

## Time



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## I. Nature's Time

1. *The Notion of Time*. We experience time as a continuous and unstoppable passage from what has been to what is now and, further, to what will be. This almost imperceptible flow does not mean that time is an absolute entity (the so-called theory of "absolute" or empty time, advanced by Newton, among others); indeed, in reality, time is a characteristic that derives from movement ("relational theory" of time, differently formulated by Aristotle and Leibniz) (cf. Le Poidevin, 1993). Every change contains an irreducible element of sequence from a "before" to an "after," and this is temporality in its original moment, prior to any measurement (we should not, however, place the *prius* and *posterius* in an empty time). Wherever there is a sequence, there is a form of temporality. From this point of view, any subsequent phenomenon produces its own time; yet, because of the connections among natural beings, we usually determine the before and after of many phenomena relatively to certain standard sequences (for example, we work before or after sunset). Time, therefore, is the *sequential order of before/after among events* that arises from movement (cf. Aristotle, *Physics*, book IV). Things that change, however, remain the same in many other respects; in a more common sense, then, time is the "duration of changeable beings," a duration that is always immersed in change, given that all natural beings undergo constant internal changes and also vary because of the continuing mutations of surrounding nature. Hence, a given entity lasts for an hour, a day, a few years, as it abides within being during that time or duration, which is determinate since that period has been characterized by some changes (for example, by changes in celestial or earthly phenomena, the aging of living creatures, and so on). Reasoning *ab absurdo*, if nothing ever changed in the world and no reference — even external — to any sequence of events existed, then, in that strange state (that has never been experienced) a real "time" would not exist. That which is

changeable is what lasts; for this reason, a-temporal things, such as abstract concepts —for example, numbers— do not “last” (the notion of hour or minute has no duration). From this fundamental notion of time derives another notion that is more common and corresponds to the “temporal measurements” performed by human beings. Time, as the non-spatial dimension of motion, can be quantified. Our reason can take into account the temporal periods of some natural sequences in order to measure the different times of nature and of human life (hours, days, years). Time as measurement is a cultural objectification created by human beings on the basis of natural times.

*2. Present, Past and Future. Simultaneity and Unity of Time.* To us, the division of time into past, present and future seems obvious. The “present” corresponds to the actuality of the moving being (in a derivative but more normal way, this term refers to our psychological present). This actuality constantly leaves behind a before, which is the “past,” and moves towards an after, which is the “future.” Abstractly, we can think of time periods of any era —for example, the time between the 17th and the 18th century, whose relative extremes consist in a before and an after— without thinking of a present that makes the before the past, and the after, the future (but, in reality, we consider this from our present). This somewhat static time, which has no present “in flow,” is called “B-series” in analytical philosophy. This designation grounds “eternal” or tenseless statements such as “Julius Caesar is earlier than Tiberius.” The “B-series” temporal dimension results from the human abstraction of time. The so-called “A-series” temporal dimension is more actual and concrete, and designates the time that contains our constantly flowing present. It is expressed in tensed statements such as “it is now raining,” a sentence that, a short while ago, we stated as “it will rain” and that, in some time, we will have to state as “it rained” (cf. Le Poidevin, 1993, pp. 23-34). Some idealist philosophers reduce time to an appearance as if, in eternity, all time had already happened, thus privileging the “B-series” dimension. Realist philosophers, instead, assert the reality of time especially in its actuality as the present, because the past is no longer and the future is still a possibility. “Being temporal” mainly refers to the present.

We cannot speak of temporal sequences without referring to the concept of “simultaneity.” The measurement of time entails two times that are taken as simultaneous (“when I was having lunch the clock indicated two in the afternoon”). In a pre-scientific, intuitive sense, two events —or phenomena— are simultaneous if they take place “at the same time”, that is, if they occur in, or are measured against, one same period of time (“I used to work during the day”). In the theory of special [relativity](#) [2], however, the phenomenon of simultaneity has some limits. According to this theory, observers in different states of relative motion cannot agree on one definition of simultaneity, that is, they do not share a common time “that flows according to the same rhythm,” hence they do not even share a common present. Such a situation is irrelevant for those objects whose speed is much lower than that of light. For these objects —such as the Sun-Earth-Man system— there is simultaneity and, therefore, a (local) unity of time. On the other hand, in its cosmological application, the theory of general [relativity](#) [2] allows us to take a *standard* clock and to consider all objects relatively to it, thus obtaining a “coordinated universal time.” If we take as “clock” (considered here in a broad sense) a movement that is sufficiently valid for the whole [universe](#) [3] (e.g. its expansion), we can speak of a “cosmic time,” from which we derive the notion of the “age” of the universe. Our common perception of unitary natural time is linked to our psycho-biological insertion in the Sun-Earth system. In other words, without even getting to the abstract measurement of time (similarly to all other living beings), we unconsciously coordinate all natural times into one time and one “relative” present thanks to the “universal” (in reality, local) reference originating from the apparent movement of celestial objects. This “movement” is the natural clock of life on earth. The present is relative also because the causal communication between physical entities requires a certain time (we always see light signals later than the moment they originated). The so-called “biological clocks” (for example, the circadian rhythms, annual life cycles, etc.) are naturally linked to the temporal succession of day and night, the same way that the internal rhythms of the body are linked to the external rhythms of

