Studies on Time: Biological, Psychological and Social Times

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Presentation

The temporal dimension of phenomenons is a philosophical, methodological and experimental concern for several knowledge areas, in the field of arts and human sciences and also in the exact and natural sciences. It can be analyzed from the perspective of its generality, as a natural dimension, through philosophical questions regarding its essence. It can, on the other hand, discuss different appropriations of time by several disciplines, through questions of how time is incorporated and dealt with by several areas of human knowledge.

The proposal of an interdisciplinary approach to discuss this and other issues on time led to the constitution of GET - Grupo de Estudos sobre o Tempo (Group for Studies on Time) in February 1989, connected to the Institute for Advanced Studies in the University of São Paulo.

Since then, this Study Group has met systematically in the headquarters of IEA/USP for seminars and debates on several aspects of issues of time in several disciplines, always with a perspective of interdisciplinary interaction. It also organized several round table discussions and public conferences in and out of USP.

One of the results of this group's work is now in your hands. We have great satisfaction in starting the publication of documents produced by GET through this special series in the Document Collection by IEA. With this we intend to show the public the transcription of several round table discussions, conferences, symposiums and internal debates that GET has organized and participated in several instances.

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THE BIOLOGICAL, PSYCHOLOGICAL AND SOCIAL TIMES

The Group for Studies on Time from the Institute of Advanced Studies in the University of São Paulo proposed and promoted a Round Table in the 42nd Annual Meeting of the Brazilian Society for Progress of Science* (42a. Reunião Anual da Sociedade Brasileira para o Progresso da Ciência) with the objective of divulging and proposing a reflection on a multidisciplinary approach to time. We chose three areas of knowledge: biology, psychology and sociology, with the aim to illustrate the current debate on time and with no pretention of encompassing all possible approaches. The texts presented here were the basis for the three interventions in the Round Table.

THE BIOLOGICAL TIME

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Is there sense in thinking of a "Biological Time"? I will try to argument that yes, through fragments of past and recent history in a new branch of Biology, which is Chronobiology. This field begins being recognized in the academic world in 1960[1]and although its history goes back to the eighteenth century when the first known hypothesis appeared regarding the existence of "biological clocks", we are watching and eventually participating in a change in the way we interpret the functioning of living beings.

The reconstitution of the paths of the development of sciences must necessarily go beyond a chronologic enumeration of facts, hypothesis and discoveries that lead to the current knowledge – in fact, what we do are possible readings for our time, always loaded with personal interpretations, especially when we try to extract logic from this reconstitution. I hope this procedure, this personal charge, becomes clear during my exposure. I will propose a reconstitution of the treatment of the issue of time in biology, or better yet, a way of treating time in the study of living beings.

First of all, it seems reasonable to suppose that the existence of time is an empirical knowledge – I know that time passes because things change, some things repeat themselves, and so on – and certainly very old. It is really possible that attempts to "mark" the passage of time, having as reference the apparent movement of the orbs, seasons of the year and development stages of animals and plants, have accompanied what we call a "humanization process". Anyway, this time that "goes by outside" and the time we feel "inside" are realities with which we have lived for a long time. They are, therefore, realities for us. The empirical knowledge that comes from this prolonged conviviality with time is immense and varied: we learn to reap and sow in the adequate times, we know that time expresses itself many times in cycles in which the individual existence, the unique experience, is an expression, we build mechanisms that are increasingly regular and precise to count times, we live, so to speak, immersed in time. Maybe that is exactly why we have some difficulty in thinking about time as an object of knowledge. This empiric knowledge, as ample and vast as it may be, does not occupy itself with the essences, does not investigate and discover new principles, does not unravel new realities. We can only "see beyond the wall" when we do what

conventionally has been called “scientific knowledge”. When did time go past the limits of empiric knowledge to become an object of scientific reflection in the domain of biology? And how did this passage occur? The attempt to answer these questions brings us closer to the construction of a category that we can then call “biological time”.

