The Human Organization of Time

TEMPORAL REALITIES AND EXPERIENCE

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All Times Are Not the Same

> Que no son todos los tiempos unos.
> (For all times are not the same.)
> —Miguel de Cervantes Saavedra,
> *Don Quixote de la Mancha*

It was a foreboding hour early in the twentieth century. The date was the first of August in 1914, and because time was about to join the Allies' cause, the world would be changed forever. Anxiety about the German attacks scheduled for that evening led William II, emperor of Germany (kaiser), to propose a change of plans to his chief of staff, General Helmuth von Moltke. The kaiser proposed that Germany's plan of war be changed to sequential attacks: first an attack against Russia, followed—presuming a Russian defeat—by an attack against France, this rather than the anxiety-producing simultaneous two-front war specified in the original plan (Tuchman 1962, pp. 15, 93–104).

But the Kaiser failed to convince his subordinate. Von Moltke declined the change on the grounds that "once settled, it [the plan] cannot be altered" (Tuchman 1962, p. 100). And because the cold war took its origins from World War II, which took its origins from the outcome of the First World War, whose outcome was intimately linked to the Kaiser's decision that fateful August day, in a very real sense the entire direction of twentieth-century history turned on that strategic decision. Indeed, one could argue that the twentieth century truly began that day.

Could a skeptic dismiss this interpretation as just an exercise in hyperbolic history? Seemingly not, for a dispassionate reading of the history of those strategic weeks at the beginning of the Great War (e.g., Gilbert 1994; Tuchman 1962) can only produce the conclusion that Britain and France stopped the German invasion in the west by the narrowest of margins, that they held on by a hair's breadth. Had Germany been able to focus on a single front and hurl the full might of its formidable war machine against the Allies in the west, the war against Belgium and France would likely have ended with a German victory—a quick German victory. Whether England would have fought on is speculation, but a quick and complete German victory over France would have had major implications for subsequent pivotal events such as the Bolshevik revolution in Russia and Hitler's seizure of power in Germany—the former becoming uncertain, the latter almost certainly diminishing to a minor if not zero probability. And if those two events were changed or did not occur at all, the rest of the twentieth century becomes unreconstructible.

TIMES DIFFER

But what led to the reaffirmation of the original plan that afternoon rather than to its modification? Cultural forces, powerful cultural forces, seem to have played a major role, and those forces directly involve forms of human time. One force was the cultural preference for engaging tasks and events, a preference selected from a continuum of choices ranging from a strict one-thing-at-a-time attitude to a preference for being involved with many tasks and events simultaneously. This continuum of choices for sequencing activities is known as *polychronicity*, and it will be explored in depth in Chapter 3. But for now we simply need to know that German culture traditionally valued and preferred the one-thing-at-a-time option; indeed, it strongly preferred it (Hall and Hall 1990, p. 14).

However, there is more to time culturally than polychronicity, as fundamental as polychronicity may be. Another facet concerns the explicit emphasis given to organizing and coordinating action with schedules and plans. And the matter of flexibility once a plan is made or a schedule created is especially relevant to that August 1 decision. Some cultures emphasize flexibility as new information becomes available, whereas others believe plans and schedules should be inviolate. German culture traditionally tended toward the latter orientation, a point that could not be made any more clearly than Von Moltke did when he said "once settled, it [the plan] cannot be altered."

Ironically, the decision could have gone the other way, because the cultural values and beliefs influencing the Kaiser were not aligned; they were pulling him in opposite directions: one to change the plan, the other to keep it intact. The plans-are-inviolate value in German culture did push for keeping the plan unchanged, but the one-thing-at-a-time value pushed in the opposite direction and was likely a source of some of the Kaiser's anxiety as the German war plan was about to be implemented. Because of the one-thing-at-a-time value, a two-front war, anathematic to all generals, should have been particularly loathsome to German generals, so it is surprising that a plan for a two-front war was developed in the first place. Nevertheless, that was the plan, and in a culture such as turn-of-twentieth-century Germany's, once a plan was made, the preference was to leave it unchanged.

So the two values conflicted, and the plans-should-be-inviolate value prevailed. Had the culture differed on this point and taken a more flexible view toward plans and changing them, had the Kaiser been Romanian on this point rather than German, Romanian culture being relatively more flexible about plans (see Chapter 8), the decision—and the twentieth century—might have gone differently. And it is in this sense that time (i.e., German values about keeping plans unchanged) joined the Allies' cause that day, because the two-front war specified in the original German plan favored the Allies more than the Kaiser's single-front-in-the-west alternative would have.

The Kaiser's decision on August 1, 1914, to retain the original plan illustrates the importance of time in human affairs, and the discussion of it also illustrates that time and times vary; they are neither uniform nor the same from one moment to the next. Thus all times are not the same. There would be no point in writing this book if this were not true. Yet of its truth there can be no doubt, a truth that can be demonstrated easily because only one time need differ from all others to make it true. To demonstrate, consider Elias Canetti's penetrating question: "And what if you were told: One more hour?" (1989, p. 144). Who would argue that with such foreknowledge of one's final hour that any other hour would be its equal?