surrounding nature (on biological times, see Whitrow, 1980; Coveney, 1991; Fraser, 1988). The psychological sense of regularity with which “time flows” originates from the regularity of day-time and night-time celestial movements, even prior to the regularity of the clocks we use (cf. Sanguineti, *Tempo naturale e tempo umano*, 1998).

**3. Continuous and Discrete Character of Time.** Time, similarly to the spatial dimension, is commonly considered “continuous”, that is, as a magnitude that is always infinitely divisible. Ideally we can represent time as a line that, if divided at any of its points, would produce what we call an “instant of time.” In physics we sometimes speak of time as made up of an infinite series of instants, but this is still an idealization. When considered as a reality in actuality, instants produce the well-known “paradoxes for continuous variables.” In Aristotelian philosophy, the instant is a potential reality, because time and continuous motion are always “in the making” (that is, they are never actual). The “present” can appear as a means of expressing the actual existence of the “instant.” In reality, however, even the perceptive present always embraces a short period of time, which is apprehended in a “structural” way, or in its *Gestalt* (in this sense, we understand the unity of a short sentence or part of a melody in its actuality, almost simultaneously). This, however, does not diminish the reality of the temporal beginning and end of a movement. The so-called “initial” and “final” instants, linked to the discontinuities among events, should be considered as the “boundaries” of motion. In this respect, we could speak of an absolute beginning of the universe (or time  $t$ ) as opposed to an eternal time, but such a beginning, in the continuist theory (that is, considering time as a continuum) illustrated here, should not be understood as an instant in the sense of a real time  $t = 0$ , but rather as an initial boundary. Thus, it is sometimes more appropriate to speak of “first periods” (for example, the first second or the first hour of the universe) rather than of a “first instant.” On the other hand, the existence of minimal stretches of time that are “physically indivisible,” as well as of initial or final instant physical events that are placed in time (e.g. the creation of particles and their annihilation), is possible (and compatible with what has been said so far).

**4. Directionality of Time.** Time is a relation of sequential order (abcd...) endowed with a direction, the same way that a line can be oriented to the right, to the left, etc. (metaphorically, we speak of the “arrow” of time). Intuitively, we can observe a unique and irreversible direction of time: we always move towards the future and can never go back towards the past. This fact is due to the constant novelty of change. A “closed” time would be constituted by the cyclical repetition of the same events (abc-abc-abc, etc.); “open,” or “linear” time, instead, moves towards events that always contain some change (abcde...). Obviously, many natural phenomena are cyclical, and in nature we find a mixture of repetition and innovation, so that time on the whole will be cyclical or linear according to the prevailing cosmological direction. At first glance, natural times seem cyclical, while our time is manifestly open in relation to history. Yet, beginning from the 19th century, the natural sciences have highlighted in an increasingly compelling way that long-term physical times are open. In any case, time’s orientation towards what we call the “future” changes according to the perspective: a future that is open but chaotic; a future of creative growth; a predetermined or a relatively undetermined future; a free and planned future; a future pointing towards an ultimate goal or towards destruction; these are not the same thing. As with other temporal terms, the meaning of the future is analogical.

**5. Ontology of Time.** Temporality is a dimension of physical reality that is intrinsically linked to being. Being alive today or tomorrow may be accidental, but the fact of being subjected to the continuous and irreversible flow of time, with a beginning and an end, is essential. At the roots of physical temporality is becoming, that is, the fact that things “are not all in one time” but “little by little” as well as the fact that we inevitably lose the days that go by in the past, or must live in wait, bent towards the future, without ever being able to stop the present. This quality of partial non-being and of becoming, proper of time, points to —so to speak— the precariousness of a certain ontological condition: entities subject to change do

not last forever and they possess their perfections only in an unstable way. Human beings dramatically experience this aspect when faced with death. Yet, we should add that in the world not everything is pure temporality. In particular, human beings show a degree of control over time, as they can measure it, organize it, and use it as they choose, while through their thought they are able to transcend time and to relate to God's eternal reality. Consequently, time should be understood in an analogical sense. There is not only a mechanical time. Different degrees of temporality correspond to different degrees of being; physics, chemistry, biology or the human and social sciences do not assume the same temporality. The highest forms of being take lower-level temporality and incorporate it within their domain, in which time takes on a new meaning. In life, the teleological direction of time already appears with clarity. In human beings time presents itself as history (tradition, project, choice, accomplishment) and is inserted in a dimension of eternity.

