made anew by electric technology. Like many a whirlwind tour, it can only hit the highlights and cannot dwell at any particular site. But it is worth the journey.

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Elusive Exactitude

Keeping Watch. A History of American Time. MICHAEL O'MALLEY. Viking, New York, 1990. xvi, 384 pp., illus. $19.95.

Keeping Watch traces a fascinating, century-long shift in the way Americans have thought about the measurement of time. In the 1820s, clock-watching Americans noticed that the sun was not a true authority for measuring the passage of time. Michael O'Malley traces the acceptance of sidereal time, based on astronomical observations, and then proceeds to the more familiar story of standardized time zones pioneered by the railroads in the 1880s. Subsequent chapters explore the production and marketing of clocks and watches, factory punchclocks, and stopwatches; the alteration in time sense brought by the movies; and the introduction and repeal of Daylight Savings Time in the era of World War I. This is no celebratory history of scientific achievement or of progressive movement toward precision. Each chapter of the book is rich with absorbing stories that illustrate how new ways of thinking about time frequently led to wrenching political, social, and even legal disputes. The theme running through all the disputes was: Who has the authority to say what time it really is?

Up to the 1820s, time was conceived of as a natural phenomenon, pegged to the nooning of the sun, the moment when the sun was highest in the sky. By common agreement, the sun's noon translated to 12 on a clock and divided the duration of daylight into two equal parts; a sunrise at 5:52 meant that sunset was 6:08, as every almanac before the 1830s confirmed. But a sea change was at hand about 1830, brought about by a slow aggregation of distinct but related historical processes. The development of commerce, industry, transportation, and the social organization of factory and urban labor necessitated more accuracy and synchrony in daily timekeeping. Clockmakers obliged by developing cheap timepieces of wood or brass, and by the mid-1830s the market for clocks extended far and wide. But good mechanical clocks do not keep time with the sun, which raised a puzzling question: how could time be irregular?

Experts on time had known for several centuries about the discrepancy between clock time and sun time. Noon does not arrive precisely every 24 hours; the sun can run up to 15 minutes faster or 18 minutes slower than an accurate mechanical clock, depending on the time of year. This happens because the earth moves on an elliptical orbit with the sun at one focus; the earth's velocity hence is not constant. A second irregularity results from the tilt of the earth's axis; the sun thus moves across the sky on a great circle not parallel to the equator, and as it crosses each meridian line its speed appears to vary because the distance between meridian lines decreases toward the poles.

O'Malley does not linger long over the scientific explanations for solar and clock, or mean, time. He is at his best on the social and political implications of the challenge to timekeeping authority. If solar time is different from mean time (so-called because it represents an average of the varying solar days), who gets to determine when the factory bell rings, when contracts expire, or when the polls close in an election? Who is at fault if a millworker goes to work on sun time but the factory bell, set to mean time, has already rung? Who can verify that the factory bell is even accurate? Verifiable mean time was not possible until the late 1840s, when new astronomical observatories started measuring time by the stars and enterprising companies telegraphed time signals from observatories to paying subscribers. O'Malley calls this the first commodification

Back cover of a pamphlet advertising the Waterbury Watch Company, 1887. [From *Keeping Watch*; National Museum of American History, Smithsonian Institution]

	SEARCH		INSPECT
	FIND		PRE-POSITION
	SELECT		RELEASE LOAD
	GRASP		TRANSPORT EMPTY
	TRANSPORT LOADED		REST FOR OVER COMING FATIGUE
9	POSITION		UNAVOIDABLE DELAY
#	ASSEMBLE		AVOIDABLE DELAY
	USE		PLAN
#	DISASSEMBLE		

"Frank and Lillian Gilbreth's 'Therbligs.' The symbols could theoretically be written as hieroglyphic sentences, to describe any job as a sequence of standardized actions. 'Avoidable delay' is a sleeping worker, 'unavoidable delay' a broken worker, 'plan' a man scratching his head." [From *Keeping Watch*]

of correct time. By the 1870s, many cities featured Western Union time balls, familiar now only in that atavistic New Year's Eve symbol annually televised from Times Square.

The immediate stimulus for telegraphed time signals came from the railroads. In the mid-19th century, track mileage increased exponentially. Railroads moved people rapidly through space; they also moved them through time—but whose time? Even a short east-west trip required people to negotiate micro time zones varying by just minutes. If the confusion was great for passengers, whose main goal was not to miss a departure, it was even more serious for employees who had to synchronize the trains. O'Malley tells of inventive ways railroads tried to solve the problem. One company collected all employees' watches each night to set and redistribute them the next day. Some companies chose the local time of their business headquarters as the prevailing time for their whole rail system. The train station in Buffalo, New York, had three clocks—one for local time, the other two for the railroad companies that used the station. Some jewelers produced watches with two minute hands, to show both local and railroad time. All of these solutions seem simpler than a German practice, that of setting time posts along the roadbed that marked each ten-minute change in time, leading to frequent watch corrections.

The now-familiar solution to the railroad dilemma was the introduction of standard time zones; by railroad fiat, and not legislative policy, the innovation went into effect in November 1883. We have lived with this solution for a century now (although it took Congress until 1918 to approve it), so it is hard to imagine the opposition it engen-

dered. Some cities that had to change a half hour or more from true local time strenuously objected. A Louisville, Kentucky, newspaper detected a devious threat to states' rights: "After they get all our watches and clocks ticking together, will there not be a further move to merge the zone states into districts or provinces?" (p. 134). Banks in Louisville perversely stuck to sun time for another 30 years. A schoolboard in an Ohio town decided to run the schools on Eastern Standard Time, in defiance of the city council, which kept the rest of the town on sun time. A debtor in Boston reset his watch to the new eastern time and thereby missed his court appearance before a judge who stubbornly persisted in using local time and declared the man delinquent; the debtor appealed the decision to the state supreme court, which ruled in his favor.

