"but let Time's news Be known when 'tis brought forth"

Time's News

An Aperiodic Newsletter

Time's News No 30 *International Society for the Study of Time* February 2000

Call For Papers

The International Society for the Study of Time
will hold its eleventh conference
July 1-7, 2001
at the Castello Di Gargonza,
90 Kms from Florence, Italy.
The occasion marks the 35th anniversary of the founding of the Society,
an interdisciplinary professional organization.

The theme of the conference is:

Time and Uncertainty

The Society welcomes papers that address the topic of uncertainty from a temporal perspective in scholarly areas such as the sciences, social sciences, and the humanities.

Proposals for papers are herewith solicited. Proposals should include a preference for one of two presentation formats: pre-circulated papers to be summarized in ten minutes followed by a twenty-minute discussion period or papers to be read/presented in twenty minutes followed by a ten-minute discussion period. All papers must be presented in English.

Whereas all papers delivered at the conference will be considered for inclusion in Volume XI of *The Study of Time*, papers that specifically reflect the topic "Time and Uncertainty" will receive a higher priority.

The 2001 conference will include poster sessions. If you would like to present a poster installation, please specify that preference in your proposal.

Proposals should be approximately 300 words in length and submitted in triplicate to:

Thomas Weissert, Executive Secretary
P.O. Box 436
Wynnewood, PA 19096, USA

The deadline for submission is **July 15th, 2000**. Electronic submissions in an appropriate format sent via email to ISST@Studyoftime.org by the given deadline will also be acceptable.

The Society is seeking volunteers for session chairs, whose names will be included on the printed program.

A Word from the President

The symposium "Time and Globalization," to which most of this issue of Time's News is devoted, was a joint initiative from ISST and AFAS, the French Association for the Advancement of Sciences. It was held at the prestigious Palais de la Découverte, in Paris on November 5, 1999, thanks to the hospitality of the Director, Mr. Jean Audouze.

My personal role in this event consisted in proposing the theme and planning the co-sponsorship with AFAS. The theme was particularly appealing and complementary to the theme of our last triennial conference, *Time at the Millenium,* in face of the reshaping of the technical, economical and social organization of the society that we are presently witnessing. The collaboration with AFAS was suggested by the fact that the latter is one of the most ancient interdisciplinary associations in France. Once both ideas had been approved by the Council of ISST and the Board of AFAS, some constraints on the format of the symposium were evident. One of them was the limitation in the number of speakers, and the second was language: speakers were given the possibility of presenting their contribution either in French or in English. We overcame the first difficulty by calling for written contributions, and the second was partly alleviated by distributing to the participants extended abstracts in both languages (these were assembled in the Booklet of Abstracts as a special issue of SCIENCES, the AFAS bulletin). Finally, in my opinion and, I understand, in the opinion of many participants, all this worked remarkably well. Contributions were quite diverse, but full of provocative observations and ideas. Discussions always had to be painfully abbreviated, cutting into passionate exchanges. Thus, this experience should encourage us to engage in other joint initiatives in the future if they present themselves, or if our members wish to launch them with the approval of the Council. This would complement our main activity well, which remains, of course, the preparation of the triennial conference and the subsequent publication of the series, *The Study of Time XI.* This volume, as you know, will be devoted to the wonderful subject of *Time and Uncertainty.* (RL)

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The Founder's Column

"Hang up philosophy!" said Romeo to Friar Laurence. "Unless philosophy can make a Juliet. . . It helps not, it prevails not: talk no more." Instead of philosophy, he could have named all fields of human endeavor from abstract art and algebra to zoology, because none of them could make a Juliet. Nor could any of them, in itself, claim access to all forms of understanding and experiencing time. It is likely that they cannot do so even when working together, but at least they have a better chance. Hence the need for an interdisciplinary study of time.

But there are certain difficulties inherent in all attempts for an integrated study of time.

First, there are profound disagreements regarding acceptable methods of reasoning, acceptable working assumptions, and acceptable ways of

demonstrating truth.

Second, there is a language problem. Each field of knowing has its own vocabulary with words peculiar to it and each uses common words to which particular, uncommon meanings are given. Also, each field uses certain stock phrases, often unanalyzed, and each has preferred ways of saying things.

Third, there is a problem that may be called the personalities of knowledge. It is a truism that personality traits are decisive in the choice of occupation. Individuals express those traits by creating different branches of skills. The wisdom of language helps here. We speak of a flock of sheep, a price of lions and a pod of seals. We could also speak of a laboratory of physicists, a log table of mathematicians, a bevy of sociologists, a studio of painters and a couch of psychoanalysts. Each of these groups represents different preferences in the pursuit and testing of truth, and in their judgements as to what material is important to pursue.

In addition, all claims about the nature of time tend to be emotionally loaded because, directly or indirectly, they address questions of life and death. The foremost stages of exchanges among laboratories, log tables, bevies, studios and couches should be that of university campuses. Unfortunately, they are not. But fortunately, such exchanges have been among the benefits of our conferences. If we are to keep on taking advantage of these benefits, then it will remain necessary for each participant to possess certain qualifications.

First, that of a serious depth of accomplishment within his or her own field. Second, familiarity with other fields of knowing expected of a well-educated person. Third, an enthusiasm for appreciating the challenges and a degree of humility to admit to the limitation of human knowledge.

These thoughts close this, the last Founder's Column which I plan to contribute to Time's News though, hopefully, it will not be my last contribution to an integrated study of time.

Time's News was started in 1974. After twenty-six years it is appropriate for a new generation to take it over.

(JTF)

Message from the Executive Secretary

Greetings fellow time scholars. Do you speak Italian? Now would be a good time to pull out those language tapes. I know I'm excited about the next triennial conference (see the call for papers in this newsletter). If you would like extra copies of the flyer, or the electronic file that produces them, drop me an email, and I'll send some off to you. Be sure to post them wherever there might be budding time scholars interested in coming to our next meeting.

Item of business: I have been charged by the council with taking a vote of the membership on the following proposed change to our constitution. It has been proposed that, beginning with our next election (2001), the elected vice-president shall automatically succeed to the presidency after serving the three-year term as vice-president. In this way we obtain a six-year commitment from our leaders and ensure a better degree of continuity in leadership as each president will have the opportunity to "learn the ropes" during his or her tenure as vice-president. Thus, if adopted, this amendment will make the next elected president the last one we elect directly (in 2001), because the next elected vice-president will thereafter succeed directly to the presidency in 2004. I will accept votes from you for the next three months, until the end of May 2000, at which time I will present the summarized vote to the council, and include the results in the next newsletter. To participate in the vote please do one of the following: Send a brief email to me with the subject "vote" and a yes or no in your message:

ISST@Studyoftime.org

or use the member information form on our website:

http://www.studyoftime.org

or send a letter to my post-office box:

Executive Secretary, ISST
P.O. Box 436
Wynnewood, PA, 19096 USA

Our web site will be expanding soon. I will be adding a report on our recent one-day meeting in Paris, an expanded scholarship section to include links to other time-related sites, and information on the Castello di Gargonza, the site of our next triennial meeting. There are lots of other exciting possibilities being explored for the web site too, including a password-protected section to house the membership directory, an online time bibliography, and an extensive listing of time-related conferences. If you have any other ideas for the web site, send them along. It's your web site too.

On other fronts, the J.T. Fraser Prize committee is busy reading lots of great books, but there are probably more good books still out there that you know about. If you want to nominate any outstanding books on time (published in English by a single author between 1997 and 1999), send me a quick note with the title, author, year, and publisher, and I'll make sure the committee gets the information.

As the number of paid members is more than double the number who have given me their email address, I'm convinced some of you have email but have not yet sent me your address. The ISST-L listservice is the best way of getting up-to-the-minute news and information about the study of time, and the only way you can participate is by sending me your email address.

Finally, please remember to keep me informed of any changes of address so that I can keep the membership list up to date. The form on the web site is a direct line to me, and it's easy to use. Good luck on your time-related efforts; I look forward to reading your proposals over the next few months. July 15th is coming up fast.

Happy next millennium (when it arrives),

Thomas Weissert

from Mignon

Johann Wolfgang von Goethe

Kennst du das Land, wo die Zitronen blühn,
Im dunkeln Laub die Gold-Orangen glühn,
Ein sanfter Wind vom blauen Himmel weht,
Die Myrte still und hoch der Lorbeer steht,
Kennst du es wohl?

Do you know the land where the lemon trees bloom, and the golden oranges glow in the dark foliage; where a gentle wind blows from the blue sky; where the myrtle is still, and the laurel stands high—
Do you know the land?

Editor's note: These words by Goethe come to mind as our thoughts turn towards Italy and the 2001 ISST conference.

TIME AND GLOBALIZATION

A one-day ISST-AFAS Symposium held at Palais de la Découverte, Paris
on November 5, 1999.

ORAL PRESENTATIONS

Joël de Rosnay°

Fractal time and time as capital : new ways to experience time

1. A highly complex system (such as a living cell, or a large network of computers) traps a certain amount of time. Through this closure, it creates a bubble of time, which is its own proper time, and which represents the environment of its evolution. Human creation nourishes itself on the degradation of energy into entropy, but saves some time in the great reservoir constituted by information.

The amount of information available to each person, measured in bits by neurons and processed with the help of the complementary prostheses of the brain, is nowadays increasing at an exponential rate. The intensity of time is increasing. Temporal bubbles form and evolve with their own dynamics. The creation of new information, the sharing of information through new networks curve space-time, produces a basin, an attractor. In contrast to the way in which thermodynamic capital is diminished when one uses it, irreversibly transforming itself into entropy, what could be termed a "symbiotic" capital increases its value with increased usage: it produces more and more interests.

If one adopts a non-linear management of one's time, one can generate niches for new activities, without necessarily eliminating others. To reach this goal, it is necessary to invest time in the creation of a Capital-Time. This new approach to time seems to me to lie deep at the heart of symbiotic evolution.

2. In order to describe the processes of evolution, I often use words such as accele-ration, autocatalysis, or self-organization, as well as more common terms like revolution, mutation, crisis, or rupture. These terms introduce a particular relation between time and duration. Words such as revolution, mutation, and explosion, express the non-linearity of phenomena, their exponential acceleration, and (as I will explain below) the premise of blocking a sector through virtuous circles. This scenario describes the case of the explosion in communications. The merging of networks, of computational and multimedia techniques, increases the density of time so much that the whole sector is self-selected, and self-organizes from a substrate of lower density. Planetary co-evolutions that occur between the biosphere, the technosphere and the ecospheres (both the economical and the ecological ones) and now the introsphere, evolve at different rates of processing; each of these respective spheres become more immaterial all the time, and link up inside several superposed evolutionary layers. At the scale of the world, the isolation of the more developed societies in their highly densified temporal bubbles poses the problem of exclusion. In a world with scarce resources, the ever-quickening appropriation of vital flows by the few progressively eliminates larger and larger numbers from the human race. The densities of the flow of time are mutually exclusive, in the way that two people who want attempt to exchange objects, one riding in a high-speed train and one riding a bicycle, are prevented from crossing paths with one another. Yet such an exchange is absolutely necessary if one wants to avoid irreversible processes of radical exclusion among communities, peoples and nations. The cybiont begins its development and evolves in a temporal bubble which is overaccelarating. It is the duty of mankind to avoid the creation of prejudiced inequalities that would jeopardize its own future.

3. The greatest challenge of the future will not be a technical one, but a social one. The big choice that humankind is facing, and which we probably will have to make as soon as the next century, will

be to slow down the blind flight of the privileged few, and to organize our society and our planet for the well-being of all men and women. The formative choices of tomorrow will not entail whether to synchronize different times according to standards set by an elite, but the harmonization of those times. Sharing, solidarity and a harmonization of times with respect for differences will be the new rules, the new modes of a symbiotic mankind.

Symbionomics leads toward a unified approach of organizations and of time, leading to human action, either individual or collective. Natural and artificial matters, arts and technologies, cultures and civilizations are now linked together in a coherent ensemble. To conceive and to plan the cybiont for the wellbeing of mankind, thanks to a better knowledge of natural laws, represents the new horizon for the human world in the next millenium.

Everything that gives human beings the potential to innovate renders them the master of their own future. Creation is what saves time. Saved time, put in parallel with natural flows, densifies duration. Salvation lies in the present, dilated from within. The future of the world, a minuscule spot in a cold and distant universe, no longer depends solely on cosmological spaces. The future of the world is inside the time of human beings. The time of the cybiont and perhaps also a time of even deeper and denser superorganism will come after it.

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Javier Santiso°

Remembering the future: on the paradoxes of the time of global finance

This work investigates the dynamics of the accelerations which are inherent to global time (as Braudel uses the term), with particular emphasis on the interactions between the time of nations and the time of markets. The time of financial operators is one of a world without memory, where past events are less important than those to come. The only important events are those that are dated back from the future. These operators are indeed signposts of the future, their job is to anticipate, to look forward. In this world without memory world, snapshots of history dominate, and chronicles hardly linger for a moment. Each event erases the preceding one, each new crisis pushes the previous one into oblivion. The worldview of the financial operators could be that which Fernand Braudel described in his writings on history: "I still have the memory, one night, near Bahia, of having been surrounded by a fireworks of phosphorescent fireflies. Their pale lights exploded, went out, then shined again without piercing the darkness with any clarity. In the same way events pass: beyond their glimmers, obscurity remains victorious." And so it goes with the world of international finance: once its transient glow disappears, sometimes in a fraction of a second, or at most in a couple of hours, the firefly is extinguished and the analysts turn their interest to another, emerging market, where other fireflies break out and shine in turn with a glow as bright as that of the previous one. And when people do think over past events, as in October 1997, at the occasion of the tenth anniversary of 1987 stock market crash, it is above all in the hopes of overstepping the next crisis on the horizon.

The temporal paradoxes that are inherent to the functioning of financial markets could themselves be the subject of a deep analysis. One of them, and not the least, is to give an original response to the question asked by the physicist Stephen Hawking, who, in the introduction of one of his essays, was wondering why we should remember the past and not the future.

In many ways, financial markets, by the way of anticipation, are remembering the future: they have the ability to turn a hypothetical future into effective reality, thus collapsing temporal horizons into the immediate present, so that problems that might occur in a more or less distant future are dealt with right away, in the very present. The nature of financial markets is to

break down the longest term projections, and thereby unlock for the time being and the immediate future the synchronizations present in them. Financial markets translate projections into actions immediately and radically in a way that cannot be found in any other sphere. They jostle each other in a tremendous rhythm, emerging and subsiding, caught up in a new projection. If there is not a memory of the past, there is by contrast a memory of the future. The most striking example is no doubt the market of issuing bonds to 100 years, where enterprises such as IBM, Coca-Cola or Disney committed themselves to pay interests to their investors for 100 years. In other words, they offer investors to bet that in 100 years these companies will always be there, a bet investors accept.