## II. Some Philosophical Aspects of Time Related to the Natural Sciences

*1. The Scientific Approach to Time.* The natural sciences, particularly physics, use the temporal parameter as a coordinate to describe in a mathematical form the dynamic evolution of bodies (see [Mechanics](#) [4]). The scientific perspective especially refers to the measurement of temporal relations even if, through these, it ends up dealing with some "qualitative" characteristics of time, such as its directionality, its continuous or discreet nature, its relativity. We should take into account a certain constructive aspect of the temporal parameter in the natural sciences, not only because the scientific approach necessarily schematizes observed reality, but also because human beings measure time based on natural phenomena that are chosen with a certain degree of freedom, whose exact regularity is presumed as an effect of agreed custom.

The time of physics, then, is abstract, one that does not always completely reflect the reality of natural ontological time. Even prior to scientific chronological procedures, this abstraction started with the oldest temporal measurements, which were based on astronomical observations and on specific cultural divisions of time. Nevertheless, the natural sciences —when correctly interpreted— attain certain real characteristics of time and sometimes overcome the constraints of common perception (the atomic second, for example, is defined by 9,192,631,770 cycles of the atom  $^{133}\text{Cs}$ , a Cesium isotope; this measurement far exceeds the possibilities of the common perception of time).

*2. Absolute and Relative Time.* As we know, in his *Philosophiae Naturalis Principia Mathematica* (1687), Newton conceived time as absolute, as a uniform and infinite flow, independent of things, in which one could place the particular times we measure. This time was nothing but an idealization, similarly to the notions of absolute space and infinite space. In some sense, in the *Critique of Pure Reason* (1787), Kant followed the same path, except that he reduced Newton's ideal time to an *a priori* intuition proper of our inner sensitivity; in this way, he introduced a dualism between psychic time (that of inner sensitivity) and the time assigned to phenomena in order to place them within the categories of thought. As mentioned, it is true that abstract time is partly constituted by human beings when they measure the sequence of natural motions (days and years, as such, are entities of reason grounded in reality); other aspects of time, however, are ontological and beyond any measurement (the future, for example, is not an entity of reason). Einstein's relativity theory definitively erased the idea of absolute time in physics. Time (better even, space-time) is relative to the state of motion of a given system of reference; in the theory of general relativity, time is also relative to the intensity of the gravitational field, that is, to space curvature. We have already indicated above (see above, I.2) some of the consequences the theory of relativity has on simultaneity and on the present (see D. Sciama, "*Paradoxes*" in *Relativity*, in Flood, 1986, pp. 6-21; Bohm, 1996).



3. *The Sequential Order of Time and Causality.* The causes of motion precede their effects, the same way that the work of a house in construction temporally precedes the existence of the constructed house (a cause can be said to be simultaneous to the effect only when we refer to the *fiendi* cause, or the cause of becoming, as opposed to the cause of the result; hence, the act of building is simultaneous to the act of being built) (see E. Agazzi, *Time and Causality*, “Epistemologia” 1 (1978), pp. 397-424). This point is valid only for efficient physical causes, but not for other types of causes, such as the final or formal cause; neither is it valid with reference to spiritual causes, which do not act within time, while being able to produce temporal effects. This last point applies particularly to the causality of God in the world. God, the Eternal Being, creates the physical world and, as a consequence, time; therefore, it does not make sense to ask “when” He creates, or think what He was doing “before” creating the world (cf. Augustine, *De Genesi contra Manicheos*, I, 2, 3), as if the Creator were a temporal cause. If this were the case, we could reflect on a causality that goes beyond God, as any temporal cause may always be preceded by another temporal cause. Because it is not a temporal event, the Eternal’s creation of time, God’s creation of the world, does not belong to the “initial moment” in which the world begins to exist, but rather embraces the whole of the world’s temporal existence, in each one of its instants. The temporal succession of physical causality, then, consists in the fact that causes “precede” their effects, and the latter exist “after” the causes (cf. *Summa theologiae*, I, q. 46, a. 2, ad 1um; *De Potentia*, q. 3, a. 17). It follows from this that the causes of events must be sought for in the past, and that based on causes we can foresee future events. If causes are potential or indeterminate (e.g. free causes), the future presents itself as a “possibility”, while the past is always determined. The so-called “causal theory of time” (cf. Reichenbach, 1956) has analyzed in depth the relationship we mentioned between cause and temporality.