The first attempts to try to “read” the time that is specific to living organisms go back, as I said before, to the beginning of the eighteenth century, at least regarding what we can recover as document today – I refer to the communication of the French astronomer De Mairan to the French Science Academy published in 1729(1), which describes an experiment. In this experiment De Mairan places a plant in a trunk, in the semi-darkened basement in his house, and he observes that the leaves in the plant continued to open and close although isolated from the environmental day/night cycle. It is then supposed – and here the desire for scientific knowledge is introduced – that the plant must have some kind of internal clock, a temporal regulator for its movements, capable of working regardless of the environment’s light and dark stimulations. This hypothesis for the existence of a “biological clock” had little repercussion at the time – biology affirmed itself then as a branch of scientific knowledge and occupied itself with other issues, essentially turned to the comprehension of the mechanisms that maintained life and to state the diversity of life forms.

In the nineteenth century it is possible to find attempts to privilege the temporal dimension of living beings, be it in the attempts to look more closely at the phenomenon of the maintenance of rhythmic movements in plants isolated from the environmental cycles, be it in the attempts to give clinical value to the oscillations in weight and temperature of men. A little later, in the beginning of the twentieth century, the evidences multiply and a body of knowledge begins to form indicating not only the existence of the “biological clocks”, but also occupying itself with the demonstration of its participation in the genetic heritage of some species and discover how they function (2). In this first half of the twentieth century much of what was produced was due to the dissatisfaction of some researchers with uncontrollable fluctuations in their results, which were not satisfied with pompous and superficial explanations such as “the intrinsic variability of the biological systems”. The homeostatic explanations were equally unsatisfying, since they could not explain, for example, the regular oscillation of the central temperature observed in mammals fed continually, at rest, and with a constant environmental temperature – in the “homeostatic” (3) reading the oscillations would be attenuated in the absence of external disturbances. The straightening or shortening of the daily central temperature curve appeared in states of relative physiological disorganization, for example, as a consequence of the inversion of the activity/rest cycle in man, which was contrary, from the pathological angle, to the homeostatic prediction that a balanced system with minimal oscillations was synonym to good functioning. On the other hand, the volume and amplitude of knowledge about biological rhythms accumulated until the middle of the twentieth century (4) made possible and necessary the proposition of hypothesis and models which privileged a specific temporal organization of living beings. In this context, Chronobiology appears as a new branch of Biology and its expansion, in the last thirty years, geographically and in disciplines (5) – researches from around the world and from different disciplines began working in this field – make my initial issue on the possible existence of a “biological time” quite current.

Thus, everything points to us being authorized to think of a “biological time”. Cyclical temporal patterns are found in almost all living beings and have participated, as far as we can tell, in the selection

itself of species. More than that, this biological time, a general category of living matter (6), unfolds in specific species times, such as, for example, in the life cycles that are characteristic of each species or in their day and night habits. We investigate today individual times, studying, for example, differences between morning and evening (7) individuals (humans) trying to explain the different adaptation speeds to new temporal schemes, such as is the case with time zone changes or irregular work shifts (8). Maybe all these times are parts of the "new times" in our knowledge of living matter.

And speaking of individual time, mine is up.

* Porto Alegre, July 1990.

1- In this year, one of the most significant events in contemporary biology, the Cold Spring Harbor Symposium on Quantitative Biology, had as central theme the "Biological Rhythms".

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THE PSYCHOLOGICAL DURATION EXPERIENCE

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Ensa ezzamân uezzamân yensâk

Forget time and it will forget you

In "The secret miracle" Jorge Luis Borges tells the story of the Czech writer Jaromir Hladík who, when brought before the platoon which would execute him, in the last instant sees time stop, for a year, or so it seems to him, enough for him to compose a play that he greatly wished to write. In truth, the execution takes no more than a few seconds. Fiction presents, in a limited form, one of the curious aspects of the

psychological experience of time, which is to stretch or shorten according to the affection or action context, with apparent disrespect to the time on the clock.

The paradox in the sense of time is that, constituting a general and permanent characteristic of behavior, it does not follow, directly, sensorial data. There is not an organ in the senses which is specialized in perceiving time. We have experiences of things that remain and things that change, things that succeed and things that go together, the temporal dimension comes, so to speak, incorporated in the events that constitute the content. "Time", said philosopher Mach, "is an abstraction we reach through the changes in things" (cited by Poynter, 1989).

It is not strange then, that the evaluation of duration depends on hints external to time itself, from marked events, and that this evaluation may suffer what we unjustly name distortions, because we place ourselves only on physical time's point of view. Psychologists, from James forward, have been fascinated with the subjectivity of the duration estimation, due to discrepancies that desire and performance create, regarding a time socially coded, and have made an effort to determine the causality involved.