Anticipating the future by the forming of projections is not specific to the world of finance. It is the nature of all human enterprise. But here it is not so much a question of an opening towards the future, but rather the ability to break with its own past. In the real economy, the inertia of the production system imposes a slower dynamics of adjustment, with a characteristic time of the order of a decade. The political context is also slowed down by the cumbersomeness of institutional structures and constitutional timetables, and remains weighed down by social rigidities. As compared to the market, the State thus appears more like the master of slowness than that of speed. The financial market, in total contrast, is able to transform a potential future into an effective reality, which from being improbable becomes, through the dynamic of projections, a self-fulfilling prophecy. In addition, the market possesses a very high capacity for amnesia; each projection has a relatively short lifetime and is irremediably pushed into oblivion by another projection.

We are already forgetting the Asian and Russian crises in order to worry about that of Brazil or Argentina, or even about the vertiginous acceleration of the Dow Jones, which has crossed the 10,000 points mark in March 1999.

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John Michon°

Globalization and the Use of Time

The structure of globalized time

From a psychonomic point of view it is relevant to ask to what *use* time can be put given the current trends towards globalization. Many physicists and a good number of philosophers have argued that the constituent structure of time in nature is determined by the relation before and after defined on any two events that happen – and little more than that. Unfortunately this skeletal view of time fails to account for the tremendous phenomenological richness of our temporal experience.

Conventional time –some would prefer terms such as social time or public time– is a relatively late product of our cognitive endowment, enabling people to stay in tune with their social environment. In other words, *social time is the product of an evolved capacity for the learning of procedures and strategies that bring us temporal independence from our environment.* Such independence is important, because it increases the capacity of survival of both the species and the individual, and also because it allows us to *apply* time and to *assign a value* to it. Conventional time, thus conceived, has produced a variety of more or less stable strategies, some of which appear to be driving forces towards globalization. *Quo vadimus?*

Conventional time is many things at once

- *Time as an event system.* One view is that social systems are event systems. They have acts as elements rather than individuals. On this view the organism is a point of intersection between a number of temporal perspectives, which is a perspective that has in fact been adopted by a good number of theoretical psychologists.

- ***Time as a multidimensional autobiography.*** Modern people split their lives in a number of relatively independent time lines,

that is, into separate thematic histories. This makes remembering facts from such a history easier than retrieving them from an undivided personal autobiography. Relating events from different time lines, on the other hand, is extremely difficult, except when the events can be easily connected to certain dramatic events, such as the assassination of President Kennedy in 1963. Importantly, in this view the individual is the focus of a number of processes. People differ from animals because they can share perspectives with others, or adopt someone else's point of view. On this view the common world is the result of common acts and socialization is the ability to be several things at once.

- *Time as a governor of daily life.* Time is a regulator of daily life: it allows the individual to count on the occurrence of certain important events, such as meals and meetings. As such it can be of fundamental importance for people's comfort and feelings of security although, on the other hand, too strict a regimen may induce neurotic symptoms in some people.

- *Time as a resource. Time* is also a resource and, as such, it is considered valuable. Being one of the most egalitarian endowments of humanhood – everyone acquires 24 hours per day every day which we cannot save up – time has acquired a relatively high value in western society. Depending on the circumstances, however its value may fluctuate wildly from moment to moment, depending on the events which occur in a given stretch of time.

Coping with globalized time

Coping with temporal constraints imposed by the social environment occupies a considerable part of human activities: much planning is spent on making events coincide. In making itself independent of the temporal constraints of the natural environment the human organism has, paradoxically, imposed on itself a strict social temporal regimen.

A large body of data has been collected describing the use people make of time in the major cycles of life: the day, the week, the month, the year and – not really a cycle for the individual – their life. The study of human activity patterns developed in the late fifties as a field of applied sociology and geography. This work was largely descriptive, and provided little insight in the reasons for certain behaviors, except for such facts as that people more often than not will sleep at night, and work and shop by daytime. Predictive studies have proved difficult. In fact, many involved in this type of work gave up efforts to predict actual behavior and instead turned to describing the boundary conditions that impose constraints on the freedom of action. This produced results in domains as diverse as accessibility and mobility studies on the one hand and psycholinguistics on the other. It is in this context that we should look for a better understanding of the use of time in a society on its way towards globalization.

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He was created member of the Royal Netherlands Academy of Arts and Sciences in 1981; he has been a member of the Academia Europaea (London) since 1989 and a member of the Academia Scientiarum et Artium Europaea (Salzburg) since 1996. He holds a doctorate *honoris causa* from the University of Liège, Belgium. From 1983 until 1986 he served as president of the International Society for the Study of Time. He has been visiting professor of psychology at Carnegie Mellon University in the year 1986-87.
Over the years his research has covered a variety of areas in experimental psychology, including the temporal aspects of cognition and skilled behavior, traffic behavior especially in relation to traffic safety, criminality and law enforcement, knowledge representation in natural and artificial systems, and the philosophy of science as it relates to the behavioral and social sciences. On these topics he has authored and edited 15 volumes, approximately 200 scientific articles and some 100 popular articles and technical reports.

Paul A. Harris°

Millennial Messages: For the Future, From the Future

Speculations about time and globalization at the millenium tend to either announce endings (of the ecology, of humanism, etc) or beginnings (e.g., the emergence of a global brain). The difficulty in analyzing time and globalization lies in recognizing that we live in a period of overlapping, often conflicting times, processes, rates of change, and speeds of life. The copresence of differing forces in our lives is explored in the context of writing and media, where print texts are being superceded by electronic media as the dominant mode of written exchange. The paper attempts to demonstrate how print and electronic media interpenetrate in a transitional period by analyzing them in terms of one another. The shortening and 'speeding up' of print in the face of electronic media is juxtaposed to the print-based metaphors and formats that shape the interfaces of wordprocessing programs. Two different facets of electronic textuality are then examined. First, if one takes websites as a unit of discussion, one witnesses a shift in the meaning of 'narrative'--narrative does not mean so much the telling of story or description of an event, but denotes a configuration of information. The temporal implication of this change is that the shape of plot is lost, the rhythm of beginning, middle and end. The temporality of websurfing and clicking through sites is compared to the potentially endless time of video games. By contrast, the second facet of electronic textuality examined is the stunning array of creative experimentation unleashed by the unchecked usage of a new medium. The innovations found in email writing and digital storytelling point to an explosion of expressive energies. The essay concludes with a call to mediate between worlds, the one that seems to be passing and the one yet to arrive.

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J.T. Fraser°

Time, Globalization, and the Nascent Identity of Mankind

This paper reports on "les reveries du promeneur solitaire." The walker, however, is not Jean-Jacques Rousseau but globalized mankind, reflecting on its identity.

A person's identity is defined by the ways in which he is similar to and different from other persons in body, conduct, and thought. The identity of a tribe, nation or civilization is also defined by the ways in which it is similar to and different from other social groups of its kind, in its institutions, behavior, and values.

A peculiar difficulty arises when the identity sought is that of a globalized mankind. Namely, there are no other mankinds with respect to which ours could establish its hallmarks of similarities and differences, a competitor could keep our excesses in check through its self-interest.

A global society is a one-and-only system of its kind. It is as unique as the object we call the universe or the idea of God in monotheistic religions. The difficulties of identifying the hallmarks of such one-and-only entities are well known.

All identities must include references to intentional conduct and hence to time. I will take advantage of this necessary relationship and discuss a few representative isssues unique to a globalized mankind. These issues will be represented by three problem areas.

One is the Malthusian principle extended to the stresses and triages in the domains of human knowledge.

The second area comprises problems that

may be subsumed under the heading of "reeducating eros."

The third family of problems pertains to the relationship between the freedom of persons and the identity of globalized mankind. These problems are manifest in the crises of values, rapidly changing under the joint pressures of narrowing temporal horizons and the volcanic explosion of information exchange.

A solitary walker may still reflect upon himself and the world as did Rousseau, but how globalized humanity as the cosmic walker will assess the nature of time, see its relation to future and past and define its identity, is yet to be seen.

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Hervé Barreau°

Natural and cultural invariants in the representation of time for a globalized society

Globalization is often presented as a threat, jeopardizing cultural traditions. A constant objection raised against the theory of a progressive adaptation of the particular cultures to a worldwide coexistence is often presented as follows: conceptions about time in these cultures render them unable to adopt the rational, occidental conception of time, which in fact presides over globalization. Ethnologists and sociologists insist on the violence that the forced adoption of the "occidental" conception of time by traditional cultures would entail, characterized by a calendar for some, by the clock for others. One might argue though that such an opposition is largely artificial, because all cultures have similar, if not essentially identical, ways of forging a concept of time and measuring time in their everyday life. Moreover, this time of quotidian life is shaped by common requirements of human life, which is unavoidably subordinate to the conditions of biological life on this Earth. To neglect these natural and cultural invariants with respect to the representation of time would be, then, to make a serious mistake about the possibilities that different cultures offer to learn to live together and to communicate with each other. I will thus propose to review these invariants; there are three such natural invariants, and seven cultural ones.

The first natural invariant is the submission to biorhythms. The most important of them is the succession of days and nights. Of course, when there is daylight where I am, it is nighttime at the antipodes. But now we have been accustomed to time zones for more than a century, and to cross them is no longer an obstacle to quasi-instantaneous communications. The second natural invariant is the succession of the ages of life, the process of aging. To be sure, the determination of the adulthood age varies from one culture to the other, but nowhere is it required that old people go to war and children be in command. The third natural invariant is the capacity that all living beings have to adapt themselves to a changing environment, as soon as this environment displays a minimal level of regularity. While animals may be subjected to various kinds of conditioning, human beings are subjected to education and learning practices which, it is true, youngsters incorporate much more easily than older people do.

Whether the fourth invariant is essentially more natural than cultural in essence is open to debate. I am talking about the feeling of synchronism, which is essential to allow people to live together. Is it not this feeling that is affected in schizophrenia? We know the gregarious behavior of animals. The simultaneity of interest, responding to expectation from both partners, is a prerequisite that is learned and acquired very early in life in babies and infants. Any socialization rests upon it. In a socialization enlarged to encompass the entire world, it would be important to be vigilant enough so that it entails more benefits than drawbacks.

The second cultural invariant deals with language about time. There are variants in the

designations of temporal relationships such as "before", "after", "time span", or "discontinuities in the succession of events". Nevertheless, there are always ways to translate such temporal relationships from one language into another. There is no need of a universal language to locate an event in its frame. The third invariant is that of narration. Every human being knows how to give an account of the events in which he or she has taken part, or about which he or she has been taught through a mythical or historical tradition. It is possible to forge a common history, which the globalized world is in such pressing need of, and at the same time to avoid the traps of prejudice or hatred that impede the process of civilization. The fourth cultural invariant is time itself, understood as a myth that covers all aspects of existence. To be sure, this myth takes on a different flavor depending on the particular culture, but because it deals finally with a global change that affects everyone and everything in this universe, it is always easy to identify and translate it. The fifth invariant is the calendar, a universal institution, despite N. Elias' s opinion; the sixth is that of the natural clocks (the sun, the stars), and the seventh is that of artificial clocks more or less elaborated (gnomon, water clocks, pendulum clocks, quartz watches). These invariants may coexist either with a cyclical conception of time (astronomical time) or with a linear conception of time (reforms of the calendar, or adoption of a new one): therefore, they have not necessarily a metaphysical meaning. It is true that often they have a religious meaning, but it is always possible to respect the latter, as it has been the case in the past when several calendars were in use at the same time. Globalization would probably be a good occasion to adopt a universal calendar, the project of which has been under study for a long time; its implementation has been so far delayed because of the popular attachment to traditional calendars; these calendars, however, could always survive in parallel with the common rule.

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Masaki Miyake°

Contact of Various Historical Time-Consciousness in the Age of Globalization

The coming of the Third Millennium reminds us of the contact of various historical time-consciousness. The various forms of historical time-consciousness are the products of the history of civilizations. In his article, "The Clash of Civilizations?", (*Foreign Affairs*, Volume 72, Number 3, Summer 1993), Samuel P. Huntington identifies seven major civilizations: Western, Confucian, Japanese, Islamic, Hindu, Slavic-Orthodox, Latin American. He also adds as a potential major civilization the African civilization (p.25.).

First of all, the calendars, which are combined with the historical time-consciousness of these civilizations, are various. As is well known, the beginning of Islamic calendar is 622 A.D, the year of Mohammed's flight from Mecca to Medina. J. T. Fraser, the Founder of the International Society for the Study of Time, asserts in his work *Time, the Familiar Stranger* that Indian people use the Gregorian calendar for official purposes, but "years are preferentially reckoned from 78 AD, the epoch of the Saka Era". (p. 93). Chinese people formerly used the calendar beginning with the age of the legendary "Yellow Emperor (Huang-ti)", who is said to have lived from 2672 to 2575 BC They have now adopted the Gregorian calendar, but they are also using the twelve horary signs represented by twelve animals of the zodiac and combined with ten celestial stems (ibid.). Until her unconditional surrender in August 1945, Japan used both the calendar beginning with the enthronement of the legendary first Japanese Emperor Jimmu in the year 660 BC and the Gregorian calendar. The concept of the Millennium itself is, in its

origin, inherent in and typical of the Western civilization. Today the religious aspect of the Millennium is rather forgotten and only the problem of the so-called "The Millennium Time Bomb" (Caroline Schwaller, 'The Millennium Time Bomb' or Year 2000 Problem, *Time and Society*, Volume 7, Number 1,1998) of the computer system is attracting attention.

We may assume that each of these seven civilizations has its peculiar historical time-consciousness, which is reflected not only in the calendar, but also in the historical self-understanding of each civilization. The time-consciousness of the Western civilization may be represented by the idea of progress. The idea of progress, however, is rather new. To establish the idea of progress, it was necessary to overcome the pessimistic view of history, which insisted that the present age was inferior to the golden age in the past, such as the age of Greek and Roman antiquity. The idea of progress was established through the debate mainly discussed in France in the later half of seventeenth century, "the quarrel of the Ancients and Moderns". As J. B Bury asserts in his work *The Idea of Progress*, this controversy was "part of the rebellion against the intellectual yoke of the Renaissance" (p. 78). The controversy began in 1687, when the academician Charles Perrault read his poem glorifying the age of Louis XIV. He asserted that Louis' age was superior to the age of Augustus. The French academician Fontenelle contributed much to the victory of the Moderns by publishing *Digressions sur les Anciens et les Modernes* in 1688. In this way, the absolute authority of ancient philosophers and poets was rejected.