But Canetti addressed final hours. What of the first hours? The first hours also differed, and originally they did so from day to day. The first measured hours were called temporal hours, which sounds redundant because what else would an hour be? In this context, however, the *temporal* conveys the sense of "changing," since these first hours were defined as twelve equal parts of the day, and twelve equal parts of the night (Boorstin 1983, pp. 30–31; Dohrn-van Rossum 1996, p. 19). Hence within a day the hours were equal, but as the days passed and grew longer or shorter depending on the season of the year, so too would the comparable hours lengthen or shorten daily. For example, during the spring each new day is longer than the last, so each hour, defined as one-twelfth of the daylight period, would lengthen with each passing day too. In autumn the order reverses, and as the days grow shorter, likewise so do the hours. Although the concept of regular, absolutely equal temporal units was known, the best early technologies (e.g., sundials and sandglasses) could do was measure a few consecutive such hours, either before dusk came rendering sundials impotent or the hourglass turner fell asleep. And in civilizations such as those of Egypt, Greece, and Rome, the period of light (day) and the period of dark (night) were each divided into twelve hours, which meant that except near the equinoxes the length of daytime and nighttime hours differed (Gimpel 1976, pp. 167–68).[1] So temporal hours would dominate the measurement of time during the day until the fourteenth century.

Some people have always realized that times differed, and in the industrial era Henry Ford was one of them. But those differences bothered him. So Ford built a watch with two dials enabling it to tell two times. It told the sun time, which defined the hour for each local community, and it told the new railroad time (the developing standard time of time zones; see Chapter 6). It also illustrated the tendency to believe there is only one time, for Ford noted that the watch "was quite a curiosity in the neighbourhood" (Ford 1922, p. 24).

Ingenious as it was, this was not the first watch to tell time in two different time systems. Jo Ellen Barnett (1998, pp. 116–17) has noted that nearly a half century earlier similar watches were constructed in England to deal with the same problem. She also described how the victorious French revolutionaries attempted to completely overhaul the time-reckoning system used in France, an attempt that divided the day (one complete rotation of the earth) into ten hours rather than twenty-four, and that divided each hour into one hundred minutes, each minute into one hundred seconds. In their efforts to establish and institutionalize this change, the revolutionaries had watches built that displayed two sets of numbers: the familiar one through twelve, but presented twice around the outer circumference of the watch's face in a circle that surrounded an inner ring containing the numbers one through ten.[2] And in the spirit of proper revolutionary zeal, the inner ring for counting the revolutionary hours appears easier to read. But not for long. After about two years of trying to convert the nation, the effort was abandoned in 1795 (Barnett 1998, p. 56; Richards 1998, pp. 263–64). It seems reasonable to suggest that the revolutionaries' efforts were motivated not so much by a desire to improve time reckoning as by a disdain for anything associated with the ancien régime and the belief that just about anything that differed from its practices was better, or at least desirable. Hence their efforts were driven principally by an effort to differentiate themselves from the old order, a use of time in which they were not unique (see the discussion of the Sabbath later in this chapter).

But the skeptic would protest, saying human time is really "just" subjective experience and not real time anyway, that one's experience of that final hour might differ from the thousands of other hours experienced in a lifetime, but that hour, the passage of a single hour across the universe, is the same as any other of the nearly uncountable hours that have passed since the universe began. The skeptic would quote Isaac Newton: "Absolute, true, and mathematical time, in and of itself and of its own nature, without reference to anything external, flows uniformly and by another name is called duration" (Newton 1999, p. 408).

Newton was wrong. Even the concept of time used in contemporary physics discards the idea of a uniform temporal meter, Albert Einstein's work on relativity having "demolished" it (Coveney and Highfield 1990, p. 70). For Einstein's special theory of relativity describes a slowing of time for clocks moving with a constant velocity relative to a referent observer (Einstein 1961, pp. 36–37), and his general theory of relativity similarly describes clocks ticking at different rates if they are located in different positions within a gravitational field (pp. 80–81). These effects are known as time dilation and gravitational time dilation, respectively (Thorne 1994, pp. 37, 66–86, 100–104), and either extreme velocities or extreme gravitational forces are necessary to produce major temporal differences. For example, gravitational time dilation means that the closer things are to a source of gravity, the more slowly time flows relative to an external observer (Jack Burns, personal communication, 2001; Thorne 1994, p. 100), and on the surface of a neutron star, a star whose gravity is often a billion times stronger than the earth's, time flows about 20 percent more slowly relative to the earth (Davies 1995, p. 105).

But even without relativity theory, other theoretical developments in the physical sciences might have eventually overturned the concept of absolute time. For example, applying the second law of thermodynamics to the universe as a whole yielded the controversial conclusion that entropy—the degree of disorder in a system (Hawking 1988, p. 102)—increases continuously across the entire universe with each passing moment (Coveney and Highfield 1990, pp. 33–34). Although this does not mean time passes at different rates, it does illuminate the different nature of each passing moment, for *if true* (the point is debatable, see Chapter 2), it means that no two temporal intervals in the history of the universe are characterized by the same amount of entropy. So, if true, it means that all times are not the same, that none of them are, which means that all times are different.

