or group achievements. Those periods which are devoid of any significant social activity are passed over without any term to denote them.[12] Time here is not continuous—the hiatus is found whenever a specific period is lacking in social interest or importance. The social life of the group is reflected in the time expressions. The names of days, months, seasons, and even of years are fixed by the rhythm of collective life. A homogeneity of social beats and pulsations of activity makes unnecessary astronomical frames of reference. Each group, with its intimate nexus of a common and mutually understood rhythm of social activities, sets its time to fit the round of its behavior.[13] No highly complex calcula-

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[11] Martin P. Nilsson, *Primitive Time Reckoning* (Lund, 1920), p. 42. Numerous examples of social designations of time duration and indication appear in the ethnographic literature. See, e.g., the monographs of J. H. Hutton, J. P. Mills, W. Hough, J. Roscoe, A. C. Hollis, R. Firth, W. H. I. Bleek, and L. C. Lloyd.

[12] Cf. Elsdon Best, *The Maori Division of Time* (Dominion Museum Monograph No. 4 [1922]), p. 19.

[13] Sturt, *op. cit.*, p. 141. ". . . . Time is a concept, and this concept is constructed by each individual under the influence of the society in which he lives."

tions based on mathematical precision and nicety of astronomical observation are necessary to synchronize and co-ordinate the societal behavior.

Thus, the Khasis name their months according to the activities which take place in each: "the month for weeding the ground," "the month when cultivators fry the produce of their fields," etc.[14] In the Meitheis tribe all time reckonings are in accordance with the *chahitaba:* each year is named after an important personage.[15] Codrington says of the Melanesian system that "it is impossible to fix the native succession of months into a solar year; months have their names from what is done."[16] Among the Navajos, "the names of the calendar months are vividly descriptive of the life of the family, as well as of the life-round of the sheep controlled by them."[17]

We see, then, that systems of time reckoning reflect the social activities of the group. Their springs of initiation are collective; their continued observance is demanded by social necessity. They arise from the round of group life, are largely determined by the routine of religious activity and the occupational order of the day, are perpetuated by the need for social co-ordination, and are essentially a product of social interaction. Durkheim lucidly observed in this connection that a "calendar expresses the rhythm of collective activities, while at the same time its function is to assure their regularity."[18]

Agricultural peoples with a social rhythm different from that of hunting or of pastoral peoples differentiate time intervals in a fashion quite unlike the latter. Periodic rest days seem to be unknown among migratory hunting and fishing peoples or among nomadic pastoral tribes, although they are frequently observed by primitive agriculturists.[19] Likewise, a metropolis demands a frame of tem-

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[14] P. R. T. Gurdon, *The Khasis* (London, 1914), p. 193.

[15] T. C. Hodson, *The Meitheis* (London, 1908), p. 105.

[16] R. H. Codrington, *The Melanesians* (Oxford, 1891), p. 349.

[17] D. and M. R. Coolidge, *The Navajo Indians* (Boston and New York, 1930), p. 60. The previously mentioned ethnographers, among others, describe further instances (see n. 11).

[18] Emile Durkheim, *Elementary Forms of Religious Life* (New York and London, 1926), p. 11.

[19] Hutton Webster, *Rest Days* (New York, 1916), pp. 101 ff.

poral reference entirely different from that of a small village. This
is to say, time reckoning is basically dependent upon the organiza-
tion and functions of the group. The mode of life determines which
phenomena shall represent the beginning and close of seasons,
months, or other time units.[20] Even in those instances where natural
phenomena are used to fix the limits of time periods, the choice of
them is dependent upon the interest and utility which they have for
the group. Thus, the year among the Hebrews, "as naturally it
would with an agricultural people," depended upon the annual
course of the crops.[21] The system of time varies with the social
structure.

