

Strategical, Tactical and Operational Errors in Science and Knowledge in General

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Introduction

Helping to build science and knowledge in general does not mean adding (a typical error of a training done predominantly of knowledge acquisition - instruction, and not, for example, by increasing the capacities and potentialities of the individual - education and/or training) more data to the knowledge repository and/or its interpretation.

We can assume, allegorically, simplifying, that the knowledge that can be implemented has three dimensions:

- The depth, which allows to leave the surface of the phenomenon - two typical examples: 1- the drift of the continents (see “*Gondwana*”), which until a few tens of years ago was considered “madness”; 2- the oceans considered as huge bodies of water, but thought of as surfaces where sometimes there is some agitation, the seas / swell / wavelets, when it is known that the waves can go thousands of meters deep, that there are large underwater rivers, currents, that waters circulate from one ocean to other, etc. There are, however, moments of panic, in which we “scare” because... there was a tsunami, or an earthquake that reached our sensitivity

level, because they are constantly happening at level's we "don't feel", outside "our world" (or from what we imagine as such);

- The width, because we can open or close the angle of what we embrace from the context (which leads, in the vision, to a strategy of having a "peripheral vision", where we detect in a more vague, open way, and a "central vision" where we focus more our attention. With knowledge we do something similar, because man is a "functional unit" (a fundamental concept as we will see below) that reproduces the behaviors and strategies, which considers (even without being aware of it) efficient, not being permanently innovating, because this would have high costs;
- The length, because we can go further or stay in the vicinity, for which man also mounts optimization strategies (often without being aware of it, take, for example, how on a motorway we look further afield, because we trust that there will be no immediate danger and speed requires anticipation, already on a road where obstacles or obstructions appear that require immediate attention we focus our attention closer and therefore reduce the speed so that we can have the response time adjusted to our reaction time) according to the problems he faces and the solutions he can find (we repeat, often without having to be truly aware of it).

But let us also consider a fourth dimension:

- The time, because yesterday when we said that "today was tomorrow" we were right. Today, if we said it, we would be wrong... because today is not tomorrow.

But this, these dimensions and the framework that we make of them, is "the knowledge we have", the knowledge that we can master because our capabilities are limited and we have to "build a world" to our dimension and ignore what we are obliged to ignore because we cannot get there. It is not easy to see that the unknown and uncertainty exist, so, as far as possible, we ignored them.

Ignorance has its advantages, so much that when we have an unbearable emotion or pain, we come to faint so we can ignore suffering. But ignorance also has its costs, and today in science we have to take into account uncertainty, with the limits of knowledge, with the implications of the unknown, with the questions so that we know no answers. One of the greatest riches of research is the formalization of questions for which we have no answers, it helps us know where to look, or what to look for.

The knowledge, that is a tool that we use to solve the problems we face (although some have transformed it into a mean of ostentatious, verborrhea, mere verbiage because it does not integrate into any attempt or gesture of balance and/or coherence – sometimes appealed of erudition, or culture, or even intelligence), depending on the objectives we have (which means that we can identify them and, again we repeat, consciously or unconsciously), for which we set up action strategies, tactics of action, operating modes according to which we proceed using technologies (or specific aspects of these technologies, particular cases, techniques).

In these strategies that we use, we also stress that being limited our ability to "pay attention" and treat information, we create "automatisms" and "habits", "addictions" when functionally are inefficient (or even harmful), to solve the situations that we consider dominated, which frees us availability to treat new situations.