One need not go that far, however, to realize that at least some times differ. And differing times mean variance among times, and that variance creates the potential to explain other phenomena because a constant explains no variance. It is the nature of these differences, especially among human times, that will be explored throughout this book. But to be concerned about such differences suggests that the differences matter, and matter they do, profoundly.

TIME AND THE HUMAN EXPERIENCE

The possibility that time can explain other phenomena, especially human behavior, is the scientific raison d'être for studying time and caring about it: If times differ, different times should produce different effects. And an important mechanism through which differing times affect human behavior is the definition of the situation.

Early in the twentieth century, William Thomas and Florian Znaniecki (1918, pp. 68–74) developed a fundamental explanation for human behavior, the definition of the situation, the implications of which would be stated most memorably a decade later: "If men [and women] define situations as real, they are real in their consequences" (Thomas and Thomas 1928, p. 572). Later, in his analysis of the self-fulfilling prophecy, Robert Merton would elevate this statement to the status of a basic theorem in the social sciences (1968, p. 475). It is so fundamental because human beings generally behave in ways consistent with their perceptions and interpretations of reality, most of which are based on social constructions developed through interactions with others. To understand these constructions is to understand and explain much of the behavior that follows from them. So if schedules and plans are seen as set once they are made, if they are thus perceived as immutable, the expected reaction to the proposal to change a plan is to reject the proposal—even if the proposal comes from the Emperor of Germany.

And temporal forms define the situation at the mundane level of everyday life just as they do at the strategic heights. For time has often served the social function of differentiating one group from another. Noting this in his cogent analysis of the week, Eviatar Zerubavel (1985) explains how the Sabbath was used this way to distinguish the three great monotheistic religions. Judaism developed first, so it had its choice of days, and the choice was Saturday. Then came Christianity and Sunday, followed by Islam and Friday. Further temporal differentiation was provided through rules dealing with prayer times. For example, prayer for Muslims came to be forbidden at sunrise, sunset, and midday so as to create a deliberate contrast with other religions (Dohrn-van Rossum 1996, p. 30). Thus the *time* of worship and devotions would distinguish one religion from another, just as would the *place* of worship.

Consistent with this interpretation was the practice of early Christians to celebrate both Saturday and Sunday (Zerubavel 1985, p. 21). This was a transitional era in which Christianity was not wholly distinct from Judaism, either theologically or temporally. So as Christianity developed as a theologically distinct religion, the observance of both days ultimately stopped, with only Sunday being observed. In this same vein, as Christianity became more organized because of events such as the Council of Nicaea held in 325, it also explicitly proscribed Easter from occurring at the beginning of Passover (Duncan 1998, p. 53). The emperor Constantine was even candid, if unecumenical (or worse), about why such a coincidence should be avoided: "We [Christians] ought not to have anything in common with the Jews" (quoted in Duncan 1998, p. 53).

But even after the two religions had become completely distinct, they still shared some things "in common," among them the general location of their respective Sabbaths within the week. Zerubavel noted that the two Sabbath days "touch," that they are temporal next-door neighbors (1985, p. 26). At first glance this would appear to be a poor strategic choice for a group attempting to distinguish itself from a well-established competitor. But that is the point: The new religions, first Christianity, then Islam, wanted to distinguish themselves. And as new religions they suffered from the liability of newness (Stinchcombe 1965, pp. 148–50), the set of disadvantages all new organizations face that make their survival uncertain at best because organizational mortality rates (i.e., ceasing to exist) decrease with organizational age (Hannan and Freeman 1989, pp. 244–70).

So the new religions likely attempted to reduce this uncertainty and enhance their survival potential by copying the temporal form of their more successful, more legitimate predecessor(s), a process Paul DiMaggio and Walter Powell (1983) describe generically as mimetic imitation. Rather than selecting Tuesday or Wednesday, the days farthest from Saturday, Christianity picked the temporally proximate Sunday. Similarly, when it was Islam's turn, it too selected a proximate day, Friday. By so doing, both Christianity and Islam tapped into an already familiar institution—a weekly holy day—and by juxtaposing their holy days with the holy days of their predecessors they created a temporal structure that communicated two messages. One message said, "We are different"; the other, "We are doing similar things." The use of the different day for weekly worship communicated the difference; the location next to ("touching") the other days of worship communicated the similarity and, it was perhaps hoped, some legitimacy too. The similarity would appeal to converts who, though they were now members of a different group, were still doing something that at a more general level was the same thing done by the other group (cf. Zerubavel 1985, p. 26)—even if in some centuries the other group might advocate burning them at the stake for doing so. For as DiMaggio and Powell have noted, "The modeled organization may be unaware of the modeling or may have no desire to be copied; it merely serves as a convenient source of practices that the borrowing organization may use" (1983, p. 151).