Astronomical time is uniform, homogeneous; it is purely quanti-
tative, shorn of qualitative variations. Can we so characterize social
time? Obviously not—there are holidays, days devoted to the ob-
servance of particular civil functions, "lucky" and "unlucky" days,
market days, etc. Periods of time acquire specific qualities by virtue
of association with the activities peculiar to them. We find this
equally true of primitive and more complex societies. Thus, says
James:

> An ingenious friend of mine was long puzzled to know why each day of the
> week had such a characteristic physiognomy for him. That of Sunday was soon
> noticed to be due to the cessation of the city's rumbling, and the sound of peo-
> ple's feet shuffling on the sidewalk; of Monday, to come from the clothes drying
> in the yard and casting a white reflection on the ceiling; of Tuesday, etc. . . . .
> Probably each hour in the day has for most of us some outer or inner sign associ-
> ated with it as closely as these signs with the day of the week.[22]

Taoism prescribes, according to the "magical universistic" book of
chronomancy, "the propitious days on which to contract marriages,

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[20] Nilsson, *op. cit.*, pp. 58 ff.; cf. Hubert and Mauss, *op. cit.*, pp. 219 ff.

[21] F. H. Woods, "Calendar (Hebrew)," in *Encyclopaedia of Religion and Ethics*,
III, 108.

[22] James, *op. cit.*, I, 623. F. H. Colson summarizes the functional importance of
social definitions of time-intervals: "How do we ourselves remember the days of the
week? The obvious answer is that something happens on one or more of them. If by
some means or other we lose count in the course of the week, Sunday is unmistakable,
even if personally we have no religious feeling about the day. So, too, school half-
holidays or early-closing days force themselves on the notice of those who are not di-
rectly affected by them. But if nothing happens it is very doubtful whether a week-
sequence could maintain, much less establish, itself" (*The Week* [Cambridge, 1926],
p. 63).

or remove to another house, or cut clothes; days on which one may begin works of repair of houses, temples, ships."[23] The Mohammedans consider Monday, Wednesday, Thursday, and Friday to be fortunate days; Tuesday, Saturday, and Sunday to be evil and unfortunate days. Friday is observed as a holy day, a day of rest, by the Mohammedans, in the same way as Saturday by the Jews and Sunday by the Christians. Among the Greeks the calendar had a definitely sacral character with a complete designation of lucky and unlucky days. Thus, the fourth and twenty-fourth were considered as dangerous days for some enterprises; the fifth as utterly unlucky; the sixteenth as an unlucky birth- or marriage-day for a girl; the fourteenth as a good day to break in cattle.[24]

We need hardly remark that we are here not concerned with the validity of what is expressed by these beliefs. They are, in any case, social facts; they reveal the various qualities actually attributed to definite units of time; they serve to indicate that a merely quantitative measure of time will not account for the qualities with which the various time units are endowed by members of a group. Quantitative approaches ignore the fact that "the human mind does tend to attach an unusual value to any day in the calendar that is in any way outstanding."[25] From this it does not necessarily follow that social time has no quantitative aspects, but it does appear that it is not a pure quantity, homogenous in all its parts, always comparable to itself and exactly measurable. In judgments of time there enter considerations of aptitude, opportunity, continuity, constancy, and similarity, and the equal values which are attributed to time intervals are not necessarily equal measures.[26]

These differences in quality lead to the dependence of relative values of time durations not only on their absolute length but also on the nature and intensity of their qualities. Quantitatively equal periods of time are rendered socially unequal and unequal periods

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[23] J. J. M. de Groot, *Religion in China* (New York, 1912), pp. 245 ff.

[24] Cf. Hesiod, *Book of Days* (London, 1858): "a perpetuall Calendar of Good and Bad Daies; Not superstitious, but necessarie (as farre as naturall Causes compell) for all Men to observe."

[25] A. L. Kroeber, *Anthropology* (New York, 1923), p. 262.

[26] Hubert and Mauss, *op. cit.*, p. 208. See especially the able discussion of the qualitative aspects of time in the chapter on "La représentation du temps."

are socially equalized. For example, "the numerically equivalent parts of the Hindu *kalpas* are not conceived as being of equal duration."[27] Or, similarly, the Chongli measure long periods of time by generations (the term of office of each set of elders) which may be quantitatively unequal but which are nevertheless regarded as equal by virtue of their identical qualitative aspects.[28]

Summing up, we may say that thus far our investigation has disclosed the facts that social time, in contrast to the time of astronomy, is qualitative and not purely quantitative; that these qualities derive from the beliefs and customs common to the group and that they serve further to reveal the rhythms, pulsations, and beats of the societies in which they are found.