Humans, thus, have a set of strategies that have been developed for millions of years and that we try to present here a very briefly a notion. A notion where we will support the reasoning that we will then expose, for what we have defined some premises, isolating some points to facilitate the dialogue we seek to establish with the reader:

- These sets of strategies, which, not being the truth or completely perfect, have a coherence and structure balances that allow man to respond to the problems with which he confronts in an efficient way, that is, with costs that are bearable and as low as possible, transforming man into a “functional unit” (with a personality, a culture, behaviors, an ethics, a moral, ..., finally a person);
- Coherence and balances are a function of a man/involvement relationship. They are not determined by an external entity (whatever it is, even if one resorts to the fantastic or the sacred), by a historical sense, imagined impositions of a past, belonging to a group, a mere pretext, ...;
- They are the “simple” expression of the functionality of a relationship, of dialectics in the context in which man integrates;
- In the reference framework still prevailing, the rupture has already begun, although it has not yet gained a dominant position (although already required by the context and to have the theoretical and discursive support that defends it). Not enough has been implanted (hence the crisis, or the crises, in the Kuhnian sense of the term, that we live, successive and almost permanent), because there are always aspects of the previous conception that are authentic conceptual pitfalls that prolong the crisis and that require strategies that promote the necessary evolution and transformation;
- The coherence and balances with which we have to break (we come from a framework that had a well-defined and consistent coherence and balances), like everything else, have gone out of the date and lost the necessary acuity to the new challenges we face, or because they are not already sufficiently efficient and/or alternatives have appeared more capable of meeting ambitions (possibly others and no longer the previous ones);
- Imbalances and failures in coherence result from changes in man, in the context in which he integrates or in the established relationships. This not only justifies the current crisis, but also provokes and sharpens it;
- Man, we, define contexts to the extent of our capabilities (at least we seek them to be), so that the problems we face are in line with the capabilities (and potential that can give rise to new capabilities) that we can roll out by defining:
 - the possible ones we can accomplish;
 - the impossible ones that we will still seek to overcome;
 - the impossible ones so that we will seek to find excuses to accept.
- These contexts are always limited, parts of a “whole” that we do not have the capacity to cover in its entirety, but which we try to understand and even explain by extrapolating from what is known to us and from the

unknowns that we can identify (which falls well short of the unknowns that we do not know, but that we want, we wish, one day to know);

- In order to try to understand, and even explain, the contexts we know, we define above four dimensions that we are constantly dealing with, although we are aware that the context of which we are part (we do not integrate as an external thing, we are imbued in it), always has much more dimensions, it has n dimensions (we do not know how many, perhaps we ignore the majority);
- We start, therefore, always from a set of parts that we can identify and detect (understanding and explaining will already be another thing, and that is where science enters, structuring knowledge in order to organize it in view of the performance of a function (there are still those who imagine that the structure of knowledge is neutral, insignificant and innocuous);
- We have, however, the tendency to consider that what we identify and/or know is what exists. In fact, it's not easy to know what we don't know, to define what we don't know. But there is a great distance between what we know and what exists (or there is nothing, because, as some argue, it can all be just an illusion);
- There are even those who, erroneously, answer whether it will be worth having models, if we can seek the truth. We can always look for the truth, if we can bear the idea that we will never find it, or because we can only detect a tiny part of it, or, because it doesn't even exist;
- One of the "excuses" for what we now find impossible to know is an attempt to tidy up the whole that transcends us in a perspective of determinism or chaos;
- Man constitutes a "functional unity" with a coherence and balances, it is a person (person - which does not mean "a human being", but an individuality, an identity, that a broader perspective of life and living being extends... a debate to be had in another space);
- Science and knowledge in general are mere tools with the function of structuring, systematizing, coordinating, ... what we know and the search for what we still don't know;
- The technologies to build on science are multiple, for example replication, contradictory, reduction to absurdity, critic, praise, suggestions, ..., tactical, technological contributions that help to operationalize the development of knowledge and its organization thus facilitating its various uses.

However it's natural in any operation to appear, always, "dysfunctions", strategic errors, tactical, operational, ..., which have to be identified, studied, evaluated, corrected,

In Science and Knowledge in General Strategic, Tactical and Operational Errors a Model of Functionality in 3 Images Criticism and Suggestions

In a succinct way we will identify three mistakes that science and knowledge in general make today.

Mistakes that are situated at both strategic, tactical, and even operational level. In the absence of significant advantages in distinguishing which of these levels the error is made, given the need to be brief and concise, and also, given the difficulties that this type of distinction would bring in this context, we will treat the errors under discussion as a whole and in a figurative form to facilitate communication.