Another consequence of what has been mentioned so far is that it is *impossible for the effect to exist prior to the cause*. A time inversion that does not conform to this causality principle is not possible (see on this point P. Caldirola, E. Recami, *The Concept of Time in Physics*, “Epistemologia” 1 (1978), pp. 263-304). This fact is emphasized in the special relativity theory, from which it follows that the before-after sequence does not vary (that is, it does not depend on the observer) for those events that can be “causally connected.” This causal connection is linked to the temporality of signal transmission, whose speed cannot exceed that of light (cf. Martínez, 1996). Precisely for this reason, “travels through time” —for instance in the past— are impossible, if by this we mean actual trips, with the possibility of interacting with other objects. If we traveled in the past, we could intervene on our causes, for example, by killing our grandfather in order to prevent our own existence (in this epistemological domain we indeed talk of the “grandfather paradox”). A travel through time, where the latter is considered as an entity that is given and can be run through, entails a logical confusion as well as a contradiction.

A form of “return to the past” would be in some way thinkable only within a cyclical universe, where the lines of space and time are closed. Yet, there are doubts as to whether such a model, formulated by Kurt Gödel, could have actual physical meaning; in any case, it would be incompatible with the linear openness of human historical time. In quantum physics we sometimes speak of a “violation of causality.” According to some theories, “tachyons” —hypothetical particles that move faster than light— would travel back in time. These conclusions should be taken carefully, and we should be wary of a presumably ontological interpretation of certain physical idealizations. For example, in the history of quantum electrodynamics, the existence of particles of negative energy able to travel back in time was considered possible; later on, however, this idea was put aside, and re-interpreted in the framework of anti-matter’s characteristics (cf. Davies, 1995).

4. *The Arrow of Time.* We have already mentioned the question of time’s directionality (see above, I.4). Mechanics equations describe phenomena that display unchanging behavior in a condition of time

reversal. These equations (or laws of physics), then, are temporally symmetric, in the sense that the events they govern are reversible (they do not give any indication allowing a distinction between the past and the future) (cf. G. Prosperi, *Il problema del tempo nella fisica*, in *Aspetti del tempo*, 1998). This fact, however, does not exclude the existence of a temporal direction in nature. The mathematical formulations of mechanics laws are still abstract, and indeed the “solutions” of the related equations are usually accepted in a temporally asymmetrical way, that is, in one direction only, whereby the reverse direction is considered improbable, highly improbable or practically impossible. This is the case with many phenomena studied in statistical mechanics, such as the diffusion of gases in the environment, the dissolution of an ink drop in a glass of water and many other melting phenomena.

After the formulation of the 2nd Principle of Thermodynamics the idea emerged that many physical processes are irreversible, hence temporally asymmetrical, despite the temporal symmetry of the related equations. The II Principle states that in isolated systems, or where external causal events are missing, entropy globally grows until it reaches a maximum. As a consequence, a physical system evolves naturally and irreversibly from more structured but unstable situations (of non-equilibrium) towards situations of equilibrium, where no differentiated order exists. Clearly, this point has consequences at the cosmological level (evolution of the universe towards a state of maximum entropy, that is, of maximum disorder; cf. Davies, 1977; Hollinger, 1985; Kroes, 1985; Bellone 1989). We should recall, in this respect, that the notion of “order” is always relative to some criteria. The characterization of entropy as a “degree of disorder” posits order as a structured, specific, organized condition, while disorder (that, in reality, is a minimal order) reflects the lack of structures (cf. Sanguineti, 1986; Arecchi, 1990).

The theme of the direction of time in the various branches of physics (quantum theory, special and general relativity, quantum-relativity theory of fields, etc.) has been studied and discussed amply during the last decades of the 20th century (for example, we can speak of temporal asymmetry in feeble interactions, as highlighted by some experiments). Besides the theoretical issue (cf. Highfield, 1992; Zeh, 1992; Halliwell, 1994), what mostly counts is the fact that the evolution of the universe had an obvious temporal direction from the *Big Bang* to its present state and in view of its distant future (cf. Hawking, 1998, 2000; P. Davies, *Stirring Up Trouble*, in Halliwell, 1994). In particular, this evolution is represented by the expansion of the universe and its progressive thermal cooling, highlighted in the fundamental cosmic radiation, that today is set at 2,74° K (Kelvin degrees) together with the formation of big and small natural structures, the birth and evolution of life and finally the global increase in the overall entropy of the universe. A possible future cosmic contraction of the whole universe would similarly entail an increase in entropy and would not be the exact reverse of its expansion (cf. S. Hawking, *The No Boundary Condition and the Arrow of Time*, in Halliwell, 1994, p. 356). All these phenomena, particularly those relating to life, are temporally asymmetric: the future of the universe is not identical to its past.

