What Time Is This Place?

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The Time Inside

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These thoughts about how our environment represents or might represent the past, the present, and the future can be brought into better order if we look at how our bodies and our minds experience time—how time is built into us and yet also how we ourselves have created it. It is the fit of this internal time to the time outside that is the theme of this book.

Biology now reasserts the ancient emphasis on the rhythm of life. The world around us pulses in cycles great and small; we swim in a stream of time information. Some of these cycles are evident to our senses: the alternations of light and dark, of heat and cold, of sound and silence, the daily course of the sun and the phases of the moon. Of others that affect us we are unaware: the flux of gravity, of pressure, of nonvisible radiation. We change, too—we sleep or waken, are hungry or full, alert or dull, joyous or sad, are born, grow old, and die. Our internal rhythms seem to respond to the rhythms of the universe, and we use those external changes to regulate our own life processes. The internal cycles have many evidences: body temperature, excretion, brain activity, heartbeat, breathing, eye movement, menstruation, dreaming, growth, muscle tone, hormone production.

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These rhythms have diverse periods, but in man the 24-hour, or circadian, cycle is the dominant one—the alternation of sleep and waking and all the bodily cycles attendant on those states. That cycle appears to be an inherent oscillation. Although there are individual differences in the length of the natural or "free-running" period, the variation in this period lies only between 23 and 28 hours. (The median period is close to the lunar day of 24.8 hours. Thus the earth's rotation seems to entrain us to a slightly faster cycle than our bodies might "naturally" choose!) The period can be influenced by shifts in the cycle of light and darkness or by electromagnetic fields or by social clues, but, unless externally imposed, any major departures from the normal range of that period or irregularities or sudden changes in it are always a symptom of illness. And when changes in this rhythm are imposed from outside, as in rotating work shifts or a flight across the meridians of longitude, they exact a price in fatigue, bodily upset, mental stress, or even permanent damage. In the technique of "brainwashing," for example, upsetting the awareness of the time of day is an important means of hastening breakdown and submission. There is further evidence that when external clues to the circadian beat are muted, as in winter above the polar circle, many people suffer from depression and difficulties in sleeping.

While the circadian rhythm is the dominant one, there are other important ones. The menstrual cycle is well known, but we now find that males undergo emotional and chemical cycles of roughly similar duration. There are periodic psychoses as well. Mental activity seems to peak in spring and autumn. There is some uncertain evidence of longer cycles (of disease, for example) which may be in phase with such events as the sunspot cycle of 22.3 years.

At shorter intervals, a persistent 90- to 100-minute cycle has emerged, at first in the study of sleep and dreams, and then as apparently underlying waking processes as well. It may well be a natural rhythm of the waxing and waning of attention, of bodily drive, perhaps of the processing of information. It is more rapid in infants—closer to 50 or 60 minutes. If this proves to be a fundamental waking rhythm, it may mean that the 60-minute hour, originally chosen because 60 and 24 are easily factored numbers, is an inhuman unit.

Such pulsations seem to be present in all living things and appear to have two principal functions: to keep the organism coordinated with its external environment, so that it acts at appropriate times, and to coordinate the internal flux of biological processes, so that the complicated machinery of the body works in harmony. A failure of synchronization in these rhythms disorganizes that machinery and puts the organism under severe stress.

Illness, age, and fear are usually accompanied by internal asynchronisms. Asynchronism in the external environment or a change in its phase may bring on this bodily asynchronism, as the internal rhythms adapt to the external change at different rates. Conversely, external lighting or social communications can synchronize the rhythms of groups of people, and lighting cycles can be used to reorganize irregular menstrual periods. As men free themselves from submission to the external cycles of nature, relying more often on self-created and variable social cycles, they increasingly risk internal disruption.

Rhythmic action is eagerly enjoyed by young children. It appears to be a fundamental means of orienting them to the world about them. Rhythm is connected with mental health, to learning and memory, to states of fear and security. There are individual differences in internal time structure, however, in its regularity, in its stability in the face of assault, in the length of the basic "free-running" period, in the degree to which all internal cycles are in phase, in the amplitude of the bodily changes.

Our environment subjects us to potent rhythms, many now man-created, many out of phase or experienced haphazardly. We fly from time zone to zone. Our attention ebbs in protracted meetings; after lunch we long for the nap we cannot take. We resist spring fever and fail to act energetically when we are most alert. We may be wakeful at bedtime and dull in the morning. As the seasons change, we carry out the same schedule in daylight and darkness. Our health depends on an integrated internal time structure, well joined to external periodicities. Perhaps we could begin to read the time structure proper to our own bodies. Children might be taught not only to "tell time" from the clock hands but to attend to and anticipate internal rhythms, to act in harmony with them in eating, sleeping, excretion, work, and play. As we gain conscious control of the external world, environmental time could be adjusted to fit our own human structure, while allowing more gracefully for individual variations.

The Idea of Time

Rhythms, objects, and events exist; but time and space are triumphant human inventions. Past, present, and future are created anew by each individual. At eighteen months the child will say "now," at two years "soon," and at three "tomorrow" and "yesterday." His time horizons are close, before and after are confused with spatial succession, and diverse sequences of events cannot be combined.

Time is discontinuous and linked with particular events. We are suddenly a year older on our birthday. At seven or eight years, the child takes a leap: the idea of succession is coordinated with that of duration, and different sequences can be put into a common "time."

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Time is a mental device to give order to events, by identifying them as coexisting or successive. Moments do not exist in themselves; they are classes of events in which there is no need to distinguish one event as occurring before the other. We are well equipped to perceive succession and simultaneity, particularly by our sense of hearing. We are poorly equipped to perceive date and duration. Although we have internal biological clocks, they are imprecise, subject to fluctuation, or difficult to read. The structure of our brain, however, allows us to learn, recall, foretell, and create a social hypothesis of time. Using this hypothesis, we modify ourselves and our surroundings to act effectively in the present.

The sense of future arises in distinguishing between purpose, effort, and result; it is the conceptual basis for action that seeks a delayed gratification. The idea of the future seems to be formed somewhat before the idea of the past in the young child's mind, and the relatively broad temporal range eventually achieved is a distinctive trait of the human species. From a simple forward projection of wishes, the concept of futurity becomes a set of expectations about events to come based on regularities in events gone by. Later, the future becomes creative; new chains of events, probable or improbable, are constructed to guide present actions. In the normal course of adolescent development, these possible futures become both more extended and more reasonably connected with present constraints. Fantasies and daydreams persist, however, just as do fables and myths of the past. They seem to be a playful way of learning how to create the future. Indeed, they continue to have a useful role, partly for release and whimsy, partly for exploring the future, as long as their dissociation from present real constraints is perceived.

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The sense of past, which has the original function of informing present action by experience, grows