The Superficiality of Science

Some readers will be shocked by the assertion that there is superficiality in science. We understand.

It is true that in science the restlessness of deepening is pressing. The concern of going deeper and deeper is a constant and leaves no scientist indifferent. It's true.

However, a line is infinite, but there's only one direction. Two ways, but one direction. At the beginning of this work, we were careful to draw attention to the existence of multiple directions, infinite directions, *n*. We talked in depth, width, length and... time.

Nevertheless, the deeper we go, the more we tend to close the angle of vision, to restrict the length and even the times when the phenomenon is considered. It is a classic, even a cliché, the statement that in science we seek to "*know more and more about less until we know everything about nothing*" It is the responsibility for those who claim it.

Man has limitations with the number of senses he possesses... that we have selected through the ages (millions of years, we repeat ourselves). But there are not only five as for a long time it has been stated, there are many more. And today, with the equipment we have, sensors and information processing capability that allows the most varied combinations, with an almost infinite capacity of accumulation of knowledge and its communication, to which is added an ability to quantify that goes from the tiny to the enormous, with discriminations that you would not even dream of a few years ago (months?), the potential has no end.

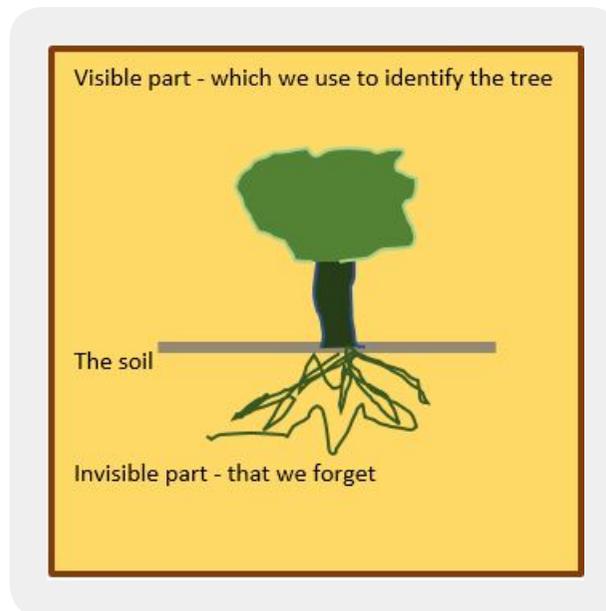
The variables (which constitute dimensions), also have a multitude of indicators, direct or indirect.

The real difficulties lie in man. In the man who is (in the triple relationship phenomenon / sign / observer, as Einstein proposal) the observer, but also part of the phenomenon, with the dialectics that establishes in the context of which he is an integral part (and not a neutral and external observer as some intend to contrast him to the context and nature), and still an integral part of the phenomenon because, even if he uses equipment as intermediaries, as we stated above, and at any time will be the interpreter and defining which the type of employment will have the readings carried out.

In the figurative example we present below we have the representation of a tree that can constitute a "functional unit", a life structure, with dimensions that allow it to perform in the different components it needs and that to be understood implies the collaboration of multiple scientific areas. But the tree is an individual with a global dynamic that has to be understood as a whole.

That can be inserted in a forest, or be isolated, in fertile or otherwise arid lands.

The characteristics it gains show that in addition to an internal life it establishes dialectics with the outside. For a long time, we ignored that life, even from a tree, is all this.



Each of the tree components has its own characteristics, not only on the outside, but also inside.

The whole constitutes a “functional unit”, with the ability to create an internal dynamic and to relate dialectically with the outside.

If the sap does not circulate the tree dies, if it ceases to coordinate with outside in normal situations, it will die too.

