



Opinion

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# Concretizing Minimum Times in Sport and Health



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## Opinion

The perception, understanding and explanation of a phenomenon can be changed by measuring relevant indicators for some of its variables. This statement seems a banality. But it is not.

It is not because:

a) It is necessary to distinguish indicators of dependent variables from indicators of independent variables and this distinction depends on the resources and means that we have, and the objectives aimed.

b) The relevance of the indicators in complementarity with the one indicated in the previous point depends on the methodology that we will use and on the way the data collected will be used (to describe the phenomenon, analyze it, understand its functionality, etc.);

c) The degree of possible and desirable precision almost never coincides, and we must make commitments.

d) Perception does not depend only on the stimuli received and the sensations they provoke, but also on their interpretation, the frame of reference used and even the paradigm (in the Kuhnian sense) in which it is integrated.

e) We can affirm that each area of knowledge (or even "school" in its scope) has its 'pertinences', 'rigors', 'precisions', according to its object of study, methodologies used, level of development....

f) And many more premises could be added to this list.

Let's see, just as examples:

a) How rigor (correction) and precision (discrimination) are so often confused (even in dictionaries), not only because of ignorance (which sometimes happens) but also because, for example, precision implies adjusted levels of rigor (weighing milligrams requires a balance isolated from the movements of air, measuring a metal with great precision requires controlling the temperature, etc.);

b) As, over time, some instruments have marked professional activities and the protocols used, for example, the thermometer to check for fever, the 'pulse taking' to check 'vital signs', the stethoscope that allows auscultation and has become even a 'brand image' of the doctor. Today we hardly have a doctor's appointment without using an extensive list of tests for the physician to make his diagnosis, when we prepare (and some are even already using) means of 'portable diagnosis' (on a daily basis, in sports activities, in space travel, in military situations, etc.) to control the evolution of parameters considered to be important in controlling the performance or health of users;

c) As more than material instruments, conceptual tools and the opening of views and the exercise of imagination and creativity can be fundamental for the transformations to happen and evolution to be made.

d) The ability to measure and accumulate and relate data has changed so much and so profoundly that we have not yet had time to adapt and adjust our procedures to the new conditions and to integrate all these capacities in the way we act.

e) Concretizing the framework we outlined above, we will confront two opposing positions in this area of perception, understanding and explanation of a phenomenon, that is, specific scientific research, health, a field of action where the highest commitments of resources are made (not only financial, but also human, institutional, publications and dissemination, complementary areas such as support instrumentation, experimental spaces, etc.) and sport, where despite the visibility achieved, the interests and even passions it arouses and the enormity of committed human and financial resources, research and, consequently, scientific production, have not achieved, with rare exceptions, the autonomy and depth that allows to reach the specificity of the area of knowledge that allows to move from research to development, and from here to technology (R,D&T), maintaining subsidiarity (namely health) that can only be justified by existing institutional blockages.

f) In this articulation that we are going to make here between health and sport, in their performance on the same target, Man, we focus our attention on the 'very small times' (as a reference we speak of time of 1/10 of a second or less) and the consequences that have in our lives and specifically in these areas, the ability to measure and record them. Many other factors could be used in identical processes, but we follow the need to be succinct at the level of an article. We are currently developing a publication where we expose under the title "Treaty on Sport", the study that we have been carrying out for the last tens of years.

### An analysis

a. As stated in point 5. above, different areas of knowledge have different levels of development, with inherent implications. We note, therefore, that while:

b. In health, the package leaflets are established based on the active principles, which requires the definition of the existing components (see point 1. above), with a dosage and a prescription (points 1. and 2.),

c. In sport it is still predominantly based in lived experience (namely starting from the champions model) (there are exceptions, unfortunately, which generates shocks with the 'normal' installed and without the support (point B.) that would be possible and without the acceptance (C.) that would allow the existence of desirable support services (points C 1&2.).

d. However, despite what we mentioned in the previous point, the specification and customization of management processes is done (despite everything, that is, in the absence of instruments and processes duly validated - points 3., B. and C.) more in sport, although in restricted populations (elite sportsmen), than in health, which has well-established protocols, although, because it is based on the average values of the general population, it sometimes loses specificities of individual cases (an evident situation is the case of 'rare diseases', but it is hushed up in

standardized situations, as in the specificity of medicines for some typeable populations).

In sport, in which there are some windows in which the rupture has already been made (point B.) with 'normality's' where the dominance of the empirical prevails and which already explore new possibilities and methodologies (points 1., 2. and 3.), and we repeat again, despite what we said in point C., we have ways of acting as we will exemplify next.