O'Malley's book is at its most ambitious when he examines new timing devices that fundamentally subverted the flow of time as naturally experienced. Stopwatches obviously belong in a book on the measurement of time; but O'Malley ingeniously links them to the advent of motion pictures. A stopwatch might seem to be merely a device to time the duration of activities, but in the hands of Progressive Era efficiency experts like Frederick W. Taylor it broke down activities into discontinuous units. Taylor observed a factory employee doing a job and with a stopwatch determined that the task required 24 minutes. Yet the workers insisted that the job took a full 50 minutes and went out on strike, likening the stopwatch to a whip. Taylor had timed each separate motion, eliminating what appeared to be unproductive time. In the same way, edited motion pictures of human activity distort and condense time. Efficiency experts seized on films as a logical progression from stopwatches for analyzing human motion. O'Malley leaps from this into a provocative exploration of how movies manipulate time in general and how film-makers had to struggle in the early decades of the industry to learn how to narrate events by dissecting and reassembling time.

The book concludes with a fine examination of the passage and repeal of Daylight Savings Time as a fuel-saving measure during World War I. As in earlier episodes of tinkering with time, the plan for daylight time created heated antagonisms. The middle and upper classes, with electric lights and relatively more leisure time, favored extending daylight one hour into the evening, but workers and farmers who now had to rise in darkness resented it. One congressman claimed it made about as much sense to move the freezing point on thermometers to 45°F to fool people into saving fuel.

The disjunctures originally caused by standard and daylight time have been fairly well smoothed over now; electricity frees us from dependence on sunlight, and the lockstep grid of television schedules would be unimaginable without time zones. We rarely think that time is still being tinkered with, although O'Malley briefly touches on the powerful commercial interests that lobby yet to extend daylight time, from charcoal briquet companies to sports equipment manufacturers. Only in a few small corners of America are there groups watching carefully for the exact minute of sunset: observant Jews and Moslems, who have strict ritual activities and sabbath prohibitions pegged to sun time. Weekly or even daily, these orthodox groups confront the continual variation between the sun time of all our ancestors and the clock time of the modern world.

O'Malley has produced a lively, provocative book that deserves wide readership. He convincingly demonstrates that time measurement is of human construction and serves the ends of some groups more than others. It may well cause some readers to pause for just a few seconds before dismissing the idea of recalibrating the thermometer.

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Reshapings by Disease

The AIDS Disaster. The Failure of Organizations in New York and the Nation. CHARLES PERROW and MAURO F. GUILLEN. Yale University Press, New Haven, CT, 1990. xii, 206 pp. $25; paper, $9.95. A Yale Fastback.

A Disease of Society. Cultural and Institutional Responses to AIDS. DOROTHY NELKIN, DAVID P. WILLIS, and SCOTT V. PARRIS, Eds. Cambridge University Press, New York, 1991. viii, 287 pp. $42.50; paper, $13.95.

A decade into the AIDS epidemic we can begin to assess more clearly how our social and cultural institutions have responded to this devastating disease and what impact it has had on them. AIDS is unique, with its stigma, particular paths of contagion, and deadly outcome. Nearly 200,000 people have been clearly diagnosed with AIDS and at least an estimated million more are HIV-positive. Though there are fewer newspaper headlines and less overt hysteria than five years ago, the seriousness of the epidemic has not decreased.

The worst fears of social reactions against people with AIDS (PWAs), such as quarantine or mass discrimination in the workplace, fortunately have not materialized. Though many are still dying from AIDS, enough PWAs are living longer with the help of medical treatments like AZT that HIV disease/AIDS is beginning to be reconceptualized as a chronic disease. There is considerable evidence in the gay community and elsewhere that reductions in risky behaviors and increases in "safer sex" practices have occurred. But the stigma clings to the disease, funding for treatment is still meager, prevention strategies are underutilized, caring options are underdeveloped, and organizational responses are contradictory and often unproductive.

At the same time the face of AIDS is changing, mostly in color, class, and sex. In the early days AIDS was seen as primarily affecting gay men (most of whom were middle-class); now it is increasingly also becoming a disease of poor minorities and women and children. While infection rates have flattened out among gay men, rates among minorities, especially intravenous drug users (IVDUs) and their sexual partners and offspring, are increasing rapidly. It is predicted that by the end of this year women will constitute 10% of AIDS cases (up from 2% in early days of the epidemic); 75% of these are women of color. Poverty exacerbates the impact of disease; people at risk are harder to reach, prevention is more difficult, social resources are fewer, problems are multiple, and AIDS is amplified by other social problems.

Diseases, especially one with the impact of AIDS, have a reciprocal relation with society: they are affected by and in turn affect social institutions. The books under review reflect this dual relationship, although each focuses mainly on one side. *The AIDS Disaster* examines how society has responded to and managed AIDS; *A Disease of Society* is concerned with the impact of AIDS on social and cultural institutions.

Perrow and Guillen's book is an indictment of the social and government responses to AIDS. Part investigative reportage, part sociological analysis, this book tells the