The determination of the physical direction of time does not derive from physical equations, but rather from the “global reality of the universe” (that is, from the sum of all particular “arrows”) so that the possible local reversal of some processes would not entail the global reversal of the time of the universe (cf. Castagnino, 1998). Stated otherwise, the unity of time’s direction in all physical phenomena derives from the unity itself of the universe taken in its totality, given that the cosmological arrow, as relatively “final,” sets the direction for all other local arrows. In order to affirm such a unitary behavior, it is not necessary to know thoroughly the whole universe; what we currently know about it is indeed sufficient. On the other hand, regarding inorganic physical processes (e.g. expansion versus contraction) we can distinguish the temporal direction of the universe from its hypothetical global reversal, simply because we are part of the universe and, *through the psycho-biological present*, we know its actuality in its precise direction. In other words, we, as observers subject to physical change, observe the expansion of the

universe and thus know that its direction is oriented towards the future. Ultimately, both the universe, taken in its totality as we know it, and our psycho-biological present, are implicated in our knowledge of the direction of physical time.

*5. Temporality and A-Temporality.* Based on the temporal symmetry of physical laws and on the theoretical possibility for physical processes to be reversed, some authors —such as Einstein— in their philosophical reflections on science, have argued that there would be no actual temporal direction in nature, but rather an a-temporal or eternal order; in addition, the sequence past-present-future would derive from human observers or from their local perspective (cf. Sanguinetti, 1997). This “a-temporal” position (if we understand “time” in a strong meaning, that is, as a time where the past and future are different) sometimes looks at reality in a Platonic way, that is, only from the point of view of theoretical laws, as abstractly considered in scientific mathematical thought. In a more radical and reductionist sense, this a-temporal attitude can erase the relevance of human historical time. An extreme example of this position, which is very peculiar but meaningful (and certainly lacks any scientific basis), was Nietzsche’s philosophical notion of the eternal return, that is, the eternal recurrence of all universal events after finite periods of time. This notion tried to make the physical instant eternal by means of its infinite repetition (thus forgetting that not even an infinite physical time corresponds to actual eternity). Other authors —such as Bergson, Whitehead and, in some respects, Prigogine (cf. Bergson, 1998; Prigogine and Stengers, 1988)— formulated a “temporal” view, where nature is essentially creative and always keeps some novelties in store; in this perspective, the a-temporal view would be just partial, if not even merely illogical. However, it would also be incomplete to consider physical time as simply decay, in the sense indicated by the second thermodynamics principle.

*6. The Beginning and the End of Time.* The absence of a direction of time in the universe, that is, the fact that temporal directions are simply local, would entail that, in principle, the universe would present itself as eternal, with neither a beginning nor an end. This eternity, however, would not be the same as God’s eternity. It would simply be an indefinite protraction of temporal things; it would not be evidence of an absolute self-substantiality in being and it would, in any case, lead back to the supreme divine causality. Ancient thinkers, such as Aristotle, believed that the world was perpetual; a Christian such as Thomas Aquinas (cf. *De aeternitate mundi*; *Summa theologiae*, I, q. 46, a. 2) admitted such a theoretical possibility with no difficulty (while reaffirming the temporal beginning of the world as a truth of faith), as for him the fact that the universe was perpetual was not incompatible with the fact that it was created by God. Creation, as mentioned, is not a temporal causality, but rather a condition of permanent ontological dependence. Those apologetic positions that tie the temporal beginning of the world to God’s existence or that, conversely, link the eternity of the world to atheism, then, miss the point.

In rigorous terms, it is neither scientifically nor philosophically possible to demonstrate that the universe had a beginning or is rather eternal (see [Cosmology](#) [5]). The current cosmological view (the *Big Bang* theory) certainly favors the idea of an absolute beginning, but it does not prove it in a definite way. Current quantum cosmologies that in any case, today, are purely speculative, posit an a-temporal quantum-gravitational framework —from which our universe would derive, together with its time— as one merely probable event among many other possible ones. Yet, there would be no incompatibility between this perspective and the notion that the universe is created (see [Creation](#) [6]).

Claiming the existence of a cosmic time arrow would imply, instead, that the universe is moving “towards a future.” Seen as a whole, the universe shows a growing organization, a kind of inner teleology that culminates in the complexity of life structures, particularly of intelligent life —as it happens in human life. However, we are equally certain about the global increase of the universe’s entropy (the emergence of order always presumes an expense of energy) and we know that each physical structure, perhaps with

the exception of some elementary particles, exists for a finite period of time, and then declines. Even within a purely physical perspective, these two aspects of the time arrow leave open the problem of the ultimate and final destiny of the universe. Some authors posit a future of new universes or new life forms, up to the ultimate affirmation of intelligent life in the universe (cf. F. Tipler, *The Physics of Immortality. Modern Cosmology, God and the Resurrection of the Dead*, London: Macmillan, 1995); however, they do not ground this argument on scientific results, but rather on value judgments on life and intelligence, while at least seeking the physical possibility of such a hypothesis. Others, instead (cf. P. W. Atkins, *Time and Dispersal: The Second Law*, in R. Flood, 1986, pp. 80-98) claim the inevitability of the disastrous end of the world, which engenders pessimistic attitudes and is at odds with the deepest aspirations of the human soul.

