Annals of
Reviews and Research

Juniper Publishers
key to the Researchers

Mini Review
Volume 9 Issue 3 - June 2023
DOI: 10.19080/ARR.2023.09.5557634

Ann Rev Resear

Action of Gravity on Time

Patrice F Dassonville*

Freelance Researcher, France

Submission: June 19, 2023; **Published:** June 26, 2023

***Corresponding author:** Patrice F Dassonville, Freelance Researcher, France

Abstract

Does gravity and time interfere?

Keywords: Aging; Gravity; Interdisciplinarity; Time

Introduction

Time is wrongly known although it's used in all areas of knowledge, except mathematics, but including art and philosophy. People are convinced that time is a natural phenomenon, whereas no proof is provided. "Conviction is the enemy of truth" the German philosopher Friedrich Nietzsche (1844-1900) writes [1]. For example, it is commonly asserted that the Big Bang is the start of time. Philosophers should ask: "The start of what?". Indeed, as far as the nature of time is not identified, we don't know what we are talking about, despite the many misleading metaphors and other seductive stereotypes and archetypes of everyday language. In order to know more about it, it comes to check if the experiments are really carried out on time. The investigation begins with some basic experiments, and it is continued with experiments that involve gravity.

Experiments about time

Observation, detection and measurement are basic physical experiments. Let's check if they can be carried out on the time:

a) Is time observable?

Observing a clock hand moving forward or a quartz watch displaying seconds is not seeing time.

Listening to the "tick-tock" of our great grandmother's longcase clock is not hearing time, even if it gives the feeling of "passing time".

We see and we hear their mechanism in a movie; that's all.

We observe the sun, not the day. We see the floods of the Nile, not the year.

It's a major result: time as such is not observable.

b) Is time detectable?

If clocks were time detectors, they would give the same time: none could be ahead or behind the others.

Clocks are in no case driven by time, whatever their technical complexity.

c) Is time measurable?

During a race, we measure the run, not its duration. Indeed, we compare what the runner does and what the stopwatch does; the result that we read on the stopwatch is called duration of the run (Figure 1).

f1

In "Life of Alcibiades" the Greek biographer Plutarch (c.46-c.126) reports about limiting the speech of speakers who were hostile to the Athenian strategist Alcibiades: "… by measuring the water from the clepsydras" (19, 5), instead of "… by measuring the duration of their speech". Well done, Plutarch!

The expression "measure of a duration" is a misuse of language: instead, we always measure an event, a movement, a change of position, a change of state.

It's unexpected, even disappointing, but time can't be measured.

The three basic examples above are not experiments about time.

Action of Gravity on Time

Gravity has the dimension of an acceleration, and they are both expressed with the same unit: the meter per square second.

However, they differ, insofar as gravity is a phenomenon generated by matter, whereas acceleration is the spatial concept of speed variation.

Physics has developed experimental protocols involving gravity. These protocols deserve to be carefully analyzed in order to check if the experiments are carried out on time. In other words, does gravity and time interfere?

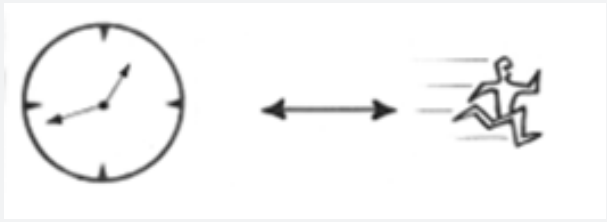

Figure 1: Duration of the run is what the clock does.

a) Action of gravity on clocks

i. On the moon surface, gravity is 6 times lower than that on the earth surface: electronic watches are not affected, whereas pendulum clocks move 2.45 times slower.

ii. On the sun surface, gravity is 21 times higher than that on the earth surface: a pendulum clock would swing 4.6 times faster. An atomic clock would take an advance of about 1 minute per year [2].

iii. In microgravity, an atomic clock becomes more precise [2], while a clepsydra, an hourglass and a pendulum clock stop functioning.

It is observed that gravity affects the operation on clocks depending on their technology, so that the action of gravity on clocks is not an action on the time.

Performing gravitational experiments on clocks is not performing experiments on time. Instead, these experiments are performed on the "mechanism "that drives the clocks.

b) Action of gravity on bacteria

Chronological aging is the age increase, which increases at the same rate for everything and for everyone. In 2017, I introduced the concept of biological aging [3] which results from the genetic heritage (the innate) and the way of life (the acquired).