In China, Confucianism glorified the golden age in the remote past and fostered a pessimistic time-consciousness. In the end of the nineteenth century, an influential Chinese Confucian scholar K'ang Yu-wei (1858-1927) tried to establish the idea of progress in China through a re-interpretation of one of the Confucian classics "The Records of Rites". He interpreted this book as prophesying both progress and utopia in the future (cf. Masaki Mikaye, Some perspectives on the idea of progress as a problem in the study of time: the case in China, Japan, and Russia in comparison with Modern Europe. In: *Dimensions of Time and Life: The Study of Time VIII*, J.T. Fraser and M.P. Soulsby Eds., Madison: Connecticut, 1996).

As regards the historical time-consciousness of the Shiites, the concept of "ghayba" (to lie hidden) is crucial. According to what the Shiites believe, the twelfth imam has hidden himself in the year 874, but he will one day come back to this world as a Messiah, i. e. as a Mahdi. History is divided into two periods, before and after ghayba. The golden age is believed to have existed in the age of the first imam, Ali (Ali ibn-abu-Talib), husband of Moham-med's daughter Fatima, who was assassinated in 661. It is no wonder that the Shiites have strongly archaistic trend, trying to return to the age of Ali.

Contact of various civilizations in the age of globalization is at the same time contact of various historical time-consciousness. In order to avoid the "clash of civilizations", an effort to understand other civilizations is indispensable. For that purpose, it will be required, among others, to understand historical time-consciousness of other civilizations.

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Cyber-Space-Time : Physical Time, Lived Time and the Life of Time

The word "cyberspace" has several meanings and thus can lead to multiple confusions. For this reason, I prefer to introduce a new term, *Cyber-Space-Time (CST)*, to refer to the computer-generated information world in its entirety, which now extends over the whole globe [1].

We shall emphasize the following seven characteristics of CST:

1. *CST is both natural and artificial.*

CST is *natural* because its source is natural: the quantum world. The basic language of the physical world, thus of nature itself, is that of the quantum world. Thus, it is a universal language.

At the same time, CST is *artificial*: it is the product of sophisticated technology and uses an artificial—humanly constructed—language (mathematics).

This double aspect (natural/artificial) confronts us directly with the question of a *new interface, that between human beings and CST*, and thus points to the emergence of a *third domain or level of reality* that would include both human minds and nature.

2. *The substance of CST is material.*

In modern physical theory, matter is linked to the complex (as substance / energy / information / space-time). Information, although it is non-substantial, is nonetheless material.

3. *CST acts as a transformer of the real into the imaginary, and of the imaginary into the real.*

A definitive characteristic of CST is its robust capacity to trigger interactions between the real and the imaginary, the concrete and the abstract, and physical bodies and mathematical equations. CST thus can, in principle, generate a *new level of perception.*

4. In CST, *all signals are propagated at the maximum speed in the natural world,* the speed of light, c.

5. *CST is not a four-dimensional manifold.*

The quantum world, the source of CST, is not characterized by the familiar four-dimensional manifold of space-time (if we keep in mind the goal of the unification of all known physical interactions). The intervention of human consciousness in the interface between human beings and CST also points to the fact that the number of dimensions is not necessarily four.

6. *The logic that rules CST is the logic of the included middle.*

The source of CST is the quantum world, which obeys the logic of the included middle. It is true that the *technical reading* of the code is, for the time being, binary, but quantum computers [2] will soon allow for a reading of this same code, using the law of included middle.

The immersion of the human body in CST triggers a new level of perception, one which marks a radical rupture from the macroscopic physical world: chains of causes and effects are suspended, linear causality is abolished, and discontinuity becomes not only an object of contemplation, but a mode of experience.

7. *The Cyber-Space-Time is neither deterministic nor indeterministic: it is the space of human choices.*

Insofar as CST puts into play the notions of levels of reality and that of the logic of included middle, it is potentially a trans-cultural, transnational and trans-political space.

In conclusion, we can assert that CST is a new level of reality [3].

Surfing the CST is a new type of navigating, a navigation in the bowels of nature, in interaction with ourselves.

Causality in CST differs from both the local causality that rules the macroscopic physical level, and from the global causality that rules the quantum level. Because of the interface between human beings and CST, causality in the latter is tangled and open-ended; it might be termed an *open-loop causality.* Through their interactions with CST, human beings discover in themselves a new level of

perception, and CST realizes more of its potentialities thanks to interactions with human beings.

A loop has emerged between the surfing in CST and what could be termed the quantum imagination. Because quantum processes certainly play a role in the functioning of memory and consciousness, quantum processes in the human brain in a certain way mirror quantum processes of CST. For the first time in history, there exists a possibility to integrate the *finitude* in which we find ourselves with the infinitesimally small and the infinitely large.

The computer is a tool of access to CST, just as the human body is the means to access the macrophysical level. A chimerical being, such as the Minotaur, with its human body and the head of a bull, could well be born of this double, recursive interaction, and jeopardize our existence. But we can also imagine an unprecedented liberation from the many constraints that weigh heavily on our everyday life, by transferring these constraints into the Cyber-Space-Time, which could then become a true *time-saving machine*. This saved time could be devoted to our own inner development. From the contradiction between the physical time and the time of life emerges a *living time, the life of time.*

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WRITTEN CONTRIBUTIONS

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Time and Cycle Synchronies

A transdisciplinary consideration of time and globalization will inevitably lead to a renewed consideration of just what are the patterns seen in temporal phenomena on a worldwide basis. Certainly the patterns alleged may require further study and evaluation. It cannot be expected that all aspects of the broad picture initially proposed will be preserved in later versions of our temporal world-view. The concept of cycle synchronies proposed by Edward R. Dewey (1895 - 1978) about 30 years ago provides one transdisciplinary approach to understanding the structure of temporal patterns.

This concept has not received much attention by scholars, perhaps because of the transdisciplinary effort that will be required to test this hypothesis and, if found true, to realize its possible implications. Certainly Dewey provided the broad outline for a new temporal world-view. Briefly, he suggested that in a wide variety of diverse phenomena, cycles of similar lengths (or periods) were often observed. He highlighted 19 different cycle periods that he had investigated for cycle synchronies. These were cycles of 4.0 years, 5.9 years, 6.0 years, 8.0 years, 9.0 years, 9.2 years, 9.5 years, 9.6 years, 9.9 years, 11.2 years, 12.0 years, 12.6 years, 16 2/3 years, 17 1/3 years, 17.7 years, 18.2 years, 22 years, 54 years, and 164 years. These were all the periods that he had reviewed for the existence of cycle synchronies and he included all the evidence, pro and con, for each of the periods. Some of the periods were associated with mainly cycles in one field such as biology or economics, while other periods were more transdisciplinary. Usually a dozen or so time series were cited for each example of cycle synchrony, and sometimes several dozen time

series were available for examination. Not all cases followed the general tendency of cycles but a striking number did show this pattern.

Two specific examples, the 5.9-year cycle and the 9.5-year cycle will be considered. The 5.9-year cycle was said to be characteristic of Business Failures, Railroad Stock Prices, Combined Stock Prices, Coal Stock Prices, Copper Share Prices, Grouse Abundance, Pig Iron Prices, Sunspot Numbers, Cotton Prices, and Copper Prices. Dewey reported that the 5.9-year cycle had an ideal crest in the year 1973.01. The 9.5-year cycle was said to be characteristic of Sugar Prices, Cotton Production, Consumption of Cheese, Cotton Prices, The Value of Sheep, and Rainfall. Dewey gave 1966.23 for the ideal crest of the 9.5-year cycle. Of course, any given time series often displays several cycles of different periods at once, some of which may be more statistically significant than others. In fact, a general skepticism in the scholarly community about the statistical significance of these largely unfamiliar cycles has slowed the study of cycle synchronies. Also, many people are not used to thinking of temporal data as being a combination of trend, cycles, and random noise, with all the statistical analysis problems that such a situation presents. Finally, the transdisciplinary approach is sure to incur pitfalls perhaps better known to the disciplinary specialists. (For details of the concept of cycle synchronies see the *Journal of Interdisciplinary Cycle Research* 2: 331-362: 1971.)

It should be remembered that most of Edward R. Dewey's research was carried out under the most difficult of circumstances of the same period to crest at the approximate same calendar time, despite the phenomenon, before the wide availability of computers. The hundreds of data sets were updated by hand by a small staff working at the Foundation for the Study of Cycles in Pittsburgh, Pennsylvania USA. The analysis of the cycles, although following accepted statistical procedures, was laborious and now would be done with somewhat different methods. The results of this work were reported in the journal *Cycles* and the *Journal of Interdisciplinary Cycle Research* over a period of about 30 years until Dewey's death in 1978. He gained sufficient recognition for his discoveries to be honored as a member of the World Academy of Arts and Science and to be awarded the Gold Medal Award of the Biometeorological Research Foundation in 1972.

Nonetheless, few scholars seem to be interested in Edward R. Dewey's grand hypothesis that diverse phenomena display a wide-range of cyclic patterns, with seemingly unrelated time series showing cycles of the same period cresting at similar calendar dates. He was well aware of many of the philosophical implications of such a seemingly deterministic model of nature. If cycle synchronies is a true phenomenon, it is to be expected that it will be rediscovered as a transdisciplinary consideration of time and globalization gains the interest of scholars.

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"The World as Will and as Idea"

Schopenhauer's very "global" title summarizes well the thesis I propose.

If one calls[1] *First Law of the Science of Time* the *equivalence of space and time* uncovered by Poincaré, Einstein, Minkowski, a *Second Law* is needed[2] for expressing *the past-future asymmetry,* and express it in terms of *probability.*

Cardano, Pascal, Fermat, the promoters of the *calculus of probabilities* together with its *combinatorial algebra,* had reasoned on chance games. Bayes, defining *probability* as *estimation of the likelihood of an occurrence,* proposed the concepts of *inverse prior and conditional probabilities* -the seed blooming later as *information theory.*

Combinatorial analysis works wonders in statistical mechanics. Boltzmann equated entropy to the logarithm of the probability of the micro-configurations which (as Pascal would have said) "our blunt instruments cannot touch exactly". This likens *entropy* to *missing information*, to *incomplete knowledge entailing imperfect control* -Laplace's theory of physical errors turned into a paradigm. However Aristotle's concept of *information-as-organisation* was not fully recognized as reciprocal to *information-as-knowledge* because the treatment was phenomenological--the observer's neurophysiological activity being taken as granted.

Around 1950 cybernetics shed new light on the problem by defining *coding* as *impressing organization* and *decoding* as *expressing knowledge*, with *negentropy* circulating in-between in the machine. This, casting Aristotle's and Schopenhauer's wordings into reversible formulas, establishes an *interactive dialog* between *reality* and *representation*, and an *operational reciprocity* between *efficient* and *final cause*.

Boltzmann's constant k -or rather k log 2- is the change rate between an *information* counted in *bits* and a *negentropy* numbered in (say) *clausius*. While the bit's definition is rational, that of the *clausius* is phenomenological, drawn as it is from a *practical* definition of temperature.

Thus k log 2 comes out as exceedingly small, 10^{-16}, meaning that for us cognizance is very cheap (so cheap that it was long held as free) and organization very expensive (so expensive that free will was denied by theories of "epiphenomenal consciousness"). Somewhat like the finiteness of the velocity of light, deemed infinite by Descartes, unveiled around 1900 the relativity of time until then hidden by its magnitude, so the finiteness of k reveiled around 1950 what its minuteness had obliterating: at one stroke the *price of knowledge* and the *possibility of free action*. So after a big tour through statistical mechanics and cybernetics Aristotle's organization-knowledge symmetry was recovered as a corollary of Bayesian reversal.

So the key of voluntary action is not energy (as implied in Bergson's[3] 'vital explosive' metaphor) *but information* -as Descartes[4] had anticipated: "That our soul moves our body is testified not by some ratiocination but by an everyday direct experience", and this it does "not as a body moves an other body". Remember that Descartes had taken part in the elucidation of the conservation laws of mechanics. Eccles[5] the neurosurgeon agrees; formalizing motive action as a weighing of the *final priors'* he likens it to an *amplified psychokinesis* - amplified by borrowing à la Carnot negentropy from the Universal Fall: a minute injection of information triggers the avalanche of muscular contraction.

Wigner[6] argues as a physicist that by virtue of the *universal action-reaction principle* there must exist, reciprocal to the action of matter upon mind (the conversion of negentropy into information) a "direct action of mind upon matter" (the conversion of information into negentropy). *Psychokinesis* is thus postulated as *reciprocal to gain in knowledge*. Random event generators monitored by electronic noise have allowed[7] tests of psychokinesis.

The spacetime aspect of the problem needs to be discussed. In the nineteenth century the concept of final cause was deemed absurd for two reasons. First retarded causality was not questioned: "by definition cause precedes effect".

Second, "final cause should operate from the future which exists not yet". But since 1908 we know that a corollary to 'the relativity of time' is *time extendedness of matter:* the light cone, *trissecting* spacetime in past, future and elsewhere, abolishes the "objective severance" of past and future. The concepts of *existing* and *now* being no more tied together *final cause is allowed to operate from the future as does efficient cause from the past* -- somewhat like in hydrodynamics *sources* operate by pressure from upstream and *sinks* by suction from downstream. Euler, a promotor of the calculus of variations, had already pointed to the *efficient-final cause symmetry* displayed in the action integral.

In the twenties there occurred the "new quantum mechanics revolution", with Born and Jordan turning de Broglie's *wave mechanics* into a *wavelike statistical mechanics:* in it *partial* and *independent amplitudes* (not probabilities) are respectively added and multiplied. From this stems *nonseparability*, a mind boggling Lorentz and CPT invariant *interference at a distance*.

In quantum mechanical *coding* is termed *preparation* and *decoding measurement -or retroparation* says Hoekzema[8]. These are *interfering* retarded and advanced Dirac *representations. So the evolving system is neither in the one nor in the other* - it is, says Wheeler[9], "a smoky dragon", the *time extendedness* and *reversibility* of which (the *Lorentz-and-CPT*

invariance) are concisely expressed by *Hermitian symmetry of the transition amplitude.*

The Feynman graph telegraphs an information coded à la Born-Jordan. Statistical correlation is thus synonymous to a *zigzagging physical interactions*[10,11] *and Diracian reversibility* to *action-reaction* or *cause-effect symmetry,* according as the separation is space or timelike.

So *The World is Will and Representation -the impressionistic representation* of a "smoky dragon" in the complex plane, above the real axis.