The developing religions' quests for legitimacy by positioning their Sabbath days adjacent to those of their predecessors also reinforced the practice of a week of seven days (Zerubavel 1985, p. 26). For if either of the new religions had instituted a week composed of a different number of days, the new Sabbaths would have been adjacent to those of their predecessors only occasionally. Moreover, unless a special exclusionary rule was included to prevent it, sometimes the new Sabbaths would have fallen on the same day as one of the other religions' Sabbaths, in such cases defeating the social functions of a new Sabbath. For the proper different-but-legitimate balance to be maintained, the new monotheistic religions had to use a seven-day week, and their weeks had to be aligned properly with the seven-day weeks of their predecessors. This alignment of weekly cycles is an example of *entrainment*, a phenomenon Chapter 6 examines in detail.

So time provides a tangible, observable way for groups to define who is and is not a member. In the case of religions, which day is the weekly holy day and which hours are and are not for prayers would clearly distinguish insiders from outsiders with relative ease. These temporal decisions and practices shaped the lives of their adherents, and in so doing led them to lead and experience different lives. But this is just a specific example of the more general principle: Different times produce different effects. Consequently, every chapter in this book includes major discussions of the differences produced by differing times and temporal practices. And one example of this principle, perhaps the most profound example of a differing time's effects, is useful to consider here.

The effect was produced by an ingenious piece of technology invented in the thirteenth century—by whom no one knows—that few residents of the twenty-first century have ever heard of, yet its effects were revolutionary. The invention was the escapement, a device that converted the power in a clock into gear movements of equal duration. The escapement made the mechanical clock possible, and the mechanical clock revolutionized time—and so very much more (Landes 1983).[3]

How big a revolution was it? David Landes (1983) ranked the mechanical clock among the great inventions: below fire and the wheel, but on a par with movable type for its impact on "cultural values, technological change, social and political organization, and personality" (Landes 1983, p. 6). Yet Landes's ranking notwithstanding, the clock did something that no invention has done before or since: It provided the archetype for the way Western civilization would see God and the universe. And by doing so the clock would become the greatest metaphor of the second millennium (as years had come to be reckoned in the West).

But the date on which this revolution began is unknown. The year, even the decade, in which the first shots were fired is uncertain. However, it seems likely that it began in either the 1270s or the early 1280s. Evidence for this is provided by J. D. North, who noted that a commentary about the most prominent medieval astronomical textbook discusses time and timekeepers but appears to be unaware of a mechanical escapement, and the commentary was written in 1271—as part of a course of lectures "at the university of either Paris or Montpellier" (North 1975, p. 396). Yet by 1283 records were made of a clock in Bedfordshire, England, that seemingly contained a mechanical escapement, the evidence for this conclusion being "persuasive" (1975, p. 384). No claim is made that this was the first mechanical clock to incorporate an escapement mechanism, just that it was described in the first records yet known about such a device, and those records date from 1283. If these bounds are accepted—no escapement-based clock is known in 1271 and the first records of such a clock appear in 1283—the escapement-based mechanical clock may have been invented sometime between 1271 and 1283, a conclusion consistent with a later statement by North, "in the 1270s, or thereabouts" (North 1994, p. 129). Perhaps the twelve-year interval from 1271 to 1283 is the best that can be done as far as determining the date of origin.

After 1283 but before 1300, records were made of several other escapement-based clocks in England (North 1975, pp. 384–85). Moreover, before 1300, references to mechanical clocks appeared in European literature (Crosby 1997, p. 79). And shortly thereafter Dante's *Paradiso*, begun in 1315 (Mazzotta 1993, p. 10) and completed in 1321 (Bergin 1965, p. 44), described the workings of a mechanical clock:

> And ev'n as wheels within the works of clocks
> so turn, for one who heeds them, that the first
> seems quiet, while the last appears to fly.
>
> (Dante 1921, p. 277)[4]

So the escapement-based mechanical clock is an invention of the latter thirteenth century, an invention that would be disseminated with amazing speed throughout the Western world—amazing given the difficulty of transportation at the time—along with its influence on "cultural values, technological change, social and political organization, and personality." It even influenced—sometimes dominated—the West's cosmic worldview, its weltanschauung.

In what may have been the centennial year of the mechanical clock's invention, 1377, at the behest of the king of France (Charles V), Nicole Oresme, the dean of the Cathedral of Rouen (later bishop of Lisieux), published a translation of important scientific works by Aristotle in *Livre du ciel et du monde* (*The Book of the Heavens and the World*) (Menut 1968, pp. 3–9). These translations incorporate Oresme's commentaries in the text, and it is these commentaries that present the Metaphor: "The situation [God creating the heavens and establishing their regular motions] is much like that of a man making a clock and letting it run and continue its own motion by itself" (Oresme 1968, p. 289). Oresme may or may not have been the first to put this metaphor into print, for he anticipated it himself in an earlier treatise (Mayr 1986, p. 38).[5] Oresme also cites an author named Tully as having written, "No one would say that the absolutely regular movement of a clockh appens [*sic*] casually without having been caused by some intellectual power; just so must the movement of the heavens depend to an even greater degree upon some intellectual power higher and greater . . . than human understanding" (Oresme 1968, p. 283). Regardless of who said it first, no one ever wrote it more dramatically than Daniel Boorstin, "a clockwork universe, God the perfect clockmaker!" (1983, p. 71) or with more poetic grace than Loren Eiseley, "God, who had set the clocks to ticking" (1960, p. 15).