Mathematical time is "empty." It has no marks, no lacunae, to serve as points of origin or end. Yet the calendar-maker requires some sort of starting-point or fixed datum. Some beginning, arbitrary or not, must be set in order to initiate any system of time reckoning which purports to be continuous. For this purpose "recourse has generally been had to the date of some civil historical occurrence conventionally selected."[29] In all cases the point of departure is social or imbued with profound social implications; it is always an event which is regarded as one of peculiar social significance.[30]

Thus, there have been introduced such social frames of reference as the death of Alexander or the Battle of Geza among the Babylonians, the Olympiads among the Greeks, the founding of Rome (*anno urbis conditae*) and the Battle of Actium among the Romans, the persecution of Diocletian and the birth of Christ among the Christians, the mythological founding of the Japanese Empire by Jimmu Tenno and the discovery of copper (Wado era) in Japan, the Hegira among the Mohammedans, the event of the white pheasant having been presented to the Japanese emperor (Hakuchi era).[31] "Egypt

[27] *Ibid.*, p. 207.   [28] Mills, *The Ao Nagas*, p. 400.

[29] Alexander Philip, *The Calendar* (Cambridge, 1921), p. 48.

[30] Cf. Maurice Halbwachs, *Les Cadres sociaux de la mémoire* (Paris, 1925), pp. 71 ff. See also Durkheim, *op. cit.*, pp. 10–11; E. Durkheim and M. Mauss, "De quelques formes primitives de classification," *L'Année sociologique*, VI (1901–2), 1–71.

[31] F. K. Ginzel, *Handbuch der matematischen und technischen Chronologie* (Leipzig, 1906), I, 136, 222, 238, *passim*. Ginzel's monumental three volumes contain a wealth of historical data pertaining to this subject.

never had any idea of dating the annals except by the years of rule of the reigning Pharaoh."[32] The Armenians likewise reckoned by the number of years of the kings or of the patriarchs. From these few examples culled from an almost inexhaustible store we see some justification of the proposition that nations form their eras in terms of some remarkable event which has social implications.

Thus, we cannot carry over into social time the characteristic of continuity which is postulated in the Newtonian conception of astronomical time.[33] Critical dates disrupt this continuity. Nilsson, whose study of primitive time reckoning is perhaps the most thorough, is insistent on this point. The *pars pro toto* principle of time reckoning (i.e., the counting, not of units as a whole, but of a concrete phenomenon occurring but once within this unit) suggests that calculations of time are essentially discontinuous. The natural year may be continuous, but that of the calendar has both a beginning and an end, which are frequently marked by temporal hiatus and are usually observed with some sort of social ceremony.

The common belief which holds that divisions of time are determined by astronomical phenomena is far from accurate.[34] Our system of weekly division into quantitatively equal periods is a perfect type of conventionally determined time reckoning. The Khasi week almost universally consists of eight days because the markets are usually held every eighth day. A reflection of the fact that the Khasi week had a social, rather than a "natural," origin is found in the names of the days of the week which are not those of planets (a late and arbitrary development) but of places where the principal markets are held. In a similar fashion the Roman week was marked by *nundinae* which recurred every eighth day and upon which the agriculturists came into the city to sell their produce. The Muysca in Bogotá had a three-day week; many West African tribes, a four-day week; in Central America, the East Indian Archipelago, old

[32] George Foucart, "Calendar (Egyptian)," in *Encyclopaedia of Religion and Ethics*, III, 92.

[33] Marshall had likewise conceived of the possibility that the assumption of continuity is not justified in the case of economic phenomena (see n. 7).

[34] Nilsson, *op. cit.*, p. 281: "It should not be forgotten that astronomy and the calendar are not identical. In matters of the calendar, practical utility is welcomed more than refined astronomical calculations."