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Temporality in Psychoanalysis

Temporality is a different notion than that of time: it concerns the experience of being in time *and* being in the world. It therefore involves a double perception: the self-perception of an individual as a living entity and a perception of the link that binds him to the environment. This perception is indissolubly bound to an affect. Psychopathology, however, has revealed that there are subjects for whom this category of temporality is absent. In this respect, I have spoken of *atemporality*, in order to distinguish this deficiency from *intemporality* (a tendency for repetition) which Freud attributed to the unconscious: in autism, toxicomania or asthma, time is motionless, it does not "flow", or it is perceived as something external to the subject. This phenomenon of atemporality leads to several observations which are even more evident in the psychoanalyses of children.

The first observation is the extraordinary inclination that these "atemporal" children display for rhythmic structures, as well as the effect of invigoration brought on by the external stimuli provided by these rhythmic structures. This shows that, despite the emotional and ideational stasis in which these children are immersed, there exists an innate temporal schema, the activation of which depends upon the presence in the external world of appropriate structures which are in resonance with unformed inclinations in them. The activation and mnemonic inscription of these structures can only be realized through such external supporting stimuli.

But we also observe that, at the early stages, this instinctive (or pulsational) inclination for rhythmic forms is very weak, fleeting, transient. The reaction of apathy in autistic patients, is in fact, as it can be *a posteriori* demonstrated, a defensive manœuvre: the child has clearly heard and noted the response that led to the brief manifestation of interest that he has shown.

This leads one to think that there is a pathological effect accompanying the lack of response: the unfulfilled expectation of an environmental signal has become something that is instinctively barred.

In addition, an effect of externalization is produced, an effect of substitution and/or fetishization: it is in the external world, in concrete objects (the watch,

the piano, the bell) that temporality, rhythm and music are frantically pursued, instead of being a perceptive-affective experience of what is "to be". The externalization and fetishization of temporality is a phenomenon which appears similar to what Freud intuited about delirium. This is, he said, a perception that could not be linked to a spoken statement.

If we extend the notion of language to non-verbal forms, that often precede or accompany spoken statements (gestures, mimic, prosody), one can see that the therapeutic effects that is characterized by the interiorization of the temporal rhythm, are only due to responses *that were mimetic of a rhythmicity,* and that this mimesis, as Aristotle had defined it, is in fact a myth, a construction, and not a simple imitation. The mimetic response brings about an external form that is an altered imitation, which in fact allows the child to perceive his own rhythmicity, and thus to recognize it as its own property. He does so because the modification brought by the play, the metaphor, the fiction, the style, the musicality, is the introduction of temporality in *languages brought from the exterior.* It is indeed by escaping to the "normal" law stimulus/reaction that these languages come about with the latency that characterizes any becoming *novelty.*

Because of the visual, immediate tools that it promotes, globalization might constitute a threat with respect to these temporal languages, the importance of which we have just emphasized. Languages in which temporality is indirectly inscribed are those in which a *process of thought is being developed,* whereas the "inter" (internet, interactive media) are globalizing a kind of extra-temporality which in some respect appear as the opposite, or the ersatz, of a phenomenon of thought.

On the other hand, because of the very existence of the International Society for the Study of Time (ISST), one could dream of another, less toxic avatar of globalization:

I mean a transciplinary, transcultural conver-gence leading to an epistemological globalization, characterized by a transdiscipli-nary consensus on the common concepts that could thus win a larger "range". This *a posteriori* consensus on common concepts (after an experimental and theoretic maturation of each concept within the frame of its original discipline) could then lead to a meta-theory, the necessity of which is beginning to reveal itself in view of the process of fragmentation and breaking into pieces of research and knowledge. In order to save the unity of human mind and its very existence in the future, it is time to cross our own boundaries and watch over what it said in other domains on the same subject, and renounce "the narcissism of small differences."

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Place, Process and Context: Time Worlds, Perception and Memory in my *Time Processional*

When we speak of the topic *Time and Globalization* as refers to music, many different perspectives may be elicited. Do we think of time as the global chronological "narrative" in a work or can time itself be repositioned, recontextualized and reimagined through musical structure such that a diversity of time worlds unfolds together? Can there be only one chronological "narrative" or can such a recontextualizing repositioning of chrono-logical narratives challenge the very nature of musical narrative and time unfolding? Is time itself simply a one dimensional idea or can the idea of time be successfully projected into different yet simultaneous dimensions such that "networks of time" exert an evolutionary temporal influence over the global unfolding of time? Can fluid musical structures be created that allow for such temporal ideas and support their sonic realization?

In my work *Time Processional* for wind ensemble (1995), I have attempted to answer such questions

and implement ideas that flow from such answers. When looking at these issues I will explore several foundational principles that allow for creation of time streams and a globalization of time in a musical context. Five broad categories will be explored in the paper:

1. Place
2. Process
3. Context
4. Time Streams (Linear time) and Time Worlds (Stratified, adjacent time)
5. Perception and Memory

We view time as a chronological unfolding manifesting in an infinite variety of ways. Space as it pertains to sound, on the other hand, is something less easily defined even than time. Space can refer to the spatial placement of sound in a stereophonic or multiphonic field. Space can refer to how sound is located in or moves across such a defined field. Equally, space can mean pitch space or the "sounding field" over which pitch manifestations occur in time. Any or all of these meanings of space can be manifested in a piece of music. If we view time in music as articulated by spaced iterations of sound such that intervals of time are marked by these iterations, we find that the closer the iterations the more swiftly time can seem to be unfolding, though in the sense of absolute or "clock" time this is not so. Further, if iterations are placed so distantly that we cannot feel a "pulse" to their repetition we could say that they can seem as isolated events with no relationship one to the other. As we know, once iterations become very closely spaced they can no longer be perceived by us as separate and we start to hear them as pitch. In this realm, the fewer number of pulsations, or cycles, per second the lower we perceive the sound to be. The greater the number of cycles per second the higher we perceive the sound to be. Thus, even space, if we mean that to represent pitch-space, can be an extension of time itself. Musical ideas can therefore be intimately and perhaps inextricably linked, both temporally and spatially, through a continuous temporal network flowing through the time fields we perceive as temporal and extending into those we hear as spatial. This sonic, spatial-temporal plane is a powerful metaphor for some of the structural strategies I have used in time processional.

In my discussion of this spatial-temporal continuum I will begin by defining the place of sound and, by extension, the place of musical idea, both chronologically as well as spatially. I will amplify my observations and discussion of place by an explanation of the technical processes I use compositionally to define such aspects of time and its musical or sonic globalization. I will then explore the important element of how space and time provide rich contexts for musical ideas. These contexts yield different linear and vertical stratifications of musical space that I call *time streams* and *time worlds*. I will explain how these unfold in my work *time processional* and their structural importance to the last two considerations of my paper: perception and memory.

In my discussion of the above mentioned ideas I refer to the concepts and work of Albert, Epstein, Friedmann, Kramer, Leighton, Lynch, Michon and Rowell and will illustrate the implementation of concepts in my work through recorded musical excerpts as well as structural charts and illustrations.

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Estimating short time intervals: researches in cognitive neuroscience

The skill of measuring time is not limited to mankind. Nor do all human relations to time involve abstract reasoning or demand linguistic skills that is, call for what constitute the final states of the development of cognitive capabilities. These pre-human measuring skills are already present in the most rudimentary animal species. One of the most fundamental aspects of adaptation of organisms to their environments is the appropriate evaluation of

the temporal characteristics of events or actions. To make a gesture at the right time may reveal itself as being essential in some circumstances of everyday life, such as -- in humans --in music or sport. To reckon with precision the duration of a sound or of a flash of light without the help of devices that measure time may become a common habit. The field of research presented here deals with the time intervals that are termed short durations -- from a fraction of a second to a few minutes. Short durations are very important to sensory-motor activities. What are the physiological mechanisms which make this kind of duration measurements possible?

In human beings, the mechanisms of short durations are probably universal, even though it is possible that the modes of expressions and degrees of precision vary. Examples are modes of expressions under different conditions and the sensory-motor skills in different cultures. The recent development of brain imaging techniques suggests that certain cortical and subcortical structures have important levels of activation in normal adults engaged in judging the lengths of time intervals. Other important insights into the mechanisms of short duration judgements may be drawn from the study of patients who suffer from cerebral lesions and show deficits in tasks that involve timing, for example, in Parkinson's disease. All these investigations and observations suggest that many

brain structures are involved in tasks related to the judgment of short duration. The brain structures involved are, in particular, the basal ganglia, the cerebellum and a part of the prefrontal cortex. Studies performed on animals have emphasized the dopaminergic striatofrontal pathways as important in the coding of temporal information.

Although there have been problems with interpretation, these studies suggest that specific neural mechanisms exist, devoted to the processing of temporal information. They may be interpreted with the help of a model of an "internal timer", derived from the analysis of animal and human behavior. The internal timer model suggests that precise judgments of time intervals require a certain quantity of information related to the flow of time. The larger that quantity of information, the longer is the estimated duration. However, the speed at which information accumulates does not only depend on the duration as measured by a clock. It also varies depending on several variables. Among them is the attention level available for judging the length of duration studied. The lesser the attention, the shorter is the estimate of duration as if part of the relevant information had been lost.

Several connectionist models have been proposed to help explain the activity of neuronal populations of those regions of the brain responsible for the processing of temporal information. One of the models postulates a signal propagation in space-time, within a particular population of neurons, triggered at the beginning of the target time interval, so as to produce a maximum of neuronal activity at a precise time and level appropriate on an initial threshold. These variables, in turn, depend on the level of attention. Such a model would allow a recognition of the remarkable relation between the level of activation of certain regions of the brain and the level of performance that is observed in some temporal tasks. An example involves the timing of the separation between two movements of a finger. The subjects were equipped with skull electrodes that allowed the recording of slow variations of the skull evoked potentials, in relation with the processing of information by the brain. The task tested for involved the repetition of a large number of trials. The required duration of intervals was 2.5 sec, and the time intervals as produced by the subjects were then sorted into three categories: correct, too short and too long. The errors appeared to be related to the spontaneous fluctuations of attention during the experiment, and have been put into correspondence with different amplitude levels of the cerebral potentials recorded from a determined prefrontal location, to the exclusion of the other recorded locations. The brain activation on this site is increasing from the short to the long intervals produced. One may think that the higher the attention devoted to the target duration, the lower is the initial threshold of the model, so that the activation of the neuronal population of the site should then increase for a larger quantity and therefore reach its highest point at a later time with respect to the case of a lower level of attention.

This kind of results, together with other studies from a multidisciplinary literature, now rapidly expanding, offer interesting insight to those who attempt to identify the mode of functioning and the neural substrate of the hypothesized "internal timer" involved in judging time intervals in human subjects and in many animal species.

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Christian Marchal°

Globalization and Irreversibility: What arrow of time?

The modern world evolution is both so fast and apparently so irreversible that it looks like fate imposed to mankind, as the principle of ever increasing entropy is imposed to isolated physical phenomena.

However let us remember that physical laws are reversible, they all have a past-future symmetry and if all planetary velocities were reversed the planetary orbits would remain the same: they would be described in the other direction...

In order to have a clear idea of the paradox, let us consider the following example: Let us open the communication between two vessels full of gas. The Brownian motion will progressively equalize the temperatures, the pressures and the compositions. However, as Celestial Mechanics, the kinetic theory of gas is conservative and reversible... We should add that, according to a famous Poincaré theorem, *almost all* initial states of a conservative and bounded system lead to an evolution that come back an infinite number of times in the vicinity of the initial conditions, which is contradictory with the observed irreversible evolution.

This paradox led to several classical attempts of explanation.

A) *Some very small, irreversible and dissipative hidden phenomena that forbid the application of the Poincaré theorem may exist.*

This rejection of a major nature symmetry is not justified and our present knowledge is sufficient to resolve the observed contra-diction.

B) *For a given phenomenon, the notion of trajectory remains accurate for only its time of divergence, and much less than the Poincaré return time that has never been observed in this type of experiment.*

This answer is true but insufficient. The impossibility of accurate long-term computa-tions doesn't resolve the contradiction...

C) *In principle Poincaré is right and for strictly isolated systems there is indeed this mysterious correlation between initial and final conditions (after the Poincaré return time). But our systems are not strictly isolated and even very small perturbations, such as the attraction of planets, destroy this correlation.*

These " mysterious correlations " are imaginary and it is in a natural fashion that the system returns toward all states attainable from the given initial conditions. The " very small perturbations " will not modify the order of magnitude of the Poincaré return time, even if it is true that they can modify very much the evolution in a relatively short interval of time and thus contribute to the disappearance of correlations.

The true answer is related to the chaotic phenomena. It is because a phenomenon is " sensible to initial conditions " and because it depends of billions of parameters, while we measure only a few statistic parameters (temperature, pressure, density...) that we ascertain an appearance of irreversibility and that the Poincaré 's return time is extremely long, much longer than the age of Universe.

Already in the experiment of the " typist monkeys ", that type at random on a typewriter, the duration necessary for the appearance of Hamlet's monologue is, by far, much larger than any physical

duration. Consider then phenomena where take place the Avogadro number and not only a few hundreds of words... However, even if this is only a theoretical exercise, in a given experiment the statistical characteristics of the Poincaré return time can be accurately computed. This return time is not infinite! [1].

The chaotic evolutions concern unstable phenomena and are today met in all domains of science and technology, they offset their impossibility of accurate long-term deter-ministic forecasts by excellent statistical forecasts (notice the similarity with quantum mechanics). The divergence time depends very much on the scale of the phenomenon of interest: extremely short at microscopic scale it becomes a few minutes for ordinary turbulent flows, a few weeks for meteorology and a few hundreds of millions of years for the astronomical motions of our Solar System.

The chaos destabilizes individual elements (position and velocity of a molecule) but stabilizes statistical elements (temperature, pressure) that follows during huge durations and with an extreme accuracy the irreversible laws of entropy. These statistical elements become the basic elements of the larger scale and phenomena are thus nested in one another until the astronomical scale where is used the notion of " center of mass of a celestial body " the motion of which is studied without much perturbation from the inner phenomena.

If, on our planet, we meet so many irreversible phenomena with increasing entropy, this is because disequilibriums are easy, the smallest valley has a sunny side and a shady one. The fundamental reason is our existence in the middle of a giant stream of energy arriving continuously from the burning Sun and escaping to the frozen Space.

Thus, in spite of our pride, the day-to-day irreversibility and the consequent globalization are not only function of our will but also of complex phenomena that are neither controlled nor even sufficiently understood. There would be a major interest to study them.