The views on the universe and history as conveyed by Christian Revelation are compatible with the various physical theories on the directionality of the physical world, as long as these are not taken as absolute. The specific contribution of the biblical Revelation does not reside at the physical level, but rather gives an ultimate and higher meaning to the evolution of the universe. Christian faith indeed teaches that the physical universe, created by God, is connected to our ultimate destiny. Creation is linked to Redemption, that is, time's flow finds its ultimate meaning in the history of salvation. The Holy Scriptures also speak of an "end of times," that is, of the end of human history, which will take place together with the [resurrection](#) [7] of the dead and the definitive advent of God's Kingdom (Heaven's glory and the blessedness of the saints). Remaining within a purely physical perspective, the "future disorder" of the universe could underline the finite and contingent nature of a world that is not God, the same way that human death underlines the finite character of our existence. On the other hand, the ultimate destiny of the universe, as wanted in God's plan of salvation and believed in by Christian hope, should not be mainly seen as part of a physical process, neither of improvement nor of destruction in light of our scientific knowledge, which could be misleading; rather, it should be seen in light of a moral and religious betterment of human beings, as a process of free agreement with Christ's grace. The specific consequences that this plan of salvation may have on the physical structure of the universe are unknown to us and therefore remain hidden in the divine mystery of creation as such.

### III. Time in Human Life

The degrees, or levels, of being reveal a number of ontological perfections such as unity, goodness, [finalism](#) [8], consciousness and, ultimately, its very existence. Temporality, seen as the pure dispersion of change (see above, I, n. 5), is gradually overcome when we reach the highest ontological levels of reality (for the levels of temporal forms, cf. Fraser, 1982, 1988). Thus, living beings preserve the past in their genetic code, organize time in function of their goals and develop until they reach their organic maturity. Animals start to overcome their present-limited life through memory and instinctive expectations. But human beings, placed at the boundary between time and eternity, are able —through their thought— to seize the nature of time and —through knowledge— to re-run through it, in each of its directions (reconstruction of the past, prediction of the future). The mind alone is able to think of "all the time of the universe," of other times or of the erasure of time. Calendars, clocks, schedules, are the tokens of human control over time.

Within limits, we organize time, use it in function of the goals we set, decide its different moments, manage its deadlines, allow ourselves some breaks, and so on; thus, we prove to be real masters of time. Our chiefly temporal structure (as the only beings that can truly look at the past and future without any limit) —that is, our historicity— is a consequence of our supra-temporal spirituality that exists in time. The "ontological condition" of human beings whereby they are *within* and *above* time, derives from the



unitary structure of their spiritual dimension, that is from the soul of the body; in other words, it derives from the fact that we are *persons* having a corporeal being. Intellectual understanding, for example, is a supra-temporal act that, on the one hand, depends on an adequate sensorial perception, through which we temporally receive some inputs from the world (e.g. when listening to someone); on the other, it is expressed through language and other sensible symbols. Speaking, talking or reasoning are temporal human acts, but they are also channels of contents that stand above time, such as the acts of understanding, willing and loving.

Human time can be called “history” but also “existence.” We are “historical” because our time progressively accumulates the past, in the form of memories, experiences, customs, acquired knowledge, traditions, while in the present we are always bending towards the future, without ever being able to stop the flow of time. We can call existence that ontological structure consisting in having a remembered and also unconscious past—which is collective, as well as individual—and in always having to deal freely with the future. The past that is remembered and recounted helps each of us gain the awareness of our identity (cf. Ricoeur, 1984-1990). The future shows us the space for our freedom and responsibility, as the existence of a future means that history, for each of us, is not closed, but stays open and in large part depends on our freedom. The present is the “place” of action and choice, not only in its horizontal relation with the temporal future, but also in its vertical relation with eternity, to which we are destined. Our existence also has a hermeneutic structure, given that we see the projection of our lives and the horizons of the past and the future always in light of the current state of our temporal awareness; we see our lives in ways that are always novel, but still compatible with what we know of the eternal truths about being and ourselves.

In sum, we can say that our existential time is characterized by “growth” and “freedom.” Acquired virtues and knowledge, all that is good and positive in our past, make us grow throughout our lives (flaws and wants, instead, decrease our freedom). In relation to time, we are both active and passive. We cannot change our human nature, or the inexorable flow of the limited time we have at our disposal, until we reach the equally inexorable moment of death; but we can give it a direction of our choice. We were given our being, which we can use freely. The future appears to us as an always open possibility, offered to freedom and springing from what we were given. Our time is above all the time granted to our freedom. The present, in this sense, is the privileged—unique—moment of freedom’s actualization: in the present moment, we bring into effect our possibilities to attain our goals, thus giving meaning to our existence. Our awareness of death is a reminder that our time is limited, and that within it we must make the necessary choices in order to attain our eternal goal.