Assyria (and now in Soviet Russia), there is found a five-day week; the population of Togo had a six-day week; the ancient Hebrews and most contemporary civilized societies, a seven-day week; examples of the eight-day week may be had among the Romans, Khasis, and many African tribes; and the Incas had a ten-day week. The constant feature of virtually all these weeks of varying lengths is that they were always found to have been originally in association with the market.[35] Colson indicates quite clearly that the earliest forms of the continuous week of which we have any knowledge were justified by the groups which used them on grounds which have nothing to do with the moon.[36] The appearance and spread of this time unit was always in conjunction with some periodically observed social event and did not come about through observation of the heavenly bodies. Moreover, as Hutton Webster perspicuously suggests, some phase of the social structure usually accounts for the variations in the length of the week.

The shorter intervals of three, four, and five days reflect the simple economy of primitive life, since the market must recur with sufficient frequency to permit neighbouring communities, who keep on hand no large stocks of food and other necessaries, to obtain them from one another. The longer cycles of six, eight, and ten days, much less common, apparently arise by doubling the earlier period, whenever it is desired to hold a great market for the produce of a wide area.[37]

In like manner the duration of the month is not necessarily fixed by the phases of the moon. Mommsen states, for example, that among the Romans there was a calendar system "which practically was quite irrespective of the lunar course" and which led to the adoption of "months of arbitrary length."[38] This same disregard of the moon's course in the determination of month durations has continued to the present. Unequal periods of astronomical time are socially equated, as is evidenced by the practice of paying monthly salaries. The equality of months is conventional, not astronomical; social duration does not equal astronomical duration, since the former is a symbolic, the latter an empirical, duration.

[35] *Ibid.*, p. 363.   [36] Colson, *op. cit.*, pp. 3, 112–13.

[37] *Op. cit.*, pp. 117–18.

[38] Theodor Mommsen, *History of Rome* (New York, 1885), I, 279. See, in connection with this subject, the whole of chap. xv.

Even today the pervasive "coloration" of astronomical time by social considerations is manifest—witness the new convention of "daylight-saving time." The desired result, an increased number of daylight hours for recreation and leisure, could have been attained simply by shifting working hours to 8 :00 A.M.—4 :00 P.M. But the "9 :00 to 5 :00" designation has become so deeply rooted in our economy that the presumably less violent innovation of changing the numerical designations of units within the twenty-four-hour cycle was deemed preferable. The conventional nature of time designation is thus clearly emphasized.

All calendrical systems have one characteristic in common. They arise from, and are perpetuated by, social requirements. All social events which are periodical, which demand, at a certain time, the presence of a number of individuals (particularly when they come from different social groupings or from some one large social group) necessitate some common means of time designation which will be mutually understood by those concerned. Religious ceremonies, rites, seasonal festivals, hunts, military expeditions, markets, intertribal conferences, and the like—all of which demand the complex co-operation of many persons at a fixed time—are the origins of a strictly defined system of time indication. Those systems of time which are common among small, closely interwoven groups participating in the same social rhythm are no longer adequate as the field of interaction expands. Individuals coming together from varied social and cultural backgrounds require some temporal scheme which will be equally intelligible to all if they are to synchronize and co-ordinate their activities.

In ancient cities there first arose the significantly large congregation of individuals with different backgrounds. Then it was that there became manifest the necessity of creating a frame of reference which would be mutually comprehensible. Thus, among the Latins:

When city life began it was naturally found necessary to have a more exact measure of the *annus* and the religious events included in it. Agriculture was still the economic basis of the life of the people; and in keeping up the agricultural religious rites within the city it was convenient, if not absolutely necessary,

to fix them to particular days. This was, beyond doubt, the origin of the earliest (?) calendar of which we know anything.[39]

Similarly, it was the necessity for regulating the religious cult that "first created the calendar in Greece."[40] And, according to Spinden, even the apparently strictly astronomical calendar of the Mayas was fundamentally for religious purposes.[41]

The foregoing argument may be summarized by a number of basic propositions. Time systems are numerous and varied, differing also in their effective applicability to events of different character. It is a gratuitous assumption that astronomical or even calendrical time systems are best fitted for designating and measuring simultaneity, sequence, and duration of social phenomena. All time systems may be reduced to the need of providing means for synchronizing and co-ordinating the activities and observations of the constituents of groups. The local time system varies in accordance with differences in the extent, functions, and activities of different groups. With the spread of interaction between groups, a common or extended time system must be evolved to supersede or at least to augment the local time systems. Since the rhythm of social activities differs in different groups or within the same highly differentiated society, local systems of time reckoning are no longer adequate. Even bionatural events (e.g., maturation of crops) no longer suffice as a common