This was an idea, an image of reality and God's relationship to it, that would shape the West's thinking to the present day. For after the invention of the mechanical clock a major argument for the existence of God would be presented in terms of the clock metaphor: "Clocks owe their existence to clockmakers; the world is a huge clock; therefore, the world, too, was made by a clockmaker—God" (Mayr 1986, pp. 39–40). As Otto Mayr noted, this became the successor to a similar argument based on the more general *machina mundi* (world machine) metaphor (p. 39).

Being seen as the quintessential machine, the mechanical clock became a template for scientists and mechanics alike. For example, early in the seventeenth century Johannes Kepler described his intent to a friend as "to show that the heavenly machine is . . . a kind of clockwork" (quoted in Koestler 1959, p. 340). And Kepler's intent was to develop an accurate description of the motions of the heavens, which eventually led to his laws of planetary motion. Descartes too used the clockwork and God-the-clockmaker analogies (Boorstin 1983, p. 71). Concerning the mechanics, Boorstin described the clock as the "mother of machines" (p. 64) because it led to the basic technology of machine tools. Clocks required precisely fabricated screws and gears, and these requirements led to improvements in lathes and other machines used to make them. These improvements in machine tools, in turn, led to improved, more precise and accurate clocks, a level of quality that would be captured in the phrase "like clockwork," used to describe any well-ordered, well-coordinated process.

But the mechanical clock and the Metaphor guided more than scientific thinking and the development of better machinery. As Gareth Morgan has made clear to students of the organization sciences, metaphor is a potentially powerful tool for understanding human beliefs and behavior, and the metaphors people hold about organizations (which encompass much of the way they define organizational reality) explain much about the decisions they make and the actions they take (see Morgan 1997, especially p. 4). Hence Morgan's analysis is consistent with the view presented here that the Metaphor offered a template, a tacit imperative for managing and organizing human life itself, especially in the workplace. A major example of this impact comes from the organizational achievements of the master mechanic who built the two-dialed watch mentioned previously, Henry Ford. And his biography may explain why, because Ford was immersed in this metaphor.

While growing up, Ford was fascinated with clocks and watches, and with seemingly intuitive acumen, he quickly developed the self-taught understanding and ability necessary to repair a large variety of timepieces (Nevins 1954, pp. 58–59). Word of his virtuosity spread quickly, and he often repaired the errant timepieces of many of the Fords' neighbors, to the displeasure of his father because Ford did not charge for the service (Simonds 1943, p. 28). After leaving home, Ford would work in the evenings for a jewelry store repairing clocks and watches to earn extra money (Simonds 1943, pp. 35–36). So Ford was well versed in clocks and clockworks by the time he turned to the organization of automobile production.

The way he organized production, the assembly line, was his greatest legacy, both bad and good. From the standpoint of the Metaphor, Ford's assembly line and all those that followed his example emphasized clocklike attributes, "the absolutely regular movements" of a clock. That was Ford's idea, a workflow that was regularly timed (the escapement) so as not to produce just the desired output (e.g., Model Ts), but to produce it at a steady, even pace—just as a mechanical clock produces not uneven temporal hours but a constant flow of hours of equal duration. Ford's assembly line was at least as much about when things were done as it was about what was done, so much so that Catherine Gourley wrote of his accomplishment, "Henry had created a giant moving timepiece" (1997, p. 30). Ford, a man who quickly taught himself how to repair clocks and watches, a man who loved the mechanisms of such devices and working on them, had developed a manufacturing process designed to run like clockwork. Nor was this necessarily an unconscious connection. Ford was aware of comparisons with clock mechanisms and coined one himself after the death of his mother, saying that the family home seemed "like a watch without a mainspring" (Simonds 1943, p. 34).

This interpretation of Ford's assembly line, an invention so strategically important because it became the archetype for manufacturing practice throughout the world, emphasized the regularity-of-movement aspect of the clock's mechanism. But the clockmaker component is at least as important a part of the Metaphor as is the regularity of the mechanism, and this aspect of the Metaphor can be found in managerial practice as well. Ford was obviously the assembly line's creator and designer, but he was anything but an absentee creator who just gave the assembly line a push the first time and then sat back and watched it "run and continue of its own motion by itself." In fact, his divine intervention included experiments such as a short-lived "Sociological Department," which employed one hundred investigators to visit workers' homes to ensure, among other things, that they used their leisure time properly (Wren 1994, p. 161).

But the image of God creating the universe, giving it a shove, and then never having to deal with its physical properties again is appealing. And it has particular appeal to managers and those who advise them. The managerial image is well illustrated in the television series *Star Trek: The Next Generation*. In this series starship captain Jean-Luc Picard is often given advice, and when he agrees with the advice, he issues the command "Make it so." Then, consistent with the view of management based on the Metaphor, whatever Captain Picard commands normally becomes "so" unerringly, and most important, without his subsequent intervention. This imagery of "good management" based on the Metaphor has serious implications for many managerial practices, including delegation, planning, and decision implementation. The implications involve expectations, including self-expectations, for managerial performance suggesting that if one plans or delegates well enough, the good manager will not have to intervene in the process thereafter—an impossibly high standard of both performance and omniscience for any mortal. Unfortunately, such expectations define managerial intervention as a sign of managerial imperfection, and even worse, of "bad management," leading to an unwarranted reluctance for managers to intervene once a decision is made, a plan is developed, or a task is delegated. There may be other sound reasons for managers not to intervene in a particular situation, but the idea that intervention represents bad management ipso facto should not be one of them.