In this work I propose to resume the issue of the psychological experience of duration, indicating some of the most relevant forms through which the perceived time is inflated or shrunk. As many authors, I will consider the duration as a construction, an inference done by the individual from the available information. However, the fact that it is a construction does not make it arbitrary or random, does not isolate it from the complex game of interactions through which the individual knows his environment and acts on it. On the contrary, I see in the capacity to account for time an essential adaptive characteristic.

It seems like the water in the pot will not boil if I watch it.

The density of events is an important factor in the determination of subjective experience. A uniform time interval, empty of events, an interval in which something will happen, but does not happen seems to last much longer than the fact. A queue in a public office, waiting for a letter or other tedious or expectation situations illustrate this idea. The proverb says "a watched pot never boils".

The estimate duration depends, therefore, on the person's perspective, if paying attention to time, during its passage, if simply living and judging later. Psychologists often distinguish a "prospective" judgment situation, where a person is aware that he will need to supply judgment on the duration of a certain experience, a situation of "retrospective" judgment where an opinion is given later, without being warned that time was a relevant dimension.

Block, George and Reed (1980) used the pot from the proverb – and the water – to test the importance of the density of events in the perception of duration. Their subjects had the simple task of waiting a little (270 seconds) looking at a glass jar on an electric heater. Some (prospective condition) knew they would need to judge the interval duration, others didn't (retrospective condition). The content of events was manipulated in the following manner: (1) the water in the recipient could boil or not, in the last seconds of the interval ("boil" represents more richness of events than "not boil"); (2) some questions could be formulated or not during the observation of the jar.

The subjective interval was usually greater when the subjects were previously aware of the task (therefore paying more attention to time) than in the retrospective condition. The 270 seconds in the interval became an average of 289 seconds in the first case and 230 seconds in the second case, in one of the experiments. But the most interesting thing was the result regarding the "content" of the interval: in a perspective condition the estimate was greater when nothing happened during the interval; in a retrospective it was the opposite, it was shorter.

How to interpret this asymmetry? An event, happening in an empty context, seems to distract from the duration and shorten time. In a retrospective condition, it will add material to memory, supply one more hint for a judgment of the kind where "the more events happen, the more time goes by".

The double judgment process: Prospective vs. Retrospective

There would be, therefore, two criteria for the subjective measuring of time, criteria used dicotomically by most scholars. The prospective judgments would be based on the registration of temporal units, accumulated and stored in the memory, in conditions competing for attention with the attention dedicated to non-temporal information in the same interval. The more complex, the more absorbent, the more interesting the task executed in an interval, lesser is the attention to time, and the subjective duration is smaller.

Models related to the remembered (retrospective) duration do not postulate the existence of a timing mechanism, because they suppose that with no previous warning, individuals do not normally pay attention to the passing of time. For their judgments, they consider only the content of the remembered information. The more complex the information, the longer the subjective duration. According to the far-reaching hypothesis of Ornstein (1969) the estimated duration would be proportional to the amount of stimulus stored in memory: this way he equates the perception of time to the mnemonic processing.

Wilsoncroft and collaborators, among many others, supply experimental arguments favoring the hypothesis of a division of attention. They show that the execution of a task of mental calculation, during an interval from 12 to 20 seconds, leads to a underestimation of time regarding control intervals (Wilsoncroft and Stone, 1975); the same happens when individuals need to execute a Stroop task, meaning to name the color in which a word is written referring a different color (for example, to say "blue" when looking at the word "yellow" printed in blue) (Marshall and Wilsoncroft, 1989).

It is interesting to note, in this last experiment, that individuals which used a counting strategy to estimate this interval had more precise judgments than those who did not receive instruction to use it: counting is not a distraction, it offers an instrument to cut, so to speak, the interval and favors the mnemonic storage of the registration. The observer of time is not a passive receiver of information regarding the constancies and environmental changes, and must be seen as imposing, through marking events he generates himself, a temporal structure to things.

The theory of change/segmentation: the estimation of time as an active process.

The use of active strategies for estimation is the result, as a central aspect, of the theory of change/segmentation of Poynter (1989). According to Poynter, and also to Fraisse (1963), all perception of time is a perception of change. A uniform fabric of events carries a message of small duration; it becomes more and more imbued of temporal substance as it differences internally. The judgment of duration is based on the individual's capacity to remember the sequence of events experienced during the interval and the capacity to infer the duration between successive events.