[39] W. Ward Fowler, "Calendar," in *Encyclopaedia of Religion and Ethics*, III, 133. Cf. the observation by Georg Simmel, who notes that the conditions of the metropolis are such that "the relationships of the typical urban resident are so manifold and so complicated and, above all, are so interwoven into an organism of so many parts through the agglomeration of so many persons with such differentiated interests, that the whole would break down into an inextricable chaos without the most exact punctuality in promises and performances . . . . [without] an unambiguity in appointments and agreements, similar to that which is mediated externally through the general diffusion of watches" (P. A. Sorokin, C. C. Zimmerman, and C. J. Galpin, "Large Cities and Mental Life," *A Systematic Source Book in Rural Sociology* [Minneapolis, 1930], I, 244).

[40] Nilsson, *op. cit.*, p. 366.

[41] H. J. Spinden, "Maya Inscriptions Dealing with Venus and the Moon," *Bulletin of the Buffalo Society of Natural Sciences*, Vol. XIV, No. 1 (1928); cf. Philip, *op. cit.*, p. 7: ". . . . It is found that luni-solar calendars have a preëminently sacral or religious origin."

framework of temporal reference as the area of interaction is en-
larged, since these phenomena do not occur simultaneously in differ-
ent areas. The final common basis was found in astronomical phe-
nomena and in the more or less widespread diffusion of conventional-
ized time continuities. Thus, the social function of time reckoning
and designation as a necessary means of co-ordinating social activity
was the very stimulus to astronomical time systems, the introduction
of which was made imperative by the inadequacy of local systems
with the spread of contact and organized interaction and the result-
ing lack of uniformity in the rhythms of social activities. Astro-
nomical time, as a "time esperanto," is a social emergent. This
process was more rapidly induced by urbanization and social differ-
entiation which involved, with the extension of multi-dimensional
social space, the organization of otherwise chaotic, individually vary-
ing, activities.

Local time systems are qualitative, impressed with distinctly
localized meanings. A time system aimed to subsume these qualita-
tively different local systems must necessarily abstract from the
individual qualities of these several systems. Hence, we see the
important social element in the determination of the conception of a
purely quantitative, uniform, homogeneous time; one-dimensional
astronomical time was largely substituted for multi-dimensional so-
cial time.

For facilitating and enriching research in the field of social dy-
namics, the concept of social time must be reintroduced as an aux-
iliary, if not as a successor, of astronomical time. The search for
social periodicities based upon the unquestioned adoption of astro-
nomical criterions of time may have been largely unsuccessful pre-
cisely because social phenomena involve "symbolic" rather than
"empirical" equalities and inequalities; social processes which at
present seem to lack periodicities in terms of astronomical measures
may be found to be quite periodic in character in terms of social
time. It is at least worthy of trial. The possible objection that such
efforts would simply resolve themselves into correlations between
different sets of social phenomena is tenable only if one ignores the
fact that the usual procedures simply involve correlations between

astronomical (or calendrical) and social phenomena. Moreover, what are the theoretical grounds, tacit or expressed, for expecting correlations between astronomical and social sequences?[42] And, finally, what is the possible significance of such correlations when they are found? The fact is—and to the best of our knowledge its implications have been persistently overlooked—that *when social and astronomical ("time") phenomena are related, other social correlates of the same astronomical phenomena must be ascertained before these relations take on any scientific significance.* Otherwise, these constitute but empirical uniformities which remain theoretically sterile. If we are to enhance our knowledge of the temporal aspects of social change and processes, we must enlarge our category of time to include the concept of social time.

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[42] Were it not for the fact that many social scientists still ignore this elementary rule of procedure, one need hardly emphasize the principle that statistical correlations should be employed only to test conclusions arrived at on other grounds (cf. John M. Keynes, *A Treatise on Probability* [London, 1921], p. 426).