Reference

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Dr. Luis Núñez and Dra Clara Romero°

The future of Education and Educational Systems in the Context of Globalization: *Toward a new Temporal Logic*

We live in a society of knowledge and information at the dawn of the third millennium. It has become evident that pedagogical practices and educational institutions should modify their dynamics and their orientation in order to respond effectively to new social demands. The preceding two decades have propelled us into a dizzying present, devoid of temporality. It is a time of globalization, more and more isolated from both of the basic dimensions by means of which the new mankind and new society have been thought of: on the one hand, the normative dimension of time, and on the other, its projected dimension. We are living in an empire of space, the topologization of time, the new hermeneutics that is being imposed upon us. In a paradoxical way, at the same time as our transnational interdependency is enlarging, the fragility of politics is increasing. Thus, this future is not an object of political control, but control from the State or otherwise is being diminished because the market determines it. One of the characteristics that explain our age is the speed with which events occur, and an increasing complexity on the level of the entire planet. The temporal mediation between the individual and his environment remains limited because of limits to the accumulation of information, of innovations, and of new techniques, so that they cannot enter the horizon of the individual who is expected to digest them. People inhabit the present, up to "run it out". At this time of globalization, space

is of primary importance. Thus it is primarily the values of simultaneity and of opportunity hat command the choices among the possible alternatives among all possible actions, so that people can manage contingencies. These contingencies take precedence along with the new times "empty of temporality" so to speak, which we have referred to in the title of this abstract.

In addition to bringing dizziness, devoid of normative value, the time of globalization is, at the same time, not very probable. The increase of complexity in the time domain is not homogeneous or regular in every country, and does not obey the same temporal logic in all cases. This means that any attempt at fixing the problems and providing hope is quite difficult; the renouncement to act put the individual in a dangerous situation of both abdication and submission. In this way, human action becomes stripped of its temporality. The debate should be resolved in the conjunction of a triple contingency: to act in urgency and uncertainty, to face the changes, and to integrate the contingence of events as a temporal axis.

Globalization imposes its mark in every field: economics, politics, social, technology and science, as well as in the educational world. The future of education in the context of globalization can be characterized from three levels of analysis that all incorporate the dimension of temporality:

(a) the future of education in terms of correction of the present
(b) the future of education in terms of management of the future
(c) the future of education in terms of creation of the future

We wish to address the complex ethical issues which overarch these questions. If globalization appears as a reality and a trap for citizenship and democracy, how can we use education to respond to the following?

(1) the exigencies of this dizzying reality that inscribes itself on the temporal system in which fact time has been excised,

(2) respond in such a way as to overcome space and regain the future, or at least the horizon of future onto which people can project their known presents containing the kind of time to which men and women in this world can access. Perhaps the responses to these questions can be found if we adapt to a new temporal ethic that incorporates the time of future generations into the discourse about the present, and rethink the future of education in terms of helping to create the future. A recursive analysis of time and temporality of education in the context of globalization also becomes necessary if we want to face the problem of the future of education and the challenges of this time, placed in the framework of a global and systematic temporal rationality.

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Rémy Lestienne°

Final Remarks

"Mondialisation" or "Globalization"?

My first remark will be about the title of our gathering, which has been rendered in English as "Globalization" and in French as "Mondialisation". I agree here that both concepts, although obviously

related, are not exactly synonymous, and that the choice of words may here be important. Although mondialisation is fact brought by the technical advances of the society, globalization may be viewed as a threat, in so far uniformity of the cultures, of the modes of organization and trade, if not of the minds, should probably be feared as threat. Uniformity would not only entail a loss richness in the world, but of complexity, and thus of biological adaptability.

Globalization is also changing dangerously our views about time. As Javier Santiso stressed it, globalization of the market brings a shrinking of all time scales, and entails a depreciation of the past in favour of the immediate future.

...But we are not the passive objects of the changes brought by mondialisation: we are the subjects of these changes and have the power of controlling them. As Basarab Nicolescu remarked, the "Cyber-Space-Time" is neither deterministic nor undeterministic : it is the space of human choices.

Time and identity

Every individual needs a "temps propre", or at least time reference points, which autistic patients so desperately look for (Anne Denis). The reason is simple: there is a close connection between the emergence of our own identity, or of the identity of a group, and his or their experience of time's passage, as J.T. Fraser so aptly illustrated. Thus, what is desirable in the XXth century world is not global synchronization, but harmonization of times, to use Joël de Rosnay's wording. That this goal is achievable has been emphasized in particular by Hervé Barreau, who remarked that nature has endowed humanity with many common time references. All cultures have similar ways of forging a concept of time and measuring time in their everyday life.

Time and Complexity

The modern theory of complexity seems to offer a tool to weigh the benefits and drawbacks of globalization, as the various authors have done it in this symposium. A greater complexity of the world can bring an increased world memory –thus an increased wisdom—. According to this theory, however, in order that the world acquires a greater complexity, it should keep itself equally away from both traps of uniformity and random chaos. It should organize itself into a hierarchy of structures, each endowed of enough individuality, on several hierarchical levels embedded in one another, and interdependent from one another, both laterally (within entities of the same level) and vertically, bottom-up and top-down. This suggests us to beware of both the devils of isolationism and of the simple one-homogenized-world-citizenship. As Masaki Miyake recalled us, there are at present seven or eight major civilizations. In order to preserve complexity, these civilizations should cross-fertilize, not homogenize...

Thus, the creation of new top-down, lateral, and bottom-up flows of information and regulations. In an information-ruled society, it is even possible to consider the creation of Capital-Time, as Joël de Rosnay call it, as a consequence of the thermodynamically sounded parallelism between information and negu entropy, to which Christian Marchal and Olivier Costa de Beauregard alluded to.

Time again

The more complex a system, the more important the time regulations in it. Look for instance at the brain, probably the most complex object that science ever broached. Time plays an immense functional role in the brain, that we only begin to discover. A functioning brain is a stuff of intermingling cycles and synchronicities. The synchronization of the activity of populations of neurons can be essential to the well doing of neuronal networks, but it can be detrimental also, as epilepsy seizures suggest it. In our debates, which means have we suggested to impede Cyber-Space-Time to develop worldwide epileptic seizures, in the stock market or otherwise?

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Time's Books

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The total number of books so far reviewed in this column is 296. The opinions stated are those of the reviewers and the reviews are their intellectual properties. But, since they are copyright Time's News, if you wish to quote from any of the reviews or republish a review, please cite the newsletter and its date.

List of Reviewers:
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Lawrence Fagg, (LF)
Richard Fusco, Philadelphia, PA (RF)
Gus Koehler and Victoria Koehler-Jones, Sacramento, CA (GK, VKJ)
Roger A. Kruger, Omaha, NE (RAK)
David Park, Williamstown, MA (DP)
A. I. Rabin, East Lansing, MI (AIR)
Mark Stuckey, Elizabethtown, PA (MS)

Barrow, John D. Between Inner Space and Outer Space, New York: Oxford University Press, 1999. 267 pp.

John Barrow is highly regarded by physicists and astronomers for his research contributions, as well as his popularized writings. It was Barrow's work on chaos in general relativistic cosmology (GRC) that inspired my Ph.D. thesis. If you have not read Barrow on the anthropic principle, cosmology, chaos, mathematics, the Theory of Everything, religion and esthetics, quantum reality, reductionism, or time, then this compilation is a must read. The scholars of ISST will find much to discuss and debate in this eclectic set of essays. The elegance and clarity of Barrow's style make for comfortable perusal.

You may appreciate his literary prowess while taking exception to his reductionist analyses. Consider, for example, why Mozart is so arresting. The mind has evolved "acute pattern recognition abilities" via Darwinian adaptation, which are linked to the "complex mental circuits" required to "coordinate body movements in precise, continuous, and rapid response to outside changes." Sonic patterns that must be identified for survival tend to exhibit intensity spectra inversely proportional to the frequency (f), so the brain has evolved to focus on 1/f noise while filtering out other variants. Mozart—as well as jazz, rock, other classical music, blues, non-Western varieties, etc.—is closely approximated by this 1/f noise over many frequencies. It's that simple.

As a physicist, I found his reductionism well done, and I had no aversion to his use of mathematics. For example, the logarithmic plot of mass versus size ranging from protons to the visible universe summarizes concisely many paragraphs of text. If you are not mathematically inclined, you will nonetheless glean interesting information and insights from his essays.

For those interested in technical accuracy, I submit the following errata. According to GRC, the proper distance to the particle horizon in an expanding, 15 billion year-old universe is not 15 billion light-years. True, any light received from the particle horizon has traveled unimpeded since the beginning of time 15 billion years ago. True, light travels one light-

year in one year by definition. However space is expanding, so space was created behind the photons as they journeyed towards us from the particle horizon. That means the amount of space between us and the particle horizon is greater than the amount of space the light had to traverse in getting here from the particle horizon. Thus, rather than 15 billion light-years away, the particle horizon is more like 45 billion light-years away. This abuse of GRC is prevalent among astronomers and, as Barrow is an astronomer, his use of this "convention" is not surprising.

I am, however, surprised that Barrow makes no explicit mention of the observational indeterminacy principle of cosmology. This principle states that given many significant assumptions—spacetime can be modeled as a Riemannian manifold with metric of Lorentz signature, the worldlines of massless particles are null curves and the worldlines of massive particles are time-like curves, and Einstein's equations hold on this manifold—we still require a maximal data set (most detailed data one could hope to obtain on redshifts, proper motions, distances, distortion of images, and galaxy counts out to some redshift z) to determine uniquely the geometry of our past light cone to z. Because astronomers obtain real data rather than the requisite ideal data, the geometry of our past light cone cannot be determined uniquely, even given the aforementioned stringent assumptions. This principle is relevant to many of his essays, so I was surprised he didn't make specific mention of it somewhere.

Also, concerning GRC, Barrow writes, "In places where there was no matter, space would be flat with a geometry of Euclid's sort." Although I can appreciate his intent, strictly speaking this statement is not true. For example, the vacuum solution outside a black hole is non-Euclidean as is the vacuum solution of the Mixmaster cosmology model.

Moving from GRC to the subtleties of logic, I note the following minor gaffe. In an attempt to offer an example of a logical paradox from set theory, Barrow writes, "A barber shaves all those individuals who do not shave themselves. Who shaves the barber?" To render the statement paradoxical, one must insert "and only those" after "all those." As posed, his question has an answer—the barber, necessarily. His version of the paradox is mathematically imprecise, but most readers will discern his intent.

I cannot however, discern Barrow's intent when he states that neutrinos do not participate in nuclear reactions. Immediately thereafter he writes that they interact with matter via the "weak force." This force is also known as the "weak nuclear force," and is—as he states—responsible for radioactivity, a nuclear phenomenon. I am not sure what we are to infer from his original assertion of non-nuclear involvement.

Finally, as with most popularized writing, you will find facts conflated with theoretical inference per the conventions of the field. Astronomical data on super-solar system scales is, for the most part, temporally irreproducible. Theory tells us, for example, that the shortest-lived stars persist for millions of years, so we have not had the opportunity to observe stellar evolution for any given star. This problem is pronounced on cosmological scales. When he writes that the expansion of the universe was "discovered," what was in fact observed was diminishing galactic luminosity with increased galactic redshift. One may infer from this observation an expanding universe as modeled by GRC, but one may also infer that mass is a (particular) function of time.

These are minor "corrections" and constitute my most serious criticisms of the forty-two essays comprising 267 pages of text. I've not read a more accurate popularized account of science. Barrow's talent is rare and his reputation well deserved.

I also admire his intellectual spirit as he unabashedly points out similarities between religion and science. Indeed, there is an entire section dedicated to religion and science that I found refreshingly unbiased. Consider the following example:

And indeed we see that if the pious hope of the scientists for a single all-embracing theory of the laws of Nature is successful, then that success will have to turn fundamental science into an unfalsifiable collection of statements about the world founded upon a faith in the primacy of symmetry and mathematics.

Of mathematics he writes, "If 'religion' is defined to be a system of ideas that contains unprovable statements, then Gödel has taught us that, not only is mathematics a religion, it is the only religion that can prove itself to be one."

I have numerous marginalia that testify to the captivating nature of this book, but let me conclude with an overview of the section on "time." The

section begins with a chapter on cosmological time in which Barrow explains the physical modeling of time via GRC with modifications from inflationary cosmology, the Wheeler-De Witt equation, and the Hartle-Hawking "no boundary condition." In a lucid explanation of these models, he explicates a fascinating interpretation of time per modern physics. In the chapter thereafter, he provides an empirical view of time and offers some witticisms:

The hands on my clock tell me what time it is, but not what time is.

The Universe is created with time, not in time.

Once upon a time, there was no time.

He ends this section with a review of Huw Price's book, Time's Arrow and Archimedes' Point: New Directions for the Physics of Time. As would be expected in a commentary on the arrow of time, Barrow describes the GRC perspective on cosmological entropy. His three essays on time provide an excellent overview of current themes in the scientific modeling of time.

In closing, Between Inner Space and Outer Space need not be read sequentially or *in toto*. The forty-two essays in ten topical areas range in length from three to fourteen pages. These attributes provide optimum reading flexibility, and as described above, the content is certainly worthy of perusal.

(MS)

Brand, Stewart. The Clock of the Long Now. New York: Basic Books, 1999. 176 pp.

The future is approaching us at an ever-accelerating rate. What happens if this acceleration continues? According to Stewart Brand, a "Singularity" forms. Like its astrophysics counterpart, a time Singularity is a place without a future, condemned to an eternal present. It is a place where even very short-term extrapolation from current trends breaks down. Existing strategy models fail, and new models are required. But these models are beyond our capacity to know using current tools.

According to Brand, this acceleration is being driven by the synergistic relationship between three laws: Moore's Law (doubling capacity in digital storage, communications bandwidth, and speed of microprocessors produces a ten-fold structural change every three years); Metcalfe's Law (the power of a network [internet] grows as the square of number of users on the network); and Monsanto's law (the ability to identify and use genetic information is doubling every twelve months). Accordingly, a Singularity is being generated that could emerge, according to some, around the year 2035. At this point, the convergence of these three laws produces a situation that limits our ability to envision a useful foresight horizon. Helpless, we are perpetually caught in what Tarkowska calls "presentism".

A market-driven culture of immediacy—that takes "the waiting out of wanting"—is reinforcing this technological crisis, says Brand. The distance between desire and fulfillment collapses. The near future is projected out for only a few months, maybe years, but scarcely as far as decades or generations as the velocity of its collapse accelerates into the "banana now" present, as J. T. Fraser has called it. The existential experience is one of free fall, of plummeting, of dismissing the future like a gambler for the rewards of the present. We think Brand is telling us that so many opportunities present themselves that their own proper time (*eigenzeitung*) and the opportunity timing of their action (*kairos*) has no meaning, no way of unfolding in *chronos*, in the complex heterocrony that forms a healthy society.