The segmentation consists of the cuts, the rhythmicity the individual creates to fill and segment time (even an "empty" time), in the strategies such as tapping feet, drumming fingers, counting, singing. These strategies may be a natural component of the waiting mechanism and spontaneous evaluation of time: 7 year old children already use, spontaneously, counting as a temporal evaluation method (Wilkening, Levin and Druyan, 1987).

When an individual knows he must estimate a certain interval, he comes ready to segment it in order to improve his performance. To choose an appropriate cut unit, he starts with his expectation regarding the global interval. Greater intervals will justify the use of larger segments. "The estimation of time with clocks done by man and perceptual mechanisms", notes Poynter, "follows the same simple rule: you do not use a millisecond chronometer to measure durations is hours, or a solar clock to evaluate milliseconds" (pp.311-312). The analogy is instructive: social time and science time constitute segmentation models – I would say "rhythmic", since the cut means the introduction of recurrent units – through which man conceptualizes and dominates duration.

A proposal to unify the evaluation processes, prospective and retrospective

The distinction between prospective and retrospective judgments, between a time when the individual is fully conscious and, so to speak, feels it pass, and a time lived spontaneously, evaluated later, is a valid distinction since it helps to discern factors involved in the task of capturing duration. It does not seem, therefore, that it is justified to understand the processes involved as being exempt of interaction.

In prospective conditions the individual obviously must wait for the interval to pass in order to give his judgment: he will not account for a temporal counting done during the experience of the interval, as the dichotomous theories suggest; it can use the structure of events that compose the content, since this structure is in his memory. In the retrospective case, on the other hand, he disposes not only of memory of content to pass judgment; he will also access a temporal registration, analogical, if not identical to the applied, according to the theories, in a prospective condition. Among the conditions what changes is the relative influence of content hints and timing hints.

Predebon (1988) used an ingenious limitation to verify if, in a retrospective situation, only information regarding the content of events occurring in the evaluated interval are taken into account. His subjects were exposed to two intervals (16 and 32 seconds), where each one was filled with the presentation of 4 words or 8 words, these words being the "events". The duration judgment was done retrospectively. The results confirmed the expectation showing that the amount of events was taken as a hint of passage of time: 32 second intervals were evaluated as being significantly longer when they had 8 events instead of 4. But

they added a result that current hypothesis regarding the dichotomy Prospective-Retrospective apparently did not allow for: intervals containing the same number of events were evaluated as longer or shorter depending on their objective duration. A 32 second interval was considered longer than a 16 second interval, even though there was the same number of events (4 events) in each one.

One could suppose, to save the dichotomy Prospective-Retrospective, that the individuals did not register only events presented by the researcher; in 32 seconds, they would have time to register more "informal" events (thoughts going through their head, perceptions of the place where the experiment occurs, etc.) than in 16 seconds, and thus would have a basis for a different evaluation, even if the amount of "formal" events is identical.

I prefer to suppose that people, even when (as in the retrospective paradigm) not led to pay attention to the passing of time, evaluate it through an automatic temporal processor. This position implies the consideration that the same processes act in both paradigms, Prospective and Retrospective, a theoretical positional which can deal with the confining results of research on the perception of duration.

An internal clock

Increasing data on the basic research with animal models lead to conceive the existence of a neural structure capable of general temporal signs that the organism would interpret as indications of duration. The idea of a biological clock gained evidence with chronobiologic research (Cipolla-Neto, Marques and Menna-Barreto, 1988) which demonstrate the incredible generality of the endogenous rhythmic phenomenon, in behavior or in the physiology of organisms. Here I refer to another type of clock, a pacemaker that would work in relatively short intervals and that would have a determined life, not through rhythmic or zeitgebers factors, but through initiator events and environmental finishers. This internal clock would be involved, together with information on the constancy and change of things, in the evaluation of time intervals. We still know very little about the physiology of this hypothetical pacemaker and about its relationship with the clock of ample biological rhythms. There are indications that the duration evaluation, as well as other behavioral phenomenon, is subjected to regular circadian fluctuations, an indication that both clocks are connected.