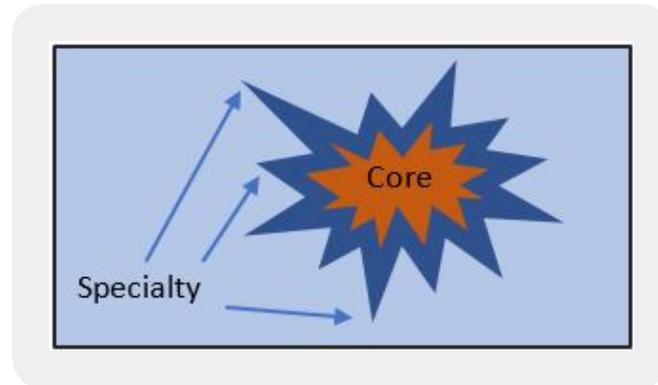
Science, in order to perform its functions, has to be understood as a functional whole and not only by some fruits it eventually produces or by the branch that is most visible.

The Mistake of the Specialty in Science

The specialization of scientists, and even the areas of knowledge, does not imply their isolation.

It is a mistake not to realize that the whole loses functionality (features?) when it goes from simple dimensions (such as the line to which we refer above) to a volume capable of treating not only the singular part, as well as the whole (of the individualities that exist in it which constitute people in the etymological sense of the term, this is individuality, expect, - which does not imply “human being”, as it was believed in another context, because then “*man, a superior being, was the only capable of functional performance...*” - we warned, above, that it is bursting “... *there are always aspects of the previous conception that are authentic conceptual pitfalls that prolong the crisis and require strategies that promote the necessary evolution and transformation ...*”) and its dynamics.

The trend, within the current (still) dynamics is for specialties to divide from the core. Because the volume of information grows exponentially and the ability to treat it, although the available means that are extremely powerful, cannot keep up with the process. Especially in its component the “man”.



However, as in the tree above, we must meet the global dynamics and find answers to the dialectics that are established and cannot be ignored. The advantages to ignore, the ignorance of some aspects that we refer to above are lost when the coherence of the whole and its balances are affected.

In the operationalization we must recognize that there are more favorable periods for science to evolve. As it is when the needs are pressing (a war, for example).

And times when it is more difficult to evolve for example, because there are other problems that attract attention like social crisis, economic, ... or a war (yes war too - right and wrong is in balance and coherence, not in more or less, we can be wrong when we say this and the opposite because if there is no balance and coherence ... everything will be unbalance).

An Error of Evaluation in Science and Its Implications

Social structuring is another constraint that we cannot ignore.

Almost as a sum of the previous two points, isolation in areas of knowledge with seemingly closed dynamics is a mistake, because the whole considered is just a part of the global whole. But we must not make the mistake to think that the whole considered is the global whole. It is true it is complex but above all confusing. But it is what we have. We isolated a field, or an area of knowledge to facilitate, but the global whole is ... global, and if we want to evaluate the results obtained, they can be in another “considered whole”. An example, as you can see others bellow - if you evaluate the results in education, you may find then in the life of the student, or in society, if you restrict yourself to the field of education you will make an assessment based on the myths of education (what would be okay if you think based on one dimension but no longer if you are based on more dimensions see dimensions above).

If there is a rupture (see Kuhn), a new paradigm, the previous evaluation processes may have become outdated, because we will have to estimate other competencies, with their own evaluation criteria and different meanings.

We give a few examples just to realize the meaning and implications of the change that needs to be considered in a break:

- In economy - the Gross Domestic Product (GDP) of a country (the country will still be the reference space in which the change falls?) still loses the sense of being as a criterion for assessing economic developments. See how today the ten largest world economies are not represented in the framework of the ten countries with the highest Gross Product Per Capita.

But won't we have to use indicators that measure change rather than "gross product", whatever it is? The ability to innovate, to transform, to create added value today will have more meaning as indicators of enrichment, although GDP is still the reference value with more weight. See how, today, the demographics are in *counter-cycle* with the values of the Product Per Capita, but with automation, computerization, robotization, etc., this difference will still, of course, increase.

When we stop thinking in terms of employment for work, and in terms of the amount of work for production, we will have profound changes in the concept of retirement, "working age", productive income, etc.

