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science speaks. A philosophical text that is totally involved in raising questions without answering them can be easily accepted regardless of the amount of doubt it may cause, while a scientific report can't be accepted as worth of interest if it doesn't affirm or deny anything.

The criteria that make a scientific report worth reading from the common point of view mean that, this report is giving answers. This observation is true for the three domains, science, religion and politics. The psychology of the public mind tends to believe those religious men, scientists and politicians who are more courageous in giving answers; more precisely, those who seem to be more confident in doing that, even if such kind of behavior is epistemologically forbidden or at least suspicious. This point which groups science, politics and religion in one category, explains clearly the religious- like adoption of some scientific. Science –although being so different from religion- becomes something like religion when commonly and zealously adopted. As we have seen before, the main point of conflict that separates religious and scientific attitudes is that, while the first contain faith the other is free of it; but when the scientific theory turns to be a subject of a common interest, or let's say when it is adopted by the common mind it is adopted as a faith, the point which shouldn't be easily neglected when dealing with the scientific text. An example of this tendency of scientific and political theories to turn into faiths the moment they are adopted by the common is clearly observable in the historical case of the way Marxism was adopted. In 1920 Bertrand Russell returned from visiting USSR to write "The theory and practice of Bolshevism" and to "describe Marxism –Leninism as a new secular Islam"¹¹.

In short, the dogmatic content of science when turns to be faith as a result of being commonly adopted gives another reason to suspect the credibility of public scientific reports.

Conclusion:

To sum up, in this article, I asked the question whether we are justified in trusting public scientific reports or not. I made a distinction between the scientific truth before and after it is presented to the common, or let's say between what we can call the isolated scientific observation as performed by the scientist himself and the published scientific report. The aim of this distinction was to prove that the scientific information suffers during the process of communicating it to the common from serious changes that can damage it in an irreparable way. The many discussed difficulties that challenge the reliability of scientific reports enable us to ask the question whether we can anymore trust scientists when they claim telling the truth, the whole truth and nothing but the truth.

Dawkins, 1997). However, despite of this fundamental conflict, science and religion share a significant point: each of them is required or at least is expected to give final answers to the most crucial human inquiries. This belief in the ability of science or religion to provide the most satisfying answers is what divides out theoretical attitudes into religious and scientific attitudes (and in some cases to scientific- religious attitudes).

Now even though the claim that any attitude is capable of providing final answers is more controversial to be accepted; science as well as religion derives their credibility from implicitly holding such a claim; because at the end of the day, any religion can gain the trust of his followers by depending on the allegation that the answers provided by this specific religion or doctrine is strong enough to face and defeat the answers provided by other competing religions or denominations. The same applies to science; any scientific theory can be adopted by the audience if proven to survive the competition from other available scientific theories.

No matter how any scientist tries to be objective in presenting his theory, at least a certain minimum degree of certainty- calming is needed to turn the isolated scientific proposal into socially accepted phenomena. To make it clearer, let us put it this way, claiming certainty is required even if this certainty was not quite approachable. Now, if certainty was beyond what any scientific theory can reach, does that mean that we have been cheated on by those scientific attitudes who maintain presenting final answers to our main questions? Again, this is a new epistemological difficulty that can profound the problem regarding the reliability of the scientific text more. This time the problem is caused by the nature of the scientific answer itself. This can be made clearer if we compare the way in which science deals with human concerns and the way philosophy deals with them, because while philosophy is more interested in asking questions, science is more interested in answering them. Since Plato, philosophers seem to be discussing the same issues without reaching any satisfactory results, and even the same discussions can be held again and again without breaking by doing that the rules of the philosophical investigation. In other words there is nothing in the philosophical discussion to be dismissed as absolutely wrong – except of course the cases of obvious violation of logic- . In philosophy, there is nothing to be walked over as being obsolete. Aristotle's views on physics are still philosophically interesting despite of their scientific inadequacy. In philosophy, the originality of the human intelligence is more crystallized in the sort of questions that can be asked. On the other hand, science as well as religion is asked and required to give answers. They should go beyond the scope of questions to the wider scope of answering them. And unlike philosophy, each new answer should be strong and convincing enough to overcome the previous answer provided by the other theories.

Now, the gap between the degree of certainty that any scientific theory can afford and the degree it should claim affording - to be good enough to survive the competing theories- is what makes room for the suspension that what scientists know is different from what they claim they know. To illustrate more, let's go back again to our comparison between the language philosophy speaks and the language

overlooking some details; but these taken for granted-details, dismissed in the process of simplification turn the final version of the offered theory to a project different from the original project before it is transformed into a publishing material. What complicates the problem more, is the fact that this process, namely the process of simplification, occurs twice, doubling by doing that the changing effect, because this process is applied not only by the expert who tries to make his work more popular and more readable by his audience, but also practiced by the reader, who by his turn applies his own act of simplification- which varies according to his level- pushing by doing so the theory from a first to a second level of simplification.

e. Masking disagreements among experts:

In his paper "Masking disagreements among experts", John Beatty says, "scientific experts often explicitly or implicitly agree to withhold information when they accept the position they report" (Beatty, 2006, p 52). As he makes clear, this "joint acceptance" is consistent with considerable disagreement among group members. Disagreements are hid from audience for the sake of them, exactly as parents may hide their disagreements about how to raise their kids for the sake of these kids and for appearing as having a more unified position. But this behavior, when scientifically practiced, makes it completely plausible to suspect the credibility of the overall represented position.

