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TRILHA PRINCIPAL

Scientific collaboration: genuine and false motivators

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***Abstract* — Here, I emphasize the need for collaborative research among scientists. Such collaboration should aim to address the genuine integrative need to build knowledge rather than searching for visibility based on the international prestige of a collaborator, increased productivity, or funding. Scientists must provide a valid and honest counterpart, such as a solid scientific proposal and performance, and avoid opportunistic motivators.**

***Keywords* – Science, Cooperation, Research Funding**

I. INTRODUCTION

Every year, there has been an increase in the need for integration among scientists to develop broader research, a process that has been greatly favored by globalization and the development of new communication technologies. Further recommended reading on this topic is the book by Shrum et al. (2007); these authors analyze the causes of scientific collaboration, mostly in technology-related scenarios. Here, I focus on philosophical bases.

The terms collaboration and cooperation are often used interchangeably, but they are different ways of contributing to a group. Each has its own dynamics and forms, shaping research groups in different ways. In a collaborative (co-labor) process, people work together toward a shared goal. For example, consider competitive rowing, in which rowers propel the same boat, pursuing a unique goal. In a cooperative process, however, people perform together (toward a group goal) while also working on an individual goal. For example, on a chess team composed of four players, in a team competition, each player will perform his/her own play (the individual goal), but the result of the competition is based on the number of winners per team (the group goal). In science, both collaboration and cooperation are elements of the processes of building knowledge. For my purposes, collaboration is preferable, but whenever needed, the differentiation highlighted above will be clear.

Although collaboration is natural in science, this practice, motivated by a very competitive scenario and technical (narrow) views of science, has distorted the genuine search for scientific collaboration. In this article, I present my evaluation of several motivators of partnerships and genuine mechanisms that can facilitate these interactions in an ethical scientific environment from an academic point of view. This approach was chosen because science cannot counteract its philosophical background. This choice might be a way to ensure good scientific conduct in a world that does not always foster such attitudes.

II. WHY COLLABORATION IN SCIENCE?

Science is a human tool that allows us to satisfactorily understand and to partly control the natural world (the world counteracting the supernatural world). In the history of science, we often hear about scientists who had certain mastery in many different areas, such as philosophy, mathematics, physics, and biology, including Aristotle and Leonardo Da Vinci. During their time, such a general trajectory was possible because the volume of knowledge in the various areas was still limited (from our current perspective).

The exponential growth in knowledge that we have been experiencing since the 20th century is gradually leading scientists to specialization. In certain moments in history, the specialist has assumed the posture of God or Oracle. However, scientific restlessness increasingly raises questions that cannot be answered by one specialist. A historical example is the unraveling of the molecular structure of DNA. The partnership of a U.S. biologist (James Dewey Watson) and an English physicist (Harry Compton Crick) on the same issue was important to decipher the molecular structure of nucleic acids and its significance to information transfer in living material, which earned them the Nobel Prize in Physiology or Medicine in 1962.

In the scientific process, the main steps are decidedly affected by collaboration among scientists. The first step is the creation of a research project. This phase's mechanisms are poorly understood, but creativity and boldness in research

proposals make a big difference. The step of establishing appropriate methodologies for the proposed objectives is next. At this time, the scientist often is faced with a lack of equipment, the need to reach a remote area, or a need for biological materials that are not easily available, among other challenges. Data collection is the next step, followed by data analysis. It is here that the scientist should look for ways to interpret (explain) the data. It was at this stage, for example, that Watson and Crick mainly showed their genius and collaboration. It was also here that Charles Darwin (the father of natural selection, who proposed the theory of evolution of living organisms) excelled over Lamarck. Darwin had essentially the same factual knowledge as Lamarck, as both tried to explain the diversity of forms of living organisms. The notion of evolution was old (from Anaximander, a pre-Socratic Greek philosopher from Mileus, c. 610 to c. 546 BC), but the mechanism of evolution was still a mystery, an issue that prevented the theory of evolution from being widely accepted. Darwin proposed an interpretation that proves valid today, which gave him great scientific merit. The data analysis is the stage in which the scientist reveals or corroborates the complete story that he/she is proposing.

In these three stages (research design, research development, and data analysis), collaboration becomes implicitly important in science. This importance is increasingly enhanced because complex problems posed by much data from specialties require explanations beyond the purview of the specialty. Dialogue between scientists from different fields is increasingly necessary. Collaboration among scientists can occur even in a narrower research environment, but it is mostly needed in areas using multidisciplinary approaches.

Based on the Cartesian method, to produce science, we need analysis (to divide the whole into parts) and synthesis (to join the parts to form the whole). In this approach, it is evident that the whole reconstructed from the sum of the parts might not be the same as initially imagined. This reconstruction may lead to new ideas, showing novelty and unusualness in science. Apparently, the science of analysis has developed rapidly, but the necessary synthesis has been slower. The various scientific subjects taught in schools attest to the difficulty of working the entire body of scientific knowledge. Postgraduate courses continue to reinforce this scenario, particularly when the interests of students usually lead them to focus on disciplines closer to their specialties. These students graduate as the scientists of tomorrow, and the process continues.

Thus, we see that collaboration between scientists from the same or different specialties is a completely necessary activity that is consistent with the process of “doing science”. This concept reinforces that the natural world (including the human social world) is a complex of parts that can be viewed from different angles. Our understanding is not tied to any theory or a single prism of vision but may require synergisms and antagonisms among approaches. This idea is natural and obvious and should be the most important motivator of scientists in any collaborative venture!