Legislation and regulations will have to adapt, or on the contrary will be a key factor in halting the transformation process (it will no longer be the evolutionary process, a concept that will gain other meanings):

- In education - one of the areas, or perhaps even the scope, in which the rupture is lagging behind, due to its cycles being very long (roughly three generations - the one that idealizes change, the formation of the agents of change, teachers, ..., and the generation that is transformed and educated already in the context of the rupture made), within the current dynamics and structures (which will have to adjust also, because they are not bearable within the current pace of change), the skills to acquire (or to develop changing the teaching to learn, the mastery of a know-how to conceive / realize);
- In health - national or private health systems (which are now the disease systems - because they focus on patients, on disease, and not on health implementation), they will certainly have to adjust to be able to efficiently integrate the technological capabilities already available and rapidly growing, which may imply changes in the structure, in the dynamics, in the legislation, in the strategies, even in priority diseases and in the concept of life ... and dead;
- In sport - the international "number of medals" (will the country still remain the reference space in which the change is framed?) is it also a reliable indicator for assessing the potential and capabilities of a sports system? Or does it mean a "specialization" that promotes the "fittest" for sports (of the industrial era, of its beginning, and which, therefore, naturally, request capabilities from that period, although there is often no concrete notion that this will happen?) in vogue, and to foment the bench screamers or the sofa hibernator?
- In science - the "number of publications" and similar indicators, in a framework that has adapted to the rules (not always objective and also made to the taste of sectoral interests) in order to exploit the advantages that the different alternatives offer, will no longer be the best of the indicators. The promotion of a framework capable of yielding the increase in resources (human, material, instrumental, technological, etc.) implies abandoning or reformulating, many of the "normal practices", in a rethinking of the whole that allows the construction of coherences and balances adjusted to the dynamics that are imposed in the new conditions.

In a general picture like the one that we leave here a brief outline, or something similar, we will have to:

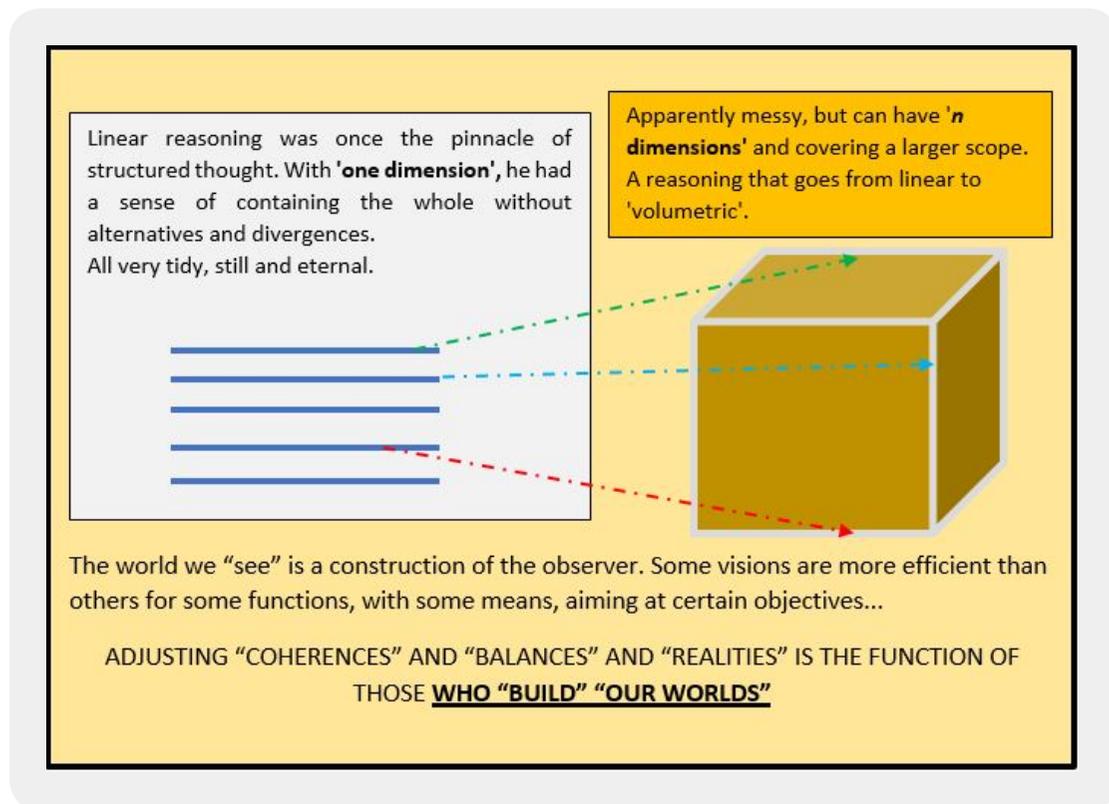
- Education will have to be evaluated by the effects it has, for example on Health, Science, Quality of Life, etc.;
- The Economy will have to be evaluated by the effects it has, for example, on availability in Education, on the capacity of Industry, on supply in the Market.
- Science will have to be evaluated by the effects it has, for example, on Innovation, Industry, Education, the accumulation of structuring knowledge, ...;
- ...