CONSTRUCTING TIME

Time is a social construction, or more properly, times are socially constructed, which means the concepts and values we hold about various times are the products of human interaction (Lauer 1981, p. 44). These social products and beliefs are generated in groups large and small, but it is not that simple. For contrary to Émile Durkheim's assertion, not everyone in the group holds a common time, a time "such as it is objectively thought of by everybody in a single civilization" (1915, p. 10). This is so because in the perpetual structuration of social life (Giddens 1984) individuals bring their own interpretations to received social knowledge, and these interpretations add variance to the beliefs, perceptions, and values. Although there is usually sufficient similarity and agreement to justify the designation "shared," variation is inherent in the process. And when it comes to times, there is such variation that Elliott Jaques would write of time and people and say that no two people "living *at* the same time live *in* the same time" (Jaques's emphases; 1982, p. 3). Of course this implies that there are as many forms of time on the earth as there are people. Nevertheless, rather than the idiosyncratic forms, the shared forms, the socially constructed forms have by far the greatest impact on human life, both individually and collectively.

But how do the shared forms come to be? It is one thing to assert that they are socially constructed, another to explain how. In some cases the how is easily seen. For example, the U.S. government's practice of beginning its fiscal year on October 1 rather than January 1 draws attention to itself and makes the human agency (i.e., decision making and consensus building) in its construction more obvious. (How else could a year with exactly the same number of days, even in leap years, begin and end on different days than the calendar year if human choice were not involved?) Such agency was certainly apparent in the eighteenth century when firms began to prepare periodic accounting reports about their operations that used a fiscal year which ended at the low point in the firm's annual operations (Chatfield 1996, p. 457). The human agency is apparent, not just because the low point in annual operations might diverge from the end of the calendar year, but because it suggests a deliberate management strategy to locate the end of the firm's fiscal year at a time when there would be more time and resources available to perform the accounting work and to prepare the reports. (This is actually a form of the out-of-phase entrainment strategy that will be discussed in Chapter 6.)

In many cases, though, the social construction of times is much less apparent. So one time story in particular will prove most illuminating, the story of the A.D. (*anno Domini*) system of reckoning dates. Early in the sixth century, a Moldavian (née Scythian) monk labored on the dauntingly complex task of calculating the dates of future Easters, and his efforts produced a method for calculating such dates known as the *computus*, the method still in use today (Steel 2000, pp. 106–7). But as the monk performed these labors, he came to have his fill of the A.D. dating system, a system he felt was insulting to Christianity, especially if it appeared in a grouping with the day and month of Easter. This was because the A.D. in this system was not an abbreviation of *anno Domini*; rather, it stood for *anno Diocletianus*, the year of Diocletian, the devoutly anti-Christian Roman emperor (Duncan 1998, p. 74). So the monk, Dionysius Exiguus, decided to replace the old A.D. system, which followed the practice common in his time of dating events from the beginning of different emperors' reigns—the A.D. system based on Diocletian is still used today by Coptic Christians in Egypt (p. 75)—with a new one based on the year in which Jesus of Nazareth was born. An oddity of this system is that it locates the birth of Jesus in 1 B.C. (before Christ)! But this is a fortuitous oddity because it provides another opportunity to illustrate the socially constructed nature of time.

By the traditional tenets of Orthodox Judaism, a boy's life does not properly begin until two things happen: He is named and he is circumcised (Steel 2000, p. 110). And following Duncan Steel's insightful analysis (2000, pp. 110–11), this is relevant because (1) Genesis 17:12 prescribes circumcision when a boy is eight days old; (2) Luke 2:21 reports that Jesus was named and circumcised on his eighth day; and (3) December 25 was established as the date of Jesus' birth under the Roman emperor Constantine and was well established as such at least 175 years before Dionysius. If these three points are combined, they reveal that Jesus' life *properly* began, as defined by the social customs and beliefs of his time, on January 1 of the year following his birth. Thus December 25 is celebrated as Jesus' biological birth, but less well known is that his sociological life began on his eighth day, which is January 1. But not January 1 of year 0. Although he was physically born in 1 B.C., he was circumcised and named on the eighth day: in A.D. 1. Something appears to be amiss here, and it is to that missing something we now turn.