At this point it is also fundamental to speak about the *human desire for eternity*. We transcend time through intellectual knowledge and love, and wish to always live in a state of fulfillment. We do not find such a fulfillment in the simple protraction of days, but rather in filling our time with acts that have intrinsic value. What we seek is “eternal life.” In utilitarian terms, time is only a means to attain a future goal (for example, the time necessary to complete a trip). To the contrary, in friendship, love, in intellectual or artistic contemplation, in prayers with God and every religious act, time is filled with immanent acts, which are wanted in themselves, and have a value of their own that does not simply depend on other acts. When considering these acts and their object in terms of being, we find in God the truly eternal Being. Our fundamental relation to eternity, then, consists in our contemplation of, and our love for, the Eternal Being, above our relationship with the created world.

On the one hand, then, we are aware that we cannot reach eternal life within the mortal life we experience, because of death and the temporal passage of our days; on the other hand, according to the Christian perspective, it is in *this* life where we can and must make those choices and perform those

actions through which we can begin participating in something eternal, while also preparing to reach Eternity in a definitive way, beyond death. The consistency of this framework, however, can be clearly perceived only through religious faith (see below, IV). At the anthropological level we can only understand and experience the irrepressible desire for an eternal life, together with our constant anxiety in front of the flow of time and the approaching of death, even if philosophical thought can help us by recognizing the immortality of the soul. Even in a secularized era like ours, the desire for eternity is strong; it manifests itself in many forms, including the preoccupation with (and even anxiety over) the preservation of nature, and the various speculations on the survival of human life in the universe.

Human beings can also live time in a pathological way. The excessive nostalgic attachment to the past; the pure haste that takes away the capacity to live the present moment with joy and serenity; the fear not to be able to use fruitfully available time, and so on, are problematic ways of living temporality. Some of these may have cultural or ideological origins, even if they affect individuals' lives. Examples are fatalism, the idea that all that happens is already predetermined; living the present while only pursuing immediate pleasure, with no care for temporal or eternal future; searching for eternity in intra-temporal utopias; or, finally, in the search for immortality in forms of artistic, scientific, social life, while trying to escape individual responsibility for the present, and forgetting our eternal destiny. We can also cloud the past—for example—when we reconstruct it in a false or unilateral way. The ideology of progress has often corrupted the meaning of human temporality, to the extent that it has put all energies of human hope in an intra-historical future of technological progress, thus leading us to forget the relevance of the individual encounter with supra-temporal values (cf. Ratzinger, 1971).

Ultimately, we must love the time we have and must be able to use it precisely employing our freedom, in order to relate our lives to the eternal dimension to which we are constitutively called. This dimension already begins in mortal life and is accomplished in the eternal life to which God calls us. All the great works of culture, science, philosophy, religion, and so on can be interpreted as our attempt to overcome finite time. In revealed religion, God shows to human beings the path to reach such a goal and invites them to follow it.

## **IV. The Nature of Time according to Christian Revelation**

Compared with many pagan cultures, the Christian perspective completely overcomes the notion of cyclical time (cf. M. Eliade, 1971; Jaki, 1974), to the advantage of a linear understanding that runs through the whole history of creation, from the very beginning—when “God created the heavens and the earth” (*Gn* 1:1)—up to the end of history—when the salvation process initiated by Christ will reach its highest and ultimate moment in “a new heaven and a new earth” (*Rv* 21:1). While completely reversing the ultimate pagan meaning of time, Christian Revelation does not say anything either about the structure of cosmological time, or about the different forms in history. Yet, it lessens the value of those perspectives that are incompatible with faith, that is, those that make time an absolute and definitive reality. Time is created by God, it belongs to God, the Eternal, the Lord of time and history, and will end when God the Father desires, through a mysterious choice that is not revealed to men (cf. *Mt* 24:36; *Acts* 1:7); but nothing is said about the concrete cosmological and historical processes that have occurred and that will occur. In this sense, neither a historical view of nature, nor its contrary are stated; a physics that necessarily entails the beginning of the world is not presumed, and neither is a physics that implies the destruction of the world or its transformation in any given direction. In Christianity, the ultimate and absolute linearity of time is that which belongs to historical human existence, the irreversible line of individual freedom that can embrace, in this life, a divine plan culminating in eternal life after death and after the end of mankind's history. Cosmological, anthropological or religious structures of time that

make this “form of human time” fruitless (e.g. chance, fate, absolute determinism) are excluded in the Christian perspective.

In this sense, we should stress the importance of temporality in the Judaeo-Christian Revelation, where it has an inherently “historical” structure: temporality is indeed a “history of salvation.” In the Old Testament, God establishes a covenant with a chosen people, and this fundamental event implicates the whole of mankind. Israel preserves and reflects on its own identity, that is, on the vocation it received from God; in this sense, it looks at the past through the constant memory of its call (choice of the Patriarchs, freedom from slavery in Egypt, conveyance of the Law) while it looks to the future of the promises made to Abraham, Moses and the Prophets, which ground the hope for a stably owned land and, further, for the final messianic liberation and the advent of God’s Kingdom.