For example, bacteria salmonella typhimurium are three times more virulent in microgravity (like that in a space station) than in gravity at the earth surface [4].

Indeed, microgravity stimulates their divisions, what causes them to age faster biologically, but not chronologically. The chronological age of bacteria increases at the same rate as everything.

This experiment with bacteria living in microgravity proves that gravity and time don't interfere.

c) Action of gravity on aging

NASA has established the clinical expression of spacemen exposed to zero gravity: loss of muscle mass, bone loss, thickening of the carotid artery wall, decreased response to cognitive tests, occurrence of cataract [5].

In other words, gravity leads to a series of biological stresses; therefore, gravity acts on biological aging, instead of chronological aging.

d) Acceleration and time

The fictional experiment of the French physicist Paul Langevin (1872-1946) is considered a paradox: in accordance with calculations, a twin back from an accelerated relativistic travel would have become less aged than his brother who was waiting in the laboratory [6].

This paradox results from the lack of differentiation between chronological aging and biological aging. What does Langevin mean by "less aged"? Is he talking about chronological age or about biological age?

Indeed, the relativistic experiment is carried out on biological aging instead of chronological aging, whereas calculations are operated on chronological aging instead of biological aging, which is another story.

This fictional experiment does not succeed in making acceleration and time interfere.

Origin of Temporality

The lack of interference between time and gravity is confirmed by the geo- historical origin of temporality, which is worth remembering.

The oldest written trace of time is a cuneiform sign (Figure 2) engraved on a clay tablet, which was uncovered in Sumer and dated 3800-3500 years BCE (Before Common Era) [7]. This sign

How to cite this article: Patrice F Dassonville. Action of Gravity on Time. Ann Rev Resear. 2023; 9(3): 555764. DOI:10.19080/ARR.2023.09.555764

means "month": by observing the moon, the Sumerian scholars noticed the repetitions of its movements, and they called "arhu" ("month" in Sumerian language) what separates two successive repetitions [3].

The Sumerians observed the moon, not the month. The movement of the moon is observable, whereas the month is not observable. Likewise, the mechanism of the clocks is observable, but not the hours, minutes or seconds.

It allows a definition of the month: "The month is a concept corresponding to what separates two identical and successive states of the moon in relation to the earth".

Figure 2: Month in cuneiform writing.

Thanks to archaeology, time can be defined in relation to the physical state of any system: "Time is a concept corresponding to what separates two states of a system".

This basic definition leads to revealing some unexpected properties: the absence of phenomenality of time is confirmed by the absence of physical properties; instead, time has mathematical properties: for example, in relativistic physics, time is continuous, determinist and covariant, whereas in quantum physics, time is discontinuous, probabilistic and invariant [3].

In the definition of the month as well as in that of time, "a concept corresponding to", is emphasized because it's crucial to differentiate a phenomenon from its corresponding concepts.

Conclusion

Confusion between time and events leads to many misinterpretations. Attempts to conduct experiments about time end in failures, because the alleged experiments are performed on realities that are not time. This finding includes the experiments operated with gravity: gravity acts on the clock mechanism instead of time; gravity acts on the biological aging of spacemen instead of their chronological aging; gravity acts on the health of a person instead of his civil age, etc.

The interdisciplinary approach of temporality allows us to define time and find out that it's an invention of thought: time is a concept, on which no experiment can be carried out; in particular, gravity has no action on time..

References

1. Nietzsche F (1881) Aurora.
2. Hawking S (2005) A Briefer History of Time. (Bantam Dell, New York).
3. Dassonville P (2017) The Invention of Time & Space (Springer).
4. Science & Avenir (2007).
5. NASA: forwarded by INSERM (Institut Nationale de la Santé et de la Recherche Médicale).
6. Mavrides S (1988) La Relativité (PUF).
7. Conteneau G (1937) La Civilisation d'Assur et de Babylone. (Payot).

How to cite this article: Patrice F Dassonville. Action of Gravity on Time. Ann Rev Resear. 2023; 9(3): 555764. DOI:10.19080/ARR.2023.09.555764

DOI:10.19080/ARR.2023.09.555764

How to cite this article: Patrice F Dassonville. Action of Gravity on Time. Ann Rev Resear. 2023; 9(3): 555764. DOI:10.19080/ARR.2023.09.555764