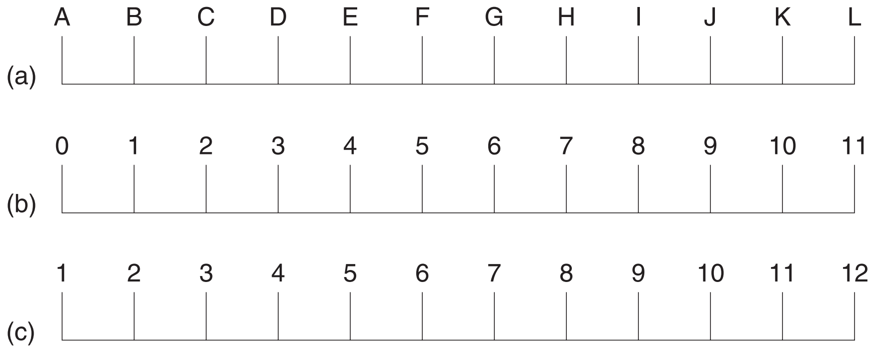
The problem was that the numbering system used in the West lacked one vital number, a number whose absence in Dionysius's era would result in all kinds of mischief roughly 1,570 years after Dionysius developed a replacement for the *anno Diocletianus* system. The missing number was zero, and because zero did not exist in the number system, it was impossible to designate a year 0. Moreover, it even might have been impossible for anyone to *think* of a year 0. This conclusion follows from the twentieth century's most provocative linguistic claim: "We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds—and this means largely by the linguistic systems in our minds" (Whorf 1956, p. 213).

Later known as the Sapir-Whorf hypothesis (Trask 1999, pp. 169–70), the principle that language is necessary to interpret reality suggests that neither a year 0 nor even the need for it ever occurred to Dionysius. Nor is it likely that he thought much about the labels for the years preceding Jesus' birth either. For Dionysius was not trying to develop a system of year reckoning for the world to use. Instead, his purpose was to develop a system for calculating future dates of Easter, and his disdain for the *anno Diocletianus* system led him to replace it with a numbering system that designated the first year of Jesus' life as year 1—and this was mainly for his personal reference and use by other clerics (Steel 2000, p. 108).

About two centuries later, the Venerable Bede briefly described Dionysius's system for calculating Easter in his *Ecclesiastical History of the English People* (1969), which was written and published in the eighth century. In this history he used Dionysius's method of designating years, using the phrase *anno ab incarnatione Domini* several times (literally meaning, "in the year of the incarnation of our Lord," but many times translated as "in the year of our Lord."[6] Although the Venerable Bede did use the phrase *ante uero incarnationis Dominicae tempus anno sexagesimo* (Bede 1969, p. 20) once (translated as "in the year 60 before our Lord" (p. 21), albeit "in the year 60 before the incarnation of our Lord" would be more literal, the use of the B.C. designation for the years before Christ's birth would not be used much until the seventeenth century (Steel 2000, p. 114). Even so, the problem is that missing year 0, not the years with negative numbers, a problem that has never been corrected by adding a year 0 to the chronicle of years. For by the time the concept and symbol of zero had migrated from India to Europe (see Kaplan 1999, pp. 90–115), Dionysius's system of designating the years had gained wide currency, being more or less accepted in Western Europe by the beginning of the second millennium (Richards 1998, p. 217). By then it was already too late to make the correction, and to do so today would be prohibitively chaotic because of the requisite correction of either every B.C. or every A.D. date recorded using Dionysius's original system. (Whether the A.D. or B.C. dates would require correction would depend upon whether the year A.D. 1 or the year 1 B.C. was converted to the year 0.) This even suggests that the A.D. or C.E. (Common Era) designations would add at least one more letter, C, for *corrected*, so a reader would know whether the date was a Dionysian date or a corrected one (e.g., 2 B.C. or 1 B.C.C.).[7] And if the A.M./P.M. system at times results in people arriving twelve hours early or late, one can only imagine the confusion and chaos a one-year correction would create, especially if the correction made A.D. 1 the year 0.

So even considering a correction is now unthinkable, but from time to time that missing year 0 leads to other problems, albeit often silly ones. The most recent manifestation of these is the millennium debate that reached its high point—one is tempted to say nadir—in 1999. This argument took the form of much smoke and fury about which year—2000 or 2001—was really the first year of the third millennium. Those advocating the year 2000 usually did so assuming a number line that begins with zero because they were unaware of zero's absence sixteen centuries earlier. Without that zero, though, no year designation tells the number of whole years that have passed since year 1, the beginning of such a year-reckoning system. Instead, the year designations tell that N − 1 whole years have passed (N being the year designation). This means that years ending in zero, even though they are evenly divisible by ten, cannot be the first year of a decade, century, or millennium. The proper first years of such time spans would be the respective years (i.e., the years evenly divisible by ten, one hundred, or one thousand, as appropriate) ending in zero *plus 1*. This would seem to resolve the debate in favor of those arguing for 2001 as the first year of the third millennium. (See Figure 1.1 for a comparison of year counts between time lines beginning with year 0 and year 1.)

However, those favoring 2000 cannot be dismissed so easily, and for at least two reasons. First, what is a millennium? A millennium is defined as "a period of one thousand years," and as "a thousandth anniversary" (see the primary definition of millennium given in the second edition of the authoritative *Oxford English Dictionary*). And this ambiguity supports those who argue for the



Each of the three time lines represents the same number of years. Counting the number of intervals gives the same number of years for each line: 11 years. But each time line gives a different answer to this question: On the first day of which year does the eleventh year *begin*? For (*a*), the answer is, on the first day of year K. For (*b*), the answer is, on the first day of year 10. And for (*c*), the answer is, on the first day of year 11. Line (*c*) represents the Dionysian year-reckoning system, which begins with the first day of year 1, so new decades begin on the first day of years x1, new centuries begin on the first day of years x01, and new millennia begin on first day of years x001.