### Some examples of structuring knowledge

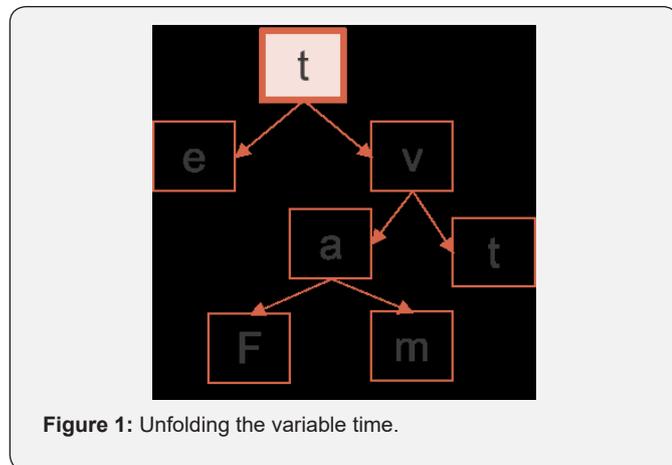
**In tennis:** Tennis is an activity that fits into the Taxonomic Model of Direct Confrontation Activities (Almada et al, 2008). This model is represented in a simplified way by the formula  $t \leq t'$  where  $t$  is the time of the player who performs the beat and  $t'$  the time of the player who receives the beat. The model also assumes that this type of activities will ask the individual who performs it the opponent's interaction, dialogue and reading behaviors (active principles). This because, to achieve the point, the individual can: H<sub>1</sub>: Decrease his  $t$  (increasing the speed of the beat); or H<sub>2</sub>: Increase the opponent's  $t'$  (I) causing him to have to travel more space to hit the ball, or ii) making it difficult to read his movement thus delaying the start of the response). The active principle of interaction is a priori guaranteed by the activity rules themselves, however, there may be situations where there are exceptions, but which will be sanctioned in terms of results. Dialogue and reading the opponent is only requested when the "game" takes on certain parameters that make the need to anticipate the necessary movement, as we will see later through some more concrete examples. Some of them are dependent variables, others are independent (identify,...) when collecting data on this phenomenon (indicators) it is necessary to be aware of what type of variable it is about so that the conclusions drawn can be coherent [1,2].

Take, for example, a service situation in tennis. If the ball is served at 170km/h it takes about 0.42s to cover 20 meters until it is within reach of the service recipient, but if we consider a speed of 200km/h the time to cover this same space is already 0.36s. Considering that the complex reaction time may be around 0.55s, in these speed intervals (170-200Km/h), the need for the receiver to focus on the dialogue and reading of the opponent is guaranteed to be successful. From 130Km/h (considering the same space) the time the ball takes are about 0.55s and if we consider 70Km/h the time is greater than 1s. That is, at these speeds the behaviors requested from the individual receiving the ball are already completely different from the previous ones. Here it is already possible instead of reading the server's movement for the player to center his sensors on the ball and its trajectory. This means that the active ingredient is no longer the same.

**In football:** Football can also be understood through the Taxonomy proposed by Fernando Almada (Almada et al, 2008). Football being a Collective Sport, it privileges the division of

labor by different elements of a group, implying the performance of specific functions and the mastery of the dynamics of their coordination (group dynamics). This model is represented in a simplified way by  $t \geq t'$ , where  $t$  is the time of the ball and  $t'$  is the time of the defensive action, therefore,  $t$  and  $t'$  represent something other than  $t$  and  $t'$  in tennis. Like what we've previously presented for tennis, let's now look at an example about a shooting situation in football. If the ball is shot at 70km/h it takes about 0.51s to travel 10 meters to the goal, but if we consider a speed of 150km/h the time the ball will take to travel this same space is 0.3s. Also considering that the complex reaction time may be around 0.55s, for ball speeds above 70km/h, goalkeepers need to focus on dialogue and the reading of the shooter is essential to be successful and avoid the goal. On the contrary, below these ball speeds, it already takes more than 0.55s to travel the 10m to the goal, so the behaviors requested from the goalkeepers are completely different from the previous ones, so they just need to focus on the ball and its trajectory to be successful. Also, in this situation, and through the knowledge of these times, we can verify that the active principle is no longer the same, so the requests will also be different.

Using the same split of the variable time shown in figure 1, we can also verify that: - in the case of the shooter, in order to increase his chances of success (reducing the time the ball takes to reach the goal), he must consider the following possibilities (or both):



a) decrease the space the ball will have to travel to the goal (for example, approaching to shoot closer to the goal);

b) increase the speed of the ball (for example, by increasing the force applied to the ball (in this case it will be necessary to consider that this increase in force will simply an increase in the indicators provided to the goalkeeper, thus giving him more time to anticipate his action if he is focused on the dialogue and reading of the shooter)).

c) In the same sense, also the goalkeeper to be able to increase his chances of success (decreasing the time he needs to reach the ball), must consider the following possibilities (or both):

d) Decrease the space that will have to travel to the possible point of interception of the ball (for example, adjusting its position in relation to the goal and possible trajectories of the ball).

e) Increase his speed of displacement (for example, increasing the force exerted on the ground (also in this case it will be necessary to consider that this increase in force will simply an increase in the indicators provided to the shooter, thus giving him more time to anticipate his action if he is focused on the dialogue and reading of the goalkeeper, in particular his center of mass / support base relationship)).

### Conclusion

As we can see it is possible, from the definition of the variables of sports activities, models that integrate them and the development of the necessary tools (which naturally integrates methodologies and processes), to structure the knowledge of sport using the experience and the teachings that can be collected in other areas of knowledge (which does not mean mere following, but an autonomy of an area that does not close in on itself and achieves dialogue in a science that is not a set of watertight zones) but in order to make the processes of evolution with natural benefits, for users, for professionals and institutions, for society.

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