Church (1984), starting from results from the experimental animal psychology laboratory, proposes an internal clock model that includes a pacemaker with pulses at a rate influenced by several factors, internal and external. The haloperidol, for example, would decrease the frequency of pulses by time interval,on the other hand, methamphetamine, as well as electric chock stress, would increase it. It also has a switch, a structure that determines when the pulses will be registered, and that has a latency to be activated, turning the registration on or off. The pulses acquired are added in an accumulator and have their values retained in the operational memory that works during a task, not conserving the information stored from one opportunity to the other. The reference memory has the parameters for past experience which are relevant for a certain task, for example "answer only if the stimulus has a t duration". A comparison device allows the collate between the present duration and the reference duration.

The study of the functioning mode of the internal clock, in the human being, of its integration to timing mechanisms is a promising and necessary path for research. It does not seem to me that a theorization

centered only on external information as a basis for duration evaluation (Fraisse, 1984) can go very far, or, to use a temporal metaphor, that it can sustain for very long.

Affection aspects in the duration evaluation

Time is not a cold dimension, of pure ascertainment; it is permeated by desires and affection. Duration contains the moments available for it, points to a future and is loaded with fears and hopes; retreats to the past, which memory dresses in colors of missing or rejection. The duration is expectation and tedium.

The emotional factor affects the subjective pointers. Edmonds, Cahoon and Bridges (1981), for example, persuaded their subjects that a wait would be followed by a pleasant event, or, yet, a neutral experience. The group with a positive expectation – our introspection predicts the result! – saw time go by slower than the others. The group with a neutral and negative expectation tended to underestimate the interval.

Prose passages, heard for a minute, were considered shorter when they were more interesting (Hawkins and Tedford, 1976), a result that would be interesting to replicate in a "naturalistic" condition, based on the opinion of our students on the classes they watch. Thayer and Schiff (1975) created a situation where people had to stay in front of strangers who were smiling or frowning. The person's smile made time go by, the frown made time stop.

Knowledge regarding psychological time

I think this entire exposure allows us to believe that the perception of duration comes from a psychological construction. But a construction does not mean an invention or fantasy, the construction is the way you reach a reality that is not ready through the organs of senses, that does not come automatically from innate sources. Not having access to a temporal "data" (it is not our place, for now, to stop on the issue of there being a temporal "data", or involving ourselves in a philosophical discussion about the existence of time or its "direction") the individual uses the available information, be it from the internal processes in his organism, be it from environmental tips, interpreting and betting. Different evaluation levels, from a fraction of a second to a month and a year, will demand different strategies and the social standardization will be exercised in full potency, establishing temporal frames that, if arbitrary from the point of view of abstract time, still have the concreteness demanded by human interaction.

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O TEMPO SOCIAL

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Social time is not physical, biological or psychological time, although it supports itself on these and seeks to redefine them. It is a representation of the social reality (1), which means that it is produced by the social life of men. In other words, social time refers to a determined notion of time, generated by men living in society, contracting with each other relationships of cooperation or opposition, articulating in structures of power and producing ideas, values and beliefs. This means to say that social time is a historic time, once it is determined by the concrete and objective conditions of the existence of man in a certain moment. Social time has, therefore, a moment of realization as a determined perception of duration, change and permanence.

As a historic time, social time is variable as a concept, changing as the social life of men changes.

It would also be an ideological time, for it corresponds to a certain form of internalization of the notion of time that is produced by a determined articulation of the objective existence conditions, which are guided according to certain interests. To qualify social time as biological time implicates in saying that the mental forms of perceiving time engendered by a certain historic situation articulate due to certain social interests which seek to be universal to society as a whole.

This way, social time, which is a historic and ideological time, is also a political time.

In a nutshell, it means, above all, that social time, as a way to measure and feel life, varied according to the social organization of men through history.

It is possible, therefore, to establish a mark or even a rupture in the elaboration of social time. This inflection point, or leap, would be given by the emergence of capitalism as a means of production or economic system that tended towards internationalization.

In the primitive societies or in the Middle Age, social time was expressed through a nature-time, where the sun, the moon, the seasons marked the rhythm of life, as well as birth, marriage, death. As Thompson says (2), among the primitive people the measure of time related to habitual processes in the cycle of work and with domestic tasks. The duration of work had a strict relation to the variations in climate, day and night, and the age and sex of individuals. The introduction of a new work process and a new accumulation process, with the advent of capitalism, marked a fundamental alteration. To use a figurative language, the bell that woke "Frère Jacques" marks a different time from the whistle of the factory or the clock that regulates the work of the factory worker.