Brand argues that six levels with different time pacing and relative size form the working structure of a robust and adaptable civilization. He orders them by speed, from fast to slow: fashion/art, commerce, infrastructure, governance, culture, and nature. In a healthy society each level has its proper pace, safely sustained by the slower levels below, which, in turn, are invigorated by the higher levels. "Culture is where the Long Now operates," according to Brand. Slower than political and economic history, culture moves at the pace of language and religion. As long as each layer maintains its separation and unique pace, we should not fear destabilizing positive-feedback loops such as the Singularity because such can usually be isolated and absorbed: "The total effect of the pace layers is that they provide many-leveled corrective, stabilizing negative feedback throughout the system. It is precisely in the apparent contradictions of pace that civilization finds its surest health." Ecologically, a combination of fast and slow components makes the society resilient to change: "Fast learns, slow remembers. Fast proposes, slow disposes. Fast is discontinuous, slow is continuous.

Fast and small instructs slow and big by accrued innovation and occasional revolution" (34)

As we see it, the technological acceleration Brand speaks of is accompanied by a continuous cross-layer digitizing of the world. This process extends to art and myth, community history and identity, fashion and behavior and to nature herself. It is a growing process of reducing a rich and varied time-ecology, at least in part, to a digitally penetrated and timed one. The layers progressively lose their intrinsic speed and separation as the three accelerator revolutions continue towards a singularity. Each layer's *kairos* and *cronos* become conflated as they move toward one speed—digital. Second, rather than shells enclosing one another to create a time-ecology, we think the paces of nature, individuals, and human institutions interpenetrate via complex, dynamic structures metaphorically like the rhythm and pacing of cells and physiological systems of the human body as it exploits and adapts to its environment.

"The main problems might be stated, How do we make long term thinking automatic and common instead of difficult and rare? How do we make the taking of long-term responsibility inevitable?" says Brand. The idea is to extend our concept of the present in both directions, making the present longer, making it a long now because civilizations with long nows are more flexible and are able to absorb and incorporate shocks. "The trick is learning how to treat the last ten thousand years as if it were last week, and the next ten thousand as if it were next week. Such tricks confer advantage." What Brand proposes are tools, both mechanistic and mythical, calculated to deliver an experience that awakens us to our responsibility for future generations. This experience would provide some sort of balancing corrective to our shortsightedness, encouraging us to take the long view and to assume long-term responsibility measured out in centuries.

Brand's "mechanism" is an incorruptible digital clock that ticks once a year and bongs once a century with the cuckoo coming out every millennium. It is to be embedded in a desert mountain formed of colorful ancient layered sediments. The main characteristic of this clock is that it is linear: "Far future and near future are the same; distant past and recent past have equal value" (49).

Although the mechanism itself will inspire a certain mythical awe, Brand believes that the clock must be accompanied by more tangible explanations to go along with the long-term context provided by the Clock. He proposes a "library of the deep future, for the deep future": "The Clock/Library would generate and preserve the kinds of information deemed especially useful over long periods of time, such as minding extremely long-term scientific studies, sending messages to the future, or accumulating a 'Responsibility Record' of policy decisions with long-term consequences" (3).

Brand lays out the symptoms producing the impending Singularity very well. But he tends to anchor his discussion in the espoused claims of how the three technological laws will unfold as though the process leading to their creation and invented uses are not connected to the individual and society. A deeper question remains: what are the social and cultural conditions that permit these three laws to form and to accelerate in the first place? Why don't we wake up to discover the limitations of this view or *episteme*, to use Michel Foucault's term, that generates the processes that are producing the singularity? Why don't we feel the results in our bodies as they struggle to deal with the emerging embodiment that accompanies the Singularity? How do we continue to desensitize ourselves such that we are oblivious to the fast approaching Singularity?

The long-now clock continues to approach the world from the perspective of established relentlessly evolving technique, albeit refined computer technique, corrected in the mountain by the sun at noon. In a way, this exquisite concern with precision mirrors the continuing collapse of time into the short-now by its infinite divisions into smaller and smaller time segments. Even the century bonging of the clock, from a free-falling present perspective, is only a moment's oddity, perhaps worth a vacation hour or sound bite but not a change of mind in a world swept up by unstoppable, accelerating technological change.

The long-now clock reconstructs and moves the national standard—which projects its electronic beat into space via geosynchronic satellites from a silicon computer in Washington—into a metal one in the desert. In some ways the cobwebbed icon of computers connecting time pulses via satellites to, say, simultaneously target a cruise missile and guide a single hiker across the sierra is even more powerful than the long-now desert clock. This spidery icon is of a planet electronically stitched by continuous switching between satellites and the

electronically encased, Cartesian segmented surface. Soon the time and space compact globe will absorb the individual. Our very clothing, internal body states, movements and home-life are uploaded and communicated on demand anywhere on the planet. But even this micro-level perversion of the awesome blue-marble earth from space icon that Brand speaks of will not be enough to puncture the way of thinking that shrinks the present into an ever shorter now.

Research supports the view that time is not linear duration extending into the past and future but is composed of varying cognitive, cellular and muscular states associated with complex, interactive patterns of phenomenological and existential change in a time-ecology. Gregory Bateson says, "It takes two to make one," meaning that the interactions between various timings generates the whole that is the "one." To us, Brand unconsciously continues to extend our conventional reality and its accompanying technologically deterministic mythos, including its impoverished notion of time. The clock itself is constructed out of this mythos; what it IS is defined by this context or *episteme*. What is needed are new time-diagnostic tools that permit a depiction and an explanation of the process and pattern that underpin and permit this linear, accelerating unfolding as such. We need to open this context to experience in a way that finds the cracks and then progressively opens them to free us from the short-now. Perhaps this freeing would involve a series of "tricks," of new games (Whole Time Games?), plays, and happenings, developed by the Library, that would permit a fully embodied experience—sight, touch, smell, taste, and mind—creating a quantum leap from our accelerating collapse into a vanishing future time horizon to a new space-time world.

As we see it, the problem does not seem to be one of information or even knowledge; Brand supplies both with his clock and his wonderful library. Clearly, both must be more than media icons that are quickly annihilated by conventional time. The clock/library needs to proceed by continuously renewing itself, by confronting espoused-technological determinism, and by generating a critical alternative time-stance. It could do these things by devising empirical and qualitative ways to recognize time as *knowledge* expressed as tempo, rhythm, and duration outside of and forming the context for "THE clock" and the three laws as they unfold. Such projects must proceed in a non-trivial but exciting way, such that the library continually both opens up the dynamics lying behind whatever trends sweep us along and provides the time-stance that responsibility-taking for the future can build upon. For now, Brand's eternal clock and its mythos are in danger of becoming Shelley's trace of a lost civilization in the desert where "Nothing beside remains. Round the decay / Of that colossal wreck; boundless and bare / The long and level sands stretch far away."

Brand does hint at a way to break out of this difficulty. He suggests a *tricky* new experience but does not develop what such an experience might be. To us, the long-now clock and the proposed library projects are not leaky enough or "tricky" enough to permit the odd perception, the surrealist accusation of a perverted now, to penetrate. In other words, there is little room for the trickster except as decay and irrelevancy. The real issue here is the techno-primitive in Borges's library: one who possesses information without knowledge, let alone wisdom, and is not able to be the archetypical Fool setting out to restart the wheel of time. For example, the trickster, in colorful raiment, looking much like the clown Wavy Gravy, could ask the question: "What IS the clock?" The trickster's investigation of this question could involve creating a new unconventional dance for Tibet's Chitipati skeleton dancers, who skillfully remind us of the corruption of any now, including Brand's singularity.

Experientially, the clock is limited to the eyes. It is to be seen (the clock, desert horizons, and openness) with hearing acting as an important but not continuous reminder. Taste, smell, touch, appetite are not engendered in the project. It has a kind of sensual scarcity. An undertaking to diagnose our "time" requires an archeology of objects, including the Clock/Library itself. The library thus could invent tools to examine why it and the clock machine look like they do, why they ask the questions they do, and how and why the singularity is affecting our bodies and our nested-time ecology. The library could establish the "Trickster Temporal Research Bureau" to design and implement such projects as these and those listed in the paragraphs above. An archeology of time and its investigatory tricks would reinvigorate the knowing capacity of all of the senses as they act in their own individual and heterocronous time-patterns. (The New Games accomplished some elements of this.) To us, we

would be getting closer to answering the question of why we can't *feel* the singularity approach and what change in *episteme* and in experiencing would make it possible to be sensitive and act for the long now.

Stewart Brand has done us a favor by writing this important book and initiating the long-now project. News coverage has already ignited the public's imagination. Scholars examining his assumptions and evaluating his proposal will be challenged. Brand has identified key elements that are catapulting us toward severe future difficulties, and he has proposed a most interesting and playful way to reflect on the implications.
(GK and VKJ)

Brown, Jason W. Time, Will and Mental Process. New York: Plenum Press, 1996. 257 pp.

Microgenesis is a theory of mind and brain process. The theory maintains that progression in mind-brain states (as well as in all physical reality) is from whole to part and from potential to actual, rather than from part to whole or from primitive to developed. It draws these conclusions from a study of the effects of pathology upon brain cognition, while maintaining that this rather narrow field of study has much broader implications. Namely, it contends that the continuum of mental process is the fundamental reality and therefore capable of explicating all others.

It is difficult, however, to determine whether clinical data or philosophical pursuits led to this current book by Jason Brown. Dr. Brown is a neurologist at the New York University Medical Center, but for at least the first half of the book one could hardly have deduced this. The initial chapters immediately immerse the reader in philosophical jargon. The philosophy is that of Alfred North Whitehead. To say that Jason Brown has been influenced by Whiteheadian philosophy would not be adequate. Indeed, at times it is more as if Whitehead himself were the author of this present text, merely using Jason Brown as his amanuensis.

According to Whitehead (and to microgenetic theory), the present is all that exists. This present actuality is only a part of the former potentiality from which it emerged but which also constrained its boundaries within certain limits. A succeeding actuality will emerge from all of the potentialities of the present moment. Time does not exist between the actualities. It exists only within each actuality. Time, in other words, doesn't flow. It pulses. Duration is a creation of memory and makes possible categorization. "Memory," Brown maintains, "does not hold on to the world but creates it, and it is memory, or the process that makes memory possible, that sustains the world over its momentary instantiations" (247).

With this view, linear causality essentially goes out the window. There are no entities that remain unchanged through time, and thus, strictly speaking, one actuality cannot cause another. On the other hand, "emergence"—the sudden appearance of something new, more than just a sum of its parts (such as the emergence of liquidity out of a collection of molecules or the mental out of the physical)—becomes far less mystical and much more prosaic.

Given this presumption, it is not surprising that Brown discovers that a sense of human "agency" is for the most part illusory. Here finally he draws upon clinical material, using readiness potential (RP) studies, which were initially introduced by Libet and Kornhuber. These studies show that neurons exhibit a negative RP anywhere between 0.2 to 0.6 seconds prior to a planned movement. If humans choose, it is only from a menu that has been presented. This circumstance fits with microgenetic theory and the assumption that the self is only a part of a larger whole, exercising at best only limited influence on the direction of actualities.

This is a difficult book to read. It is filled with philosophic and psychological terminology, most of which is neither defined or explained. Nor is it always easy to follow Brown's line of argument. Perhaps, indeed, it would be presumptuous to say that Brown is *arguing*, given his view of agency. As he notes in his introductory chapter, "If change is realized in the becoming of whole to part, there is a surround of indefiniteness that is ingredient in the description of every part. . . . There have been times in the writing of this book when ambiguity seemed the model of clarity" (13).

Nevertheless, one gets carried along by his relentless and oftentimes piercing dissection of key concepts. With insightful precision he distinguishes between desire and will, value and desire, preferences and values, desire and obsession, belief and desire, uncertainty and indecision, doubt and disbelief, naïve and skillful, novelty and creativity

(and this is not an exhaustive list). It is almost as if he believes that by sharpening the particular, he can hasten the future by helping the part to emerge from the whole.

Perhaps he can. (RK)

Flaherty, Michael G. A Watched Pot: How We Experience Time. New York: New York University Press, 1999. 231 pp.

This is a valiant attempt, by a cognitively oriented sociologist, to delve into the vagaries of an aspect of human temporal experience—that of duration. In the exploration of the phenomenology of "lived duration" (Minkowski's term), he concerns himself with the possible causes of "protraction" (or slow passage of time) and "compression" (contraction, or the rapid passage of time) in human temporal experience.

The monograph's six chapters present the major thrust of the author's critique of theory and knowledge in this field. He also presents a program of theory construction buttressed by an analysis of empirical data especially designed for this purpose. Included are also a methodological appendix and detailed chapter notes.

Flaherty addresses the three major paradoxes that he identifies in the report of past work dealing with temporal experience. First, it is alleged that time passes slowly when it is experienced as "empty" (lacking in activity) and quickly in situations of abnormally high levels of overt activity. The author presents a fair amount of anecdotal evidence that clearly contradicts this proposition. His findings indicate that both high and low levels of activity may cause time to pass slowly. The second paradox of "lived" duration is well known since the time of William James who called attention to it. It is based on the observations that the same interval of time that is perceived slowly in the present tends to be remembered as having passed quickly in retrospect. Akin to the first paradox is the third one which points to the fact that some busy intervals are experienced as passing slowly while others are experienced as passing quickly.

The author's ambition is to develop theory that would be based on "research and discovery, not the reiteration of common sense," which he believes much of the previous work is guilty of. The endeavor to investigate the paradoxical phenomena begins with the collection of 389 published passages and 316 interviews with students which yielded personal accounts of "sufficient" causes underlying the experience of "protracted duration." The following series of possible causes are proposed: "suffering and intense emotion," "violence and danger," "waiting and boredom," "altered states," "concentration and meditation," and "shock and novelty." The statistics presented show that the two sources of data are rather similar in the incidence of the different causes listed above. Further analysis of the episodes indicates that they seem to extend the experience of time. Extreme circumstances, increased emotional concern, cognitive involvement, stimulus complexity (increased perspicacity toward one's own subjectivity and surroundings) and density of experience are seen as the underlying conditions for the experience of protracted duration.

A helpful device in the theory construction is the introduction of the concept of synchronicity, which is the quotidian temporal experience resulting from "interactions of the subjects that were temporally coordinated." Thus, the resulting S-shaped model of the theoretical relationship between duration experience and conscious information-processing includes temporal compression at the low end of the coordinate and protracted duration at the upper level, with synchronicity occupying an intermediate position. Thus, when the density of consciously processed information is low, time passes slowly and is protracted. Synchronicity is the normal experience of lived duration that is, in a sense, automatic and is not necessarily conscious, as is the case in the experience of "protracted" duration.