The NT is permeated with a sense of fulfilled promises; “this is the time of fulfillment” (*Mk* 1:14), Christ came “when the fullness of time had come” (*Gal* 4:4; cf. *Eph* 1:10). Time is a deployment of God’s grand design that runs through the whole of creation and reaches a climax in Christ, not only in a chronological sense (Gr. *chrónos* in *Gal* 4:4), but also in a qualitative one (Gr. *kairós*, *Mk* 1:4), above all because Christ reunites time and God’s eternity, thus allowing men to participate in this union in a vital and concrete way. “Thanks to God’s coming on earth, human time, which began at Creation, has reached its fullness. ‘The fullness of time’ is in fact eternity, indeed, it is the One who is eternal, God himself. Thus, to enter into ‘the fullness of time’ means to reach the end of time and to transcend its limits, in order to find time’s fulfillment in the eternity of God” (John Paul II, *Tertio Millennio Adveniente*, n. 9).

In Christianity, the sense of novelty of the “present” prevails. It is in the present that we participate in the mystery/event of Christ (Gr. *kairós*, proper time: *Eph* 5:16; cf. *Col* 4:5), so that we are able, in Him, to redeem and sanctify time itself, a time that, in such a way, participates in the eternity of the resurrected Christ (cf. *Dies Domini*, n. 74). Christians, then, administer time, a gift of God, by capitalizing it in view of eternity (see the Gospel parables on the growth of seeds, the farming of fields, the loyal management of the household, etc. For a commentary on these parables, see Escrivá de Balaguer, *Friends of God*, London: Sceptre Publishers, 2002, nn. 39-54). The time of grace is a germ of future eternal life, which must be cultivated even when suffering. The tension towards the eschatological future represents Christian hope. The end of times will be “the day of the Lord” (cf. *2Pt* 3:10), when God’s judgment will end history and, for the faithful, the life of grace will reach its perfect maturity, performed by God Himself who will fully reveal Himself to the saints: “when the perfect comes, the partial will pass away” (*1Cor* 13:10). The Bible then appears wholly enclosed within a temporal perspective: it starts with “In the beginning” and ends with Christ’s “I am coming soon” (*Rv* 22:20).

The Christian eschatological tension towards the future, then, is not a philosophy of immanent or intra-worldly history. The Christian redemption of time has an exquisitely “vertical” dimension, and does not entail an exaltation of human “horizontal” development, which proceeds according to its own dynamics, but should not be deified. History always remains open and human future is not necessarily better or worse; in fact, it will always include elements that should be corrected. Secular history is the set of temporal situations in which all human beings must live their personal vocation to eternal life, rather than a mere temporary phase towards God (cf. *Gaudium et spes*, 38-39).

Divine eternity does not thwart the reality of time and history, as time proceeds from God, even the unpredictable time of the created freedom of human beings who, by responding to the divine summons, determine their own eternity. Christianity does not intend to lessen the value of time, but the latter acquires meaning only in light of eternity. God’s eternity, on the other hand, should not be confused with the a-temporality of abstract thought, but should be conceived as a full Life, always actual and without

flow; according to Boethius' famous definition, it is the "perfect and simultaneous possession of a life with no end" (*De consolazione philosophiae*, V, 6, 9). In the eternal life of the glorious state, given that bodies will resurrect and the universe will reach a new state, physical time will not be erased, but rather transfigured and freed from the corruptive elements it contains today. Time is always a way of participating in being, and so time will belong to the final state of glory of the universe and will also be a particular form of participation in eternity (for the concept of "participated eternity," see *Summa theologiae*, I, q. 10, a. 2, ad 1um and a. 3). In conclusion, let me mention Aquinas' argument —interesting as well as common in the Christian tradition— on a certain analogical form of temporality, called "eviternity" (cf. *ibidem*, I, q. 10, aa. 5-6; q. 57, a. 3, ad 2um) —characteristic of spiritual beings such as angels and separate souls— which would indicate a kind of *measure* for their acting, the existence of a certain sequence for their acts of will and intelligence.

**Read also:** [Creation](#) [6]

[Relativity, Theory of](#) [2]

[Universe](#) [3]

**Additional Related Documents:** Augustine of Hippo, [Time and Eternity: the Christian Conception of Time](#) [9], 426

Thomas Aquinas, [On Creation and Time](#) [10], 1269-1273

#### **Documents of the Catholic Church related to the subject:**

[Abbreviations and complete titles of the documents](#) [11]

DH 951-953; [Vatican Council I, DH 3002](#) [12]; [Humani Generis, DH 3890](#) [13]; [Tertio Millennio Adveniente, 9-10](#) [14]; [Dies Domini, 74](#) [15].

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