This change is not due only to a matter of time (pun intended), of time going by, but an alteration in the perception of time that comes from a transformation in the social life of individuals. The defining mark, as has been said, is given by the diffusion of a new means of production of the social relationship that restructured the work habits. On the one hand, the new system divides and recomposes the tasks, chaining them and reorienting the process in the direction of a final product. On the other hand, there is a qualification/disqualification mechanism in work, ranking roles and tasks, and resizing the feminine and child presence in the production space.

The new work process inaugurates a new time. The balance of the cycle of nature with the work system is broken, and the work no longer obeys the rising and setting of the sun, of the variations in climate, but the demands of the company. Therefore, the restructuring of the organization of work aims not only at productivity, given by the intensification of work on time, increase in hours, or by resourcing to technology, having more production in the same time. The general reorientation of tasks also aims at work discipline, which finds one of its realizations in controlling the worker's time.

In truth, this means a new social construction of time, expressed in a differentiated internal representation. We see the appearance of the notions of "useful time" and "time is money". From there comes a worry about the good use of time, the condemnation of idleness and repression of vagrancy, the same way that there are articulations of strategies to watch the worker's time. Controllers, time clocks and regulations complement themselves with fees and rewards, which penalize those who work less and those who use their time in a satisfactory manner.

The mental representations brought by capitalism find their finished form when these notions are internalized and each individual has an internal moral clock.

Although the capitalist world is filled with appeals, symbolisms and mechanisms that rationalize the new social time, true punctuality comes from within…

However, if one the one hand the introjection of a new social time would give the mark of examples of the process of domination/subordination of the system, on the other hand the fights for control over time

by the worker was one of the most frequent forms of worker resistance. Since the beginnings of its formation as a class, workers had, as one of their main requests, the decrease in work hours or repudiation to vigilance and discipline imposed on their actions in the company. The fight for control over time can assume more symbolic and ideological dimensions than actually practical ones, as, for example, the tragicomedy dispute between bosses and workers during a strike in 1906 in Porto Alegre, regarding 15 minutes more (or less) in the work hours… (3)

Beyond that, the notion of useful time would lead Taylor (4) to dedicate a series of studies to eliminate the "porosity" of idle time present in the work hours, with the objective of rationalizing the productive process as much as possible and obtaining a greater and better productivity from the worker.

Regarding the symbols in the new social time, the clock no doubt has a place of honor. It is not random that Lewis Carroll, who lived in England in century XIX, when watching the consolidation of the bourgeois order, put on the white rabbit chased by Alice in Wonderland a pocket watch, which made him repeat, nonstop, every time he was asked: *it's late! It's late! It's late!*

David Landes (5) remembers well that, considering the technical charge, the possibility of the appearance of the clock pointed in the direction of the east, and not the west, where it appeared. In truth, the appearance of the clock is more tied to the demands of a new system than a previous development of the technique. This does not mean that as a precision instrument it did not presume the technical perfection and does not demand a certain degree of precision. However, as Lewis Munford (6) argued, the clock, and not the steam machine, was vital in the modern industry era. As an instrument to regulate the social action of men, it became a true symbol of the new world dominated by capitalism.

At first being present in the church grounds or squares, it expanded to the factories, public buildings and schools, invaded the homes and arrived triumphant on each person's wrist. The clock became the natural complement to the bourgeoisie home and a sign of status for the worker himself. It is not for nothing that, as a symbol of discipline, punctuality and good performance, it can be offered as a Reward to the most dedicated workers. This was the specific case of the Eberle company, in Caxias do Sul (RS), who awarded its workers, when they completed 25 years of service, a gold watch...

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(3) Cf. PESAVENTO, Sandra Jatahy. Burguesia gaúcha: dominação do capital e disciplina do Trabalho. Porto Alegre: Mercado Aberto, 1988.

(4) TAYLOR, Frederick Winslow. Princípios de administração científica. 7ª ed. São Paulo: Atlas, 1982.

(5) LANDES, David. L'heurequ'ilest; Les horloges, la mesure du temps et la promotion du monde moderne. Paris: Galimard, 1987.

(6) Apud LANDES, op. cit.