Any one wishing to replicate the study would have considerable difficulty due to the limited discussion of the methods in evaluating the literary samples and the interview material. There is very little detail concerning interview content, procedure of follow-up questions, etc.

This well written, sophisticated presentation, buttressed by sociological theory and sophistication, is a good start in the study of introspection of time experience, which remains a fascinating topic for further exploration. (AIR)

King, David. The Commissar Vanishes: Falsification of Photographs and Art in Stalinist Russia. New York: Henry Holt and Company, 1997. 192 pp.

How the time of individual experience becomes social time, or vice versa, is an enduring problem in the study of time. What happens when individual memory and experience conflict with social imagery or definitions of the past? Some theories of social time posit that society creates its own reality, social time or *umwelt*, a social present where words, images, and sounds—broadcast or in cyberspace, flowing through wires, existing in documents and archives, or simply being shouted or shown—have their own validity and power apart from or above that of individual memory or sense. Marxists in particular have tended to find truth in social history and to view individual history, experience, or memory that conflicts as (eventually) irrelevant.

David King's book provides documentary evidence of Stalinist falsification of the past. Many readers' images of that process come from Orwell's Nineteen Eighty-Four, where the protagonist, Winston, worked in the Ministry of Truth, destroying or altering documentary evidence to conform to the latest party line. King's book suggests that while Orwell captured the essence of the process as an ad hoc redefinition of the past, his imagery overemphasized its roots in centralized bureaucratic rationalization. There was no ministry that coordinated the Stalinist lies.

According to this book, the process was more diffuse, subordinates following subtle orders. It was based on terror rather than the creation of a believable but false historical past. The author speculates, in fact, that poor quality of much of the retouching may have been a subtle message, saying, in effect: "You may not really believe this photograph, but the power that created it has made these persons disappear." And there is considerable evidence of self-censorship, where owners of books themselves obliterated faces of those whom authority had, in one way or another, removed.

While some of the falsification was of history on a large scale (false pictures of crowds to create an image of mass support), more of it was personal: the result a cult of personality rather than a Marxist creation evidencing objective historical law. Stalin was placed at significant revolutionary events at which he had not been present, and made to seem closer to Lenin than he had been.

Some of the falsification, to today's eye, seems too incompetent to be threatening. One picture shows Lenin relaxing with his sister in a garden, a telescope partly covering her hair. A later picture shortens the telescope, making it appear to be a gun aimed at her head. This picture may seem ironic, but others (for example, of people killed by the regime and removed from later pictures) remind one of the real effects of an authority claiming the right to redefine the reality of the past in the name of historical inevitability.

For students of social time, however, intentional falsification by controlling bureaucracy or personal tyranny does not end the problem. There still remains the stubborn fact that mass communication technology, in expanding senses on a social scale, permits the manipulation of information in a way that was not possible when information and its communication were limited to what could be known through individual personal senses and acquired through language and thought. People then might have lied, but audiences were on guard that they sometimes needed to "see for themselves" or to think about explanations that made no sense.

Now much of the effective information is contained in mass communication technologies. When the U.S. landed a man on the moon, a number of residents of urban ghettoes said they did not believe the television images being portrayed—and they knew they were not able to go to the moon to check it out. The link between authoritative statements and images, verifiable in individual experience, had not been maintained or established. What one believes of social images still ultimately depends upon a link with the individual truth that continues to conform to experience.

This book reminds readers that it is not just centralized tyranny that creates false social images. There is also a more ad hoc process in which we participate, partly because we are afraid but also because it is easier. In an age when the digitally enhanced image has replaced the airbrushed image and Stalin and the Soviets are gone, we rest more easily in the images created by modern advertising and communication in mass consumer and political culture. The images are more pleasant, and it is easier to adapt to them. Horror and atrocity in African or Balkan nations is, if not manageable, at least removed.

The past becomes more and more, in the social time of modern mass communication, only prologue. It is understood, vaguely, as the not-yet-adapted-to future, part of an undifferentiated present where contradictory images co-exist, floating above the world of individual people where, when we think the past was real, actions can have intended consequences.

For a number of reasons King could invoke Shakespeare, with one slight change: O brave new world, that had such people in't. (MHA)

McNeill, William H. Keeping Together in Time. Cambridge: Harvard University Press, 1995. 198 pp.

In this book a preeminent historian (author of The Rise of the West) argues gracefully for a hypothesis that is almost certainly wrong. Subtitled Dance and Drill in Human History, the book puts forward McNeill's argument that what he has unfortunately chosen to call "muscular bonding" is basic to, and can restore, human communities: "Moving our muscles rhythmically and giving voice consolidate group solidarity by altering human feelings." This muscular bonding, he says, is the "surest, most speedy, and efficacious way of creating and sustaining communities that our species has ever hit upon. Words and ideals matter and are always invoked, but keeping together in time arouses warm emotions of collective solidarity and erases personal frustrations as words, by themselves, cannot do."

By the author's own account this book had its genesis in his army basic training camp in 1941. Despite the fact that close-order marching was utterly useless as a military tactic in an age of machine guns, trucks and railroads, the recruits were made to march around in unison, hour after hour, in the hot Texas sun, responding to commands and counting cadence. The effect on McNeill was one of personal enlargement, well-being as a part of collective ritual.

In his later historical studies McNeill noted a striking fact: when European armies rediscovered close order drill in the late sixteenth century (and within two centuries carried European power around the world), they found an advantage other than the obvious one of efficiency of command in battle: drilled soldiers developed an "espirit de corps" that permitted armies to recruit from even the poorest social classes and expect obedience, even to the point (usually) of firing upon their own kind in domestic disturbances. Why McNeill might conclude this circumstance bodes well for creating a sense of community, however, requires considerable explanation.

McNeill surmised that the emotional response to drill was an inheritance from prehistoric times when hunters and warriors danced around campfires, reenacting and reinforcing their actions in successful hunt or battle. The dancers reinforced not only precision but also group solidarity, increasing chances for survival. There was selection in favor of groups that kept together in time, and genetic transmission of a capability later tapped, inadvertently, by European armies in the late 1500s.

This response to rhythm, McNeill notes, occurs through the sympathetic and parasympathetic nervous systems, the seat of nervous response to rhythmic bodily movement, linking to parts of the brain that maintain rhythmic bodily functions and later filtering to the left brain where verbal responses are based. Rhythmic movement may also, he notes, recapitulate the brain's response to the heartbeat in the womb.

McNeill was forced by the evidence to expand his initial inquiry past directed drill to include different forms of community dancing ("group behavior where an indefinite number of individuals move their muscles rhythmically, establish a regular beat, and arouse euphoric excitement in participants and, more faintly, onlookers"). Such dancing, he says, occurs only among humans. It likely arose as a kind of protolanguage (with gesture and context but no grammatical structure) before the fully articulated speech that appears to have precipitated the "take-off" of human societies about 40,000 years ago: imagine the steady, controllable, reassuring beat of a drum on a foreboding night before there was language to express group solidarity—light is limited, but sound can be heard by all.

McNeill traces the development and bonding of small communities through what sparse records there are of community dancing, "trance" dancing, and shamanism, and he notes the utility of rhythmic, coordinated, muscular movement for physical tasks such as building pyramids or increasing efficiency on Southern cotton plantations. He traces the influence of "muscular bonding" through religious and political communities, where established communities tend to turn rhythm into controlled

ritual and reform communities tend to bring back individual participation. He considers calisthenics and American football. He is strong on military history, where changes in military technology (long distance weapons or cavalry, for example) made close-order marching more and less significant in various societies.

"Surrendering personal will to the command of another, " he notes, almost casually, "while simultaneously merging mindlessly into a group of fellow subordinates, liberates the individual concerned from the burden of making choices." He also quotes a twentieth century political leader who refers to his own rhetorical skill at controlling collective rhythms: "The audience is not being informed, it is made to perform, and its performance makes history"—Adolf Hitler.

In villages and small communities, McNeill goes on, children learned the arts of life without conscious design, by being with elders. Urbanization and mass communication are breaking down that process, and a way is needed to restore feelings of group solidarity. Muscular expressions of membership in communities, he concludes, is a way to find it.

There are less reassuring sounds I hear, though, if this book is correct: Hitler raving and the noise at rock concerts where "the beat goes on. . . ." McNeill's emphasis on military drill, given the hopes he has for his hypothesis, is unfortunate. His excursion into dance and music seems more promising at times but sets up a dichotomy between controlled drill or movement by command and rhythmic movement to dance or music that is more spontaneous. McNeill considers historical dancing that is professionalized, where the audience participates by watching, but he fails to distinguish this moving in time to a common beat, while not dancing oneself, from close-order drill in which ones moves muscularly in time with others.

Unfortunately McNeill does not consider rock concerts at all. This omission is probably because he cannot see them as restoring social community—they are usually considered symbols of rebellious individualism worked into collective frenzy. But therein lies the problem with his hypothesis. Coordinated muscular movement under a unified direction and control is different from keeping together in time where there is a common rhythm, or beat, but no one to insist that participants' muscular movements be timed and coordinated to the same purpose or effect. The military/political model tends toward totalitarianism while the individual/group dancing model does not. The latter, however, in its modern forms, does not seem to do much to sustain communities.

This distinction suggests that it may not be the coordination of muscular movements that inculcates some of these feelings of community or solidarity but rather movements to common beat or tempo—recurring sounds that recapitulate feelings from long-ago campfires (or elsewhere), evoking a feeling of collective protection, control, and security. Demagogues like Hitler project themselves as providers of that feeling of security and protection from danger, seeking to call up the past to perform a function it no longer can.

McNeill argues, correctly, that it is language and thought that has generally provided direction to these primal urges in controlled ritual (in religious services or political rallies), but he nevertheless looks forward to a return to the virtues of "muscular bonding" at the expense of words and ideals, or at least in the face of their failure to stem the tide. What he seems not to be able to do, though, is let this vision loose from authoritarian structure or control; he senses that there are primal forces that have been kept in check, sometimes inadvertently, and that we may not know all that is being unleashed. McNeill considers only tangentially, for example, the rhythms involved in sexual reproduction, even though to most observers evocation of sexual feeling seems to be an integral part of much of modern dance and music. This is very far removed, however, from the military drill that is the initiating force of this book.

McNeill may well have hit upon something, but just what is not entirely clear. Dance and drill are probably subcategories of human experiences in which people come and stay together because of common interests and where repetitive sound or rhythm help keep them together, thereby creating social time, but there are other long run institutional structures (armies or villages) that also help define and direct these interests. Modern media of communication are releasing a barrage of images that mix sight and sound in a way that corresponds more closely to the experience of earlier evolution than have heretofore existing technologies of communication, and they seem to be overriding many inherited programs of thought, language, and education. We are finding that many of these

programs no longer seem capable of providing rational structure to permit balanced assessment of the emotions drummed up. In all probability, though, this is a matter of adapting to a new environment where not just words, but sights and sounds, can be called up virtually instantaneously. What is being created is something entirely new, and its relationship to the "muscular bonding" of old seems tenuous at best. (MHA)

Pullman, B. The Atom in the History of Human Thought. Trans. A. Reisinger. New York: Oxford University Press, 1998. 403 pp.

In the beginning there were little particles. They were minimal in the sense that they could not be cut (the meaning of *a-tomos)* and they existed in huge variety: atoms of silver and gold and marble and air, of fire and water and sound and light, of flesh and bone and soul. They swirled in empty space and gradually clumped together to form earth and stars and living creatures. In these random collisions, similar atoms tended to stick together, so that if there was one atom of marble there tended to be many others nearby. And how it all came out was a matter of chance. Gods had nothing to do with it. If we allow for a confusion between atoms and molecules, the teachings of Leucippus of Miletus and his pupil Demicritus of Abdera at the end of the fourth century BCE have their counterparts in the Standard Model of cosmology today.

Leucippus and Democritus probably left treatises that argued these ideas, but all that are left are fragmentary sentences quoted by later commentators to serve their own purposes. We learn from these fragments that atoms have very few properties, only size, shape, and weight. There are no atoms that are red or sweet or sour: redness is the eye's response to atoms of a particular sort; sweetness and sourness originate in the tongue. It was not the style of Greek expositors to tell how they reached their conclusions. Euclid's Elements proves one theorem after another but never tells us how they were arrived at in the first place, and though there is plenty of evidence of atoms in the world around us, it was 400 years later that Lucretius pointed out that their existence can be argued: if we observe a wet shirt drying in the wind, we have to decide whether the water leaves imperceptibly, atom by atom, whether it turns into air, or whether it simply ceases to exist.

Bernard Pullman was a professor of quantum chemistry at the Sorbonne, and clearly he was also a great reader, for he gives us not only the gradual evolution that has led to our present view of what an atom is and how it works, but also the arguments of those who believed none of it, from Aristotle to physical chemists a hundred years ago, for whom anything that they could not see was simply an arbitrary invention with no scientific status. Time has dealt harshly but a little unfairly with these professors, for ironbound skepticism is a good quality in a scientist, not less so because someone happens to have been mistaken. And there were the philosophers not directly involved—Kant, Schopenhauer, Comte, Lenin—for whom the continued health of this hypothesis, unsupported by any direct evidence whatever, challenged their ideas as to what human knowledge is and where it comes from.

In the final chapters Pullman takes the atom apart, down to the electrons and quarks that compose it and the photons and gluons that hold it together. And at the end, though we know much, he, like most other professionals, is not convinced that we know it in the right way.

The book would have been improved by more illustrations, a more critical discussion of the classical sources, and more on the Middle Ages, but anyone who looks for that can find it in Kurd Lasswitz's Geschichte der Atomistik vom Mittelalter bis Newton (1890). I know of no history of atomism on a similar scale written during the century between these two works. (DP)

Standage, Tom. The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's On-Line Pioneers. New York: Walker and Company, 1998. 240 pp.

This book should appeal to members interested in the relationship between instantaneous communication and the development of social time on a global scale, now usually referred to as globalization, and in some Society writings as the "time-compact" globe. Thirty years ago Marshall McLuhan hypothesized that instantaneous electronic communication was different from other

communication in that it extended, on a social level, the entire human nervous system rather than just particular senses. Then, in a time when it was easier to romanticize villages in contrast to larger social structures, he called it the "global village."

For George Washington, as for Alexander the Great, the speed of a message over significant distances was limited by the speed of an animal (usually a horse) or a ship. Messages within earshot or eyesight permitted communication over smaller areas, but distant wars, deaths, discoveries, or disasters could remain unknown. Life could go on in one part of the world unaffected by change in another. Governments and armies obtained advantages with organization through relay stations, but there was still a technological limit. Then the world was wired, and instantaneous communication changed the character and pace of lives affected by it. This wiring was first accomplished not by the telephone or the internet, but by the telegraph, and this short, interesting, and entertaining book tells its story.