FIGURE 1.1. The millennium controversy

year 2000. Because if *millennium* means each thousandth anniversary of Jesus' birth, the second point supporting the year 2000 enters the debate: No one knows in which year Jesus was born. Several years seem plausible, ranging from 7 B.C. to A.D. 7 (Duncan 1998, p. 75), with 4 B.C. being the most commonly accepted date (e.g., Richards 1998, p. 218). Yet if this year is uncertain, so too must be its thousandth anniversary years, the millennia, and this uncertainty makes the designation of new millennia a matter of social constructions, several of which are involved in this story.

First, Dionysius's system was socially constructed. It was invented, not discovered (although, following Whorf 1956, all discoveries involve elements of social construction too). Moreover, it took several centuries to move from the status of a monk's proposal to the church hierarchy to a generally accepted social fact in Western Europe, only coming into widespread use in the eleventh century (Richards 1998, p. 217). And of special import to this explanation is the missing year 0 in this system.

The missing year 0 is the second social construction in this story, for zero is a social construction, as is the entire decimal (based on ten) number system of which it is a part, as are all number systems. Although the decimal number system has achieved worldwide acceptance, it is as much a social construction as are the Mayan vigesimal (based on twenty) or the Mesopotamian sexagesimal (based on sixty) systems (see Barnett 1998, p. 54). It just seems more real, more natural to twenty-first-century humanity because it is so well institutionalized that it is taken for granted as the True Number System, a status more easily maintained by the absence of encounters with alternative systems in everyday life.

Being a product of human interaction, the system for counting and designating the years is clearly a social construction, as are the number system and its elements, on which Dionysius's system is based. So then, what of the debate? Just as this problem was socially constructed, so too can it be resolved by developing a social consensus about its solution, a consensus that seems to have already occurred. It seems to have occurred because much of humanity already decided this issue late in the twentieth century by simply defining the year 2000 as the first year of the third millennium in this system, which is what it would be if the years were counted from a missing year 0 (see Figure 1.1). And as already noted, a millennium is properly regarded as a thousandth anniversary, in this case the thousandth anniversary of an event whose date will likely always be unknowable with complete certainty, so this socially constructed solution is as reasonable a solution to this dispute as any.

Indeed, the principal value of this debate is that it provides a good example of the socially constructed nature of time, in this case the temporal reckoning system used to designate the years. However, this system is relatively visible, and despite its nearly planetwide use for secular matters, the continued existence and parallel use of other calendars and year-reckoning systems such as the Jewish and Islamic calendars, whose year designations are very different from the Dionysian, occasionally remind humanity of the socially constructed nature of *all* calendars. Similarly, the Gregorian adjustment to what was then the Julian (for Julius Caesar) calendar reemphasizes this point, skipping as it did ten days in 1582 so October 4 was followed immediately by October 15, and also changing the system for designating leap years (Richards 1998, pp. 247–52). Thus humanity still receives occasional reminders about the socially constructed nature of calendars and year-reckoning systems, producing at least a semiconscious recognition of this point. Similar reminders are much less frequent, almost nonexistent, regarding that other major time reckoner in everyday life, the clock, so its system of reckoning the hours tends to be even more reified, even though it is equally a social construction.

THE PROFOUND IMPORTANCE OF TIME

In the seventeenth century both Cervantes and Newton wrote about time. Yet they reached fundamentally different conclusions about this abstruse phenomenon. To Newton, time was abstract and external to events, something that flowed "uniformly." Newtonian minutes were completely homogenous; one was the same as any other. Cervantes saw time differently. Although he might not have believed that all times were different, clearly he believed that not all of them were the same. Hence he wrote, "Que no son todos los tiempos unos (For all times are not the same)," the epigraph introducing this chapter.[8] As already noted, Cervantes' insight forms the basic premise upon which this book is based. Were it false, were Newton to prevail—as he did for several centuries—time would be reduced to a constant flow of banal, dreary, sterile moments, because the Newtonian concept of time was separate from events. Thus devoid of content, it could be characterized only by amount, for being reversible (Whitrow 1980, p. 3), it even lacked direction.

Although fungible Newtonian time has been fruitfully applied in many domains, its variability, being solely in terms of quantity, renders it not unimportant but extremely limiting, an "intellectual straitjacket" (Davies 1995, p. 17). To break out of that straitjacket, the strongest assumption underlying this entire book is that times differ, and they differ in many ways other than quantity, in ways that give time and times much greater potential for variance than Newtonian time. And the variance in times is a most profound sort of variance, so profound that Ilya Prigogine concluded that "time is the fundamental dimension of our existence" (1997, p. 1). Thus we strive to know time, not just to understand it, but to understand ourselves. And then not just to understand who we are or how we came to be, but to recognize the possibilities of who we might become. Because the most important findings of any investigation, empirical or theoretical, are not the discoveries of what is. The most important findings are the possibilities, the intimations of what yet may be. So ultimately this book is about possibilities—profound possibilities.[9]