There is talk (in general, but we need to go to realization, conceptualizing first, but then operationalizing) in a dynamic framework, in rupture, in innovation, ..., but what we see is discourse, in which the old (and may be outdated) concepts and conceptions are discussed in recombination's that do not consider the specificities of the problems we are discussing today and the reconstruction of the contexts in which we may be in the future. Strategies, tactics, operating modes, technologies, ..., have to adjust to the objectives targeted, the resources (materials, conceptual, etc.), the contexts, the times, ..., because all of them are structuring in the coherences and balances that generate the "fluidity" of the processes and the yields that can be obtained by reducing costs and, simultaneously, by increasing the benefits earned. Not forgetting that all these terms have n dimensions (of which we must select the most convenient ones, as far as is possible) and the conceptions that we have of them evolve and transform according to the attractors that greater (better) "forces" (*lato senso*, metaphorically) can exercise.

Building the Future in a Prospective Framework

An Underlying Area - Targeting the Causes and Not the Consequences

Adapting to the context and its requirements we have been publishing within the existing norms and conditionings, but with the concern of performing a conceptual work that responds in its entirety to what we think of as "the new normal" of "break" who replied to "crisis" (see Kuhn) from which we have submit through of an image:



Following what Ian Hacking suggests, on the importance of instruments, tools (conceptual and material), for the construction of change, we seek to structure a framework of foundations (the bedrock) for a proposal of rupture that we will present in the form of a book (the dimension requires it) under the title "THE NEXT DECISIVE TECHNOLOGICAL LEAP".

A "Conceptual Cube"

And the Indication of Some of the Parts That Define It

As we have defended above, the discourse is not enough, it is necessary to present proposals for the rupture, to debate them, to defend them and to select the most apt ones to look for their implementation and operationalization.

We could not simply present the positions we have defended above and wait for the speech to take shape.

Nor can we ignore the coherence and balance that Thomas Kuhn defended without considering the globality of his proposal and the breadth of the positions he took. Coherence and balance are not in some aspects of a proposal, and even more so, when that proposal focuses on "the logic of scientific revolutions".

In this way, and in order to facilitate access to the reader, we leave here the indication of some complementary works that we've published, which will serve as foundations for the publication that we have indicated

above, the book under the title “*THE NEXT DECISIVE TECHNOLOGICAL LEAP*”, in which we present proposal of tools for the realization of the rupture by the understanding of man in terms of the causalities that are at the base of its functionality, the foundations of the transformations that occurred in the evolutionary process that, of course, continues today.

We have, therefore, some examples and dominance in the treated topic:

➤ **About the Foundation and Structuring**

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➤ **On Operationalization, Conceptual Tools**

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➤ **About the Justification of the Rupture**

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➤ **On the Framework and Definition of the New Paradigm**

Almada, F., Fernando, C., Lopes, H. & Vicente, A. (2019). For a Vision of Man in a Dynamic Framework: Promote Equilibrium Versus Add or Remove 'Parts' - Facts, Strategies and Operational Modes. *Orthopaedic Surgery and Traumatology*, 2(5), 407-416.

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