III. FALSE MOTIVATORS OF SCIENTIFIC COLLABORATION

A. International Prestige

The purpose of adding status to the activity is a poor motivator for collaboration. This practice can achieve results but demonstrates the incompetence of its supporters. Unfortunately, this motivator has recently been touted by certain “managers” of science in Brazil. For example, when told to attain visibility abroad, Brazilian scientists try to establish collaboration (co-authorship) with important personalities in the international scientific community. Obtaining results in this way does not necessarily lead to scientific improvement. Such proposals certainly attest to our incompetence and seek to teach us the famous “Brazilian way” to achieve success. You should not seek collaboration simply because one scientist, one laboratory, or one country adds value through authority. The amount expected to be added must be related to content, solutions, and learning.

B. Increased Productivity

As mentioned above, certain collaborations will raise our visibility, which can increase our scientific efficiency (productivity). However, the increase in productivity should be the result of collaborative attitudes and not the motivator of collaboration. As I stated in the Introduction, collaboration is a natural process in the search for scientific knowledge. It is from this knowledge that productivity may arise naturally.

C. Meeting the Demand of Research Funding

A universal approach that is relatively common in Brazil is a rush to respond to announcements of research funding by agencies—research and collaboration on demand! Such notices become the motivation for research and collaboration between groups. Research projects are idealized and planned according to the chance of getting financial support. It is obvious that this occurs naturally and is a way through which funders of science and technology can guide the direction of science according to their interests. However, this motivation makes the researcher a co-adjuvant, rather than the protagonist, of the work. Instead, projects should be set according to the researcher’s scientific curiosity and weighted by elements of social responsibility. Announcements of financial support should give us the chance to run several of our projects. Collaboration is then a consequence of the requirements of our research and inquiry, and not the main aim. Scientific collaboration is the result of scientific motivators and not a means to obtaining funds.

IV. GENUINE MECHANISMS FOR ESTABLISHING SCIENTIFIC COLLABORATION

The basic assumption is that in collaboration, scientists gather to solve complex scientific issues. Everything that is not consistent with this assumption should be excluded as a

requirement or academic motivator of scientific collaboration. In this framework, how can we enter sound international science, building genuine collaborations?

A. Have Solid Scientific Proposals

Solid research groups, in which people are usually interested when establishing scientific collaboration, are coordinated by scientists of solid training. Thus, to add to a group in a genuine collaborative process, you should also have strong training. I do not mean aggregation of pure learning, but rather scientific collaboration among scientists. There is only one true way to achieve this aim: learning high-quality science and its philosophical and methodological foundations. It is exactly from these foundations of science that we learn to construct scientific knowledge and to define our capabilities and limitations in such a journey. In this way of collaboration, you offer good science and receive good science.

B. Avoid Opportunism (including funding opportunities, fame, and publication)

Focus on the genuine pursuit of knowledge. You need not be naive, but you should not be opportunistic. Look for contacts with solid scientific proposals. To select such contacts, you will most likely need to evaluate the scientific profile of the group or scientist based on their publications. Why does the opposite not occur? Why not have a competent set of publications to submit? Two decades ago, when publications were not disseminated on the Internet, when scientists visited other researchers abroad, they gave their hosts several of their best reprints (papers) as a type of "business card". This genuine conversation in science has evolved over the years.

C. Make a Responsible Schedule for the Research Project

One prerequisite for collaboration among scientists is that everyone does his/her own part competently. Unfortunately, in Brazil, scheduling delays are more the rule than the exception. Thus, only a few groups can aggregate and participate in international science. Competent performance expects that agreements are met with no excuses. This requirement directs the continuity or dissolution of collaborations. Remember that achieving collaboration is easier than maintaining it.

D. Provide a Counterpart (curriculum and research)

Considering the scientific expertise already discussed in this text, we can still collaborate based on the particularities of our country. We have a climate, natural conditions, and certain details that are typical here that can greatly facilitate partnerships. In this regard, I highlight the National Institute of Amazonian Research, or INPA. This institute is highly sought after by high-level foreign scientists from the biological area. Beyond the competence of this institute, the word "Amazonian" surely adds much value. The Amazon is a region that much of the world is watching. However, we must not believe that national facilities are only facilitators for foreigners doing research here. Such facilities should add value to our own scientific value.

E. Ensure Intellectual Participation

Reinforcing what I have been saying in this text, take care that you are not only a data collector or a doorman in an interesting environment. Collaboration among scientists should involve contributing in similar ways for the construction of scientific knowledge.

V. CONCLUSION

Science presupposes collaboration in various stages of scientific activity. If we do not lose our scientific direction, collaboration becomes natural. Achieving scientific collaboration is not very difficult. In many areas, Brazilian scientists may still be seen by rich countries as people from an underdeveloped country who want to obtain certain value by associating with reputed international research groups. We must change this framework. Therefore, we have only one genuine path: improving our scientific quality. I am thus worried about many of our science managers, who focus more on collaboration than on quality in Brazilian science. It is true that collaboration is a way of learning, but we certainly should also have good perspectives on improving the quality of science in our country. However, this process should start with high-quality education, a goal that is still far off in Brazil.

REFERENCE

[1] W. Shrum, J. Genuth, I. Chompalov, *Structure of Scientific Collaboration*. Cambridge, Massachusetts; London, England: MIT Press, 2007, 280 p.

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