The word "telegraph" first applied not to the transmission of a message by electrical impulse, but by the communication of visual messages using synchronized clocks, a code, and movable black and white panels observable by telescopes. In 1791 the device transmitted a message ten miles between two towns in northern France. Subsequent improvements led to a substantial expansion of optical telegraph networks, and by the 1830s telegraph towers had spread across Europe, sending mostly governmental and military messages.

The optical telegraph, however, was limited by distance, terrain, weather, light and dark. Around 1800, the voltaic cell permitted electricity to be driven around a circuit more evenly than with the sudden jolt of previous batteries, and around 1820, it was discovered that electricity flowing through a wire gives rise to electromagnetism, causing a compass needle to move. This discovery meant that there was a reliable way to detect electricity in the wire, and it was thus theoretically possible to send an electric impulse through a wire and deliver a repeatable signal on the other end. The signal, using codes, could then be translated into letters or words. The immediate problem, however, was that the signal could not be reliably sent over long wires, and distance was thus limited.

The 1829-30 work of American physicist Joseph Henry (who discovered that a number of connected smaller batteries permitted electricity to be transmitted over longer distances) eventually led both Samuel Morse in the United States and Cooke and Wheatstone in England to build, by the late 1830s, successful telegraph machines. By 1850 the telegraph was expanding rapidly, with networks in the United States, Britain, Prussia, Austria, Tuscany, Saxony, Bavaria, Spain, Australia, Cuba, and Chile. When the transatlantic cable was completed in 1858, Western nations came to view the world as "wired." *Scientific American* magazine referred to the Atlantic Telegraph as the "instantaneous highway of thought between the Old and New Worlds." Writers and editorialists gushed, calling it "the greatest event in the present century," and ventured optimistically: "It is impossible that old prejudices and hostilities should longer exist, while such an instrument has been created for the exchange of thought between all the nations of the earth."

Though it turned out that the thoughts exchanged were not always kindly, the world did change. The transmission of time-sensitive information (from stock and commodities prices to sports wagering) mushroomed as problems of security and cost were solved. The movement of financial information increased the speed of commerce and the lives of those involved in it. Important personal information was conveyed too—marriages by telegraph took place, and camaraderie, sometimes intimacy, developed among telegraphers.

Some differences can best be understood by contrast: in 1825 Samuel Morse, then a portrait painter, had traveled from New Haven to Washington, D.C., a four-day trip, for an important commission. On February 10, 1825, he wrote to his wife in New Haven, telling her how much he missed her. On February 11 he received a message that she had died suddenly on February 7. Her funeral was on February 12, and he did not arrive home until after it was over. In 1832 he became interested in the telegraph.

Other social institutions changed as a result of the telegraph. Newspapers delivered less old news (previously it had sometimes been weeks old, recycled from other papers) and more current news. The worldview of the public began to shift to comprehend global events, and thus to be affected by them. With the telegraph, this shift was accomplished by news delivered, mostly through press associations, to newspaper offices and then redistributed in the papers. (More direct mass

communication did not come until later, with broadcasting). Still some complained, even then, that there was too much information about which too little could be done.

The conduct of war changed. Britain had customarily revealed locally to its citizens the news of departing warships. This information helped maintain public enthusiasm, and since news could travel no faster than the ship, the enemy could gain no advantage. In the Crimean War, however, the ship information was telegraphed to Russia. The telegraph also meant that bad news could reach the public earlier, undermining public support, and that generals in the field had to deal with inquiries and orders from officialdom. Rapid communication in the place of more measured response could lead to misunderstandings, a perceived need for rapid response, and thus war. Messages could be manipulated to obtain advantage. Diplomacy was seen as suffering too as ambassadors found their autonomy undermined. One decried "the telegraphic demoralization of those who formerly had to act for themselves."

In 1876 Alexander Graham Bell obtained a patent for "Improvements in Telegraphy." His new machine transmitted speech itself and did not require code translations by experts. By 1880, there were 30,000 and, by 1886, 250,000 telephones in use around the world. The telegraph had been superceded. The new technology permitted faster, more efficient messages, responses in real time, and communication in normal human speech. It rapdily came to be used for both personal and commercial communication. This book, focusing on an "internet" from a century and a half ago, serves to remind us both how much we have changed and how much we have stayed the same.

A postscript of sorts: as this review was being written NATO nations were bombing Yugoslavia after becoming aware of massacres stirred by ancient hatreds and territorial impulses that have endured and been passed on in social memory through the centuries. Such massacres occurring 160 years ago would have remained unknown or ignorable for a longer period of time, and nations not directly threatened would have felt less capable and less obligated to do anything about them. Now spy satellites can fly over territories and document atrocities, and we know and can prove (or at least the national agencies charged with keeping secrets from and for us can) more about what is happening in the world around us. Instantaneous communication has meant that more information is available and that more social structures have been created to let in, and to filter out, that information. (MHA)

Wagner, Jon, and Jan Lundeen. Deep Space and Sacred Time: *Star Trek* in the American Mythos. Westport, CT: Praeger, 1998. 280 pp.

While reading Jon Wagner and Jan Lundeen's Deep Space and Sacred Time: Star Trek in the American Mythos, I discovered, with uneasy resignation, just how outdated my critical sensibilities have become when juxtaposed to current theoretical fashions. Essentially, the authors direct their treatment toward two audiences. Obviously, Wagner and Lundeen want to tap into the legendary corps of devotees of the television and cinema franchise. Such viewers find some legitimacy when academe devotes serious study to their venerable symbols from popular culture. Thus, the authors use the more than five hundred episodes of Star Trek (from four television series and a battery of feature films) to introduce this audience to selected current trends in criticism, ranging from (1) issues arising from the postmodernist debate about the vapidness of existence through (2) politically correct discussions involving race, gender, and class to (3) recent insights about the roles myths play in American society. Wagner and Lundeen's other audience includes those already conversant with these philosophies. They desire to impress this group with how icons of popular culture such as Star Trek have fared against the expectations and rigors of recent theory. At the end of this essay, I will clarify why I think none of these purposes will meet the particular intellectual needs of this newsletter's readers.

One of the overarching assumptions that span Deep Space and Sacred Time is how Trek myths confront postmodernism's dismissal of a "mythic construction of a cosmos." Framed by the humanist world view of its creator, Gene Roddenberry, "Star Trek's project, in the face of this chaos, is one of establishing a 'fixed point' of orientation for the cosmos, and that point is the starship or station that carries its center with it in the otherwise decentered universe" (213-14). Throughout its thirty-five year run, however, Star Trek has pursued this challenge at

times with fervor, at other times with manifest hypocrisy, and still at other instances with self-consuming ambivalence. Thus, in their exploration of "whether myth is an agent of human growth or a handmaiden of the status quo," Wagner and Lundeen simultaneously praise Roddenberry for assigning a woman to play the Enterprise's first officer in the pilot episode and condemn the creator for yielding to network pressures to conform to 1960s social values (by assigning these command responsibilities to a man in the original series itself). This strain between progress and stasis propels Wagner and Lundeen though a variety of issues such as (1) the migration of Trek's attitudes toward women throughout its manifestations, (2) the culturally hegemonic assumptions that underlie both its utopian and its dystopian visions of the future, or (3) the periodic, halfhearted reflections on racial issues that appear in various episodes.

The discussion of these issues does not exactly move at warp speed. The pluralism arising from Wagner and Lundeen's implicit faith in the value of cultural diversity apparently extends to tolerating competing textual voices. Although they share values, each writer composed his or her portion of the chapters with differing epistemic concerns. One voice prefers compartmentalized arguments: recapitulations of the definition and status of a theoretical concept, long descriptions of plot summary (one tedious seven-page passage recounts without argumentative relief the plots of the pilot episodes for all four series), and Olympian pronouncements about how these plots fulfill such criteria. The other voice (which I eventually came to prefer) leads the reader more carefully through the evidence, demonstrating how it responds to the nuances of myth theory's many individual subjective embodiments.

Although intriguing at times, the insights proposed by both voices are plagued by false assumptions. For example, on a small scale, Wagner and Lundeen sometimes skew the evidence to fit their thesis. Amid several very valid assertions regarding Trek's peculiar depiction of women, the authors invoke the actions of two female characters from the film Star Trek VI: The Undiscovered Country as evidence of the "theme of women as deceivers who conceal their true nature" (105). This stance disguises the transgendered nature of betrayal in the film. Captain Kirk's (and thus the audience's) ultimate task is to ferret out those who would undermine the culturally hegemonic goals of the Federation. The conspiracy involves both men and women from three races (human, Klingon, and Romulan) and includes key members of the military, such as the head of Starfleet. To me, this evidence presents betrayal not as a gender-specific quality but a human one. Such misrepresentations contaminate the quality of argumentation in several of Wagner and Lundeen's key positions.

On a large scale, I see dangers in treating the corporation of writers, actors, producers, and directors of Star Trek as a monolithic entity. The ambivalences about the Vietnam War in the original series arise, in part, from script writers with differing agendas. Some of the incarnations of plot that Wagner and Lundeen value owe existence to an actor's personal ambition. (George Takei negotiated his way into a starship captaincy in one film.) Also, I wish that the authors had offered more detailed examples of the public's acceptance of Star Trek's racial, feminist and other mythic images, especially after the initial chapters.

I do not think that Deep Space and Sacred Time will appeal to the interests of the readers of this newsletter. The authors touch upon the subject of time infrequently and cursorily. In their chapter entitled "Decentered Cosmos," they do address the manifestation of temporal paradoxes and privileged time lines in various episodes and films. Their insights, however, do not progress beyond a reiteration of what Trek's scripts already proclaim. Whether or not the three dozen or so scripts that invoke alternative time lines merit more detailed study is questionable. Most of these plots are infamous for their implausibility and discombobulation. As Kathryn Janeway, the captain of Voyager, once confessed, "Future is past, past is future–it all gives me a headache!" (198). (RF)

Time-Related Conferences and Programs

1993-1999

The following table provides a brief summary of time-related conferences and programs that took place during the years 1993-1999. John Walter Cordes is the coordinator of this effort. He will be working together with Tom Weissert to maintain an electronic archive and bulletin board for past and future events; this information will be posted on the ISST website. More detailed information about most of the conferences/programs listed here is available through actual program materials (see contact information below). If you have any information or material about past or future time-related conferences or programs, please send them to the following address:

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Theme	Date	Location	Sponsor	Information Type
Spatio-temporal Reasoning in Geographic Information and Analysis	May 8-11, 1993	UCLA Conference Center, Lake Arrowhead, CA	National Center for Geographic Information	Proceedings
The Resurgence of Time	June 28-30, 1993	Otto-Friedrich-Universitat, Bamberg	Bamberg Mastercourse	Program
Neural Mechanisms Involved in Psychological and Biological Time Measurement	September 22-27, 1993	Cambridge, UK	ENP Autumn School	Provisional program
Time and the Dynamic Control of Behavior	November 7-8, 1994	Liege, Belgium	Universite de Liege	Program
Time and Mind	December 1-3, 1994	Regensburg, Germany	Universitat Regensburg	Program
Women/Time/Space	March 25, 1995	Lancaster, UK	Lancaster University	Call for papers
The Pace of Life	July 14-16, 1995	Totnes, Devon, UK	Dartington Hall	Provisional program
International Conference on Modern Mathematical Models of Time and Their Applications to Physics and Cosmology	April 11-13, 1996	Arizona, US	University of Arizona and Pima Community College	Agenda
Between Tradition and Innovation	May 22-24, 1996	Palermo, Italy	University of Palermo	Call for papers
Mind and Time	September 8-10, 1996	Neuchatel, Switzerland	Universite de Neuchatel	Call for papers

Theme	Date	Location	Sponsor	Information Type
The Temporalities of Nature and Culture	May 1-5, 1996	Tutzing	Evangelische Akademie	Notice
A Conference on Time and History	January, 1997	Lancaster, UK	University of Lancaster	Notice
The Meaning of Time	April 9-13, 1997	UK	Dartington Hall Easter Conference	Inquiry
Time and Value	April 10-13, 1997	Lancaster, UK	Lancaster University	Partial program
What is Time? A Multidisciplinary Approach	May 29-30, 1997	Milano, Italy	VI International Conference, Centro Congressi Cariplo	Program
The Psychology of Time	April, 1997	Berkeley, CA	The Clair Studies	Draft of Advertisement
The IV Latin American Symposium on Chronobiology	August31-September 3 1997	Puebla, Mexico	Universidad Nacional Autonoma	Program
Recent Trends in Time Studies and Organization	April 24, 1998	Amsterdam	ISIDA, Kurt Lewin Institute	Program
Seminar Series on Time	January 26, February, 19, March 19, April 23, 1999	Stockholm	Institutet for Framtidsstudier, Migma Film AB, KK-stiftelsen i samarbete med Kulturhuset, Stockholm Akademiska Forum	Program
Studies of the Time Phenomena	February-May, 1999	Moscow	Moscow University	Seminar series
Time, Reality, and Transcendence	March 19-21, 1999	Aalborg, Ost	Aalborg University	Seminar listing
Time, History, Commemoration	September 16-18, 1999	Liverpool, UK	British Society for the History of Science, Royal Historical Society, NMGM	Program
"Zwischen Anfang und Ende: Nachdenken uber Zeit, Hoffnung und Geschichte" [Between the Beginning and the Ending: Reflections on Time, Hope, and History].	May, 1999	Munster, Germany	Josef Pieper Stiftung	Program

International Society for the Study of Time

APPLICATION FOR MEMBERSHIP

(Please type or print)

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1. Name, title of present position, and professional affiliation:

2. Preferred mailing address:

3. Academic discipline, profession, or area of study:

4. Telephone, fax, and e-mail numbers:

_____ _____

Signature Date

Instructions

- Attach a complete vita, including a list of your publications or works, especially those relevant to the study of time. A brief statement of interest or other relevant information may also be included.
- Circle any items of information above that you would NOT like to have appear in the Society's directory.
- Return the completed application form, with your vita, together with a check for the first year's dues (US $35) payable to the International Society for the Study of Time, to the Executive Secretary at the address shown beneath the letterhead. If the application is not approved, the first year's dues will be refunded.

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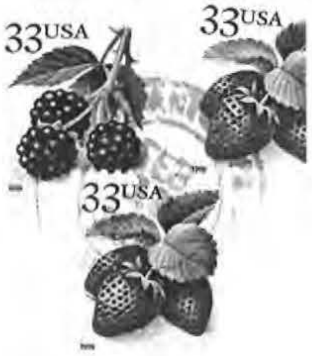

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