One might argue that simple differences between scientists can be easily neglected without having to worry about them if the purpose is to end up by a homogeneous unified theoretical position. But even this line of argument can face the difficulty of figuring out the way in which we can exactly demarcate the degree and the size of disagreement after which the disagreement is no more considered as being "small". In addition, another question one might ask is, what justification do scientists really have to leave behind small and not big differences? In his paper, "How do biologists argue like they do?" John Beatty asks the question, "The question remains, why extreme differences in relative significance should be worth arguing about and small differences not." (Beatty, 1987,S439)

f. Science, religion and the final answers:

Certainly, it would not be fair to claim that science is similar to religion. The two phenomena are historically and fundamentally separate and the dissension between both of them seems to be still ongoing towards more irreconcilable conflicts. In addition, despite the many promising attempts to achieve the missing reconciliation between religious and scientific attitudes, the belief that the gap between the two is going wider and wider is the mostly dominant convention. John Worrall in his paper "Does science discredit religion?" expresses this convention by saying, "There is no way in which you can be both properly scientifically-minded and a true religious believer." (Worrall). Richard Dawkins highlights one huge divergence by saying, "Science is not religion and it doesn't just come down to faith. Although it has many of religion's virtues, it has none of its vices. Science is based upon verifiable evidence. Religious faith not only lacks evidence, its independence from evidence is its pride and joy, shouted from the rooftops." (

bigger as long as the process of simplification is left to the personal choices of the scientific writers, and as long as there is no certain criteria to figure out the red lines after which scientists can't go beyond in their simplification behavior. John Beatty refers to this problem by saying, "Even if simplification and joint acceptance are in fact common features of expert committee reports, one might still find unfortunate the effect that they have in reinforcing the epistemological gap between experts and the lay public"⁴. (Beatty, 2006, p 56)

In the process of simplification, there are two kinds of information: the explicit information, which is exposed as the main result of what the scientist was working on, and the implicit information which is withheld or at least abbreviated for being accidental and for having nothing to do with the essential substance of the offered scientific theory. Unfortunately, in a considerable number of cases, the neglected part turns to have consequences even more fundamental than the highlighted part itself. To illustrate this point more, let's take the case of new discovered medicines in medical research. The problem of neglecting some parts of the research in favor of others in the medical research, as a kind of a simplifying behavior, can be found in the repeating tragedy of the unconsidered dangerous side effects of many drugs offered on daily bases in medicine markets. In such cases, the problem is not due to the scientific ignorance of those side effects, rather, it is due to the unjustifiable division of the results of the research to: major results, which are to be focused on and published, and minor results, which are to be abbreviated in the process of simplification, for having very little role to play if compared to the role played by the first kind of results.

In many cases, minor effects of the newly discovered medicine are neglected in favor of the major effects, therefore; when the minor effects play the essential role problems occur. Let's take an example; Trasyolol 5 is a drug that has been on the market for more than 14 years. Eventually, it was discovered to be responsible of contributing to the deaths of thousands of patients. This drug was basically made by Bayer to be given in the operation room to control bleeding. In 2006 a study showed widespread death associated with Trasyolol, to be eventually taken off the market although the concerns about this drug go back to the early 1980's. However, the tragedy had taken place, and for my paper's purpose the side that I am going to highlight is not whom to blame or how to avoid such things from happening in future, rather, I will focus only on the epistemological side of the case; because, in this case, as many other cases all over the world, what happened is that some effects of the drug were overlooked in the process of simplification for making more room for those effects, taken to be the more essential ones. Those unnoticed side effects of the drug turned out to be responsible of the whole case. Dr. Juergen Fisher, the director of the institute of experimental medicine at the University of Cologne wrote after finding severe kidney damage in animals that were given the drug, "I felt that Bayer wasn't interested to examine these side effects".

It is common for any theory to focus only on some sides even if this commonly held scientific practice threatened the whole theory by a high probability of

As we have seen, the scientific writer changes his style of writing to fit more the audience he is addressing his work to. However, it is not only the nature of the audience or even the scientific text which plays the essential part in deciding what style is to be chosen for expressing it; rather, it is the character of the scientific writer who chooses from the unlimited possibilities the best way to present his work.

However, if the style dominating scientific reporting is a matter of a personal choice, this means that the alleged objective content of the same scientific information will be a subject of changes when reported by more than one party, more importantly those changes will have nothing to do with the objectivity of the reported information.

d. Oversimplification of scientific information:

This problem is the other face of the same problem discussed earlier as the problem of the complexity of scientific knowledge. In other words, the oversimplification observed in some scientific reports comes as a reaction to the fear of the misunderstanding that can come out as a result of the complexity of the scientific theory. In his paper “Masking disagreements among experts”, John Beatty argues for the asymmetry between scientific experts and the lay public. For him, this asymmetry is mainly caused by two factors; first; simplification which I am going to discuss here and second; the so-called “joint acceptance” between scientists which I am going to discuss in the following paragraph. Jointly, these two factors form the gap that exists between what scientists know and what we know; more precisely: between what they know and what we think they know. For Beatty, this difficulties end by variable degrees of “withholding of information from the public” (Beatty, 2006, p52).

To sum up the problem, scientific information can be so difficult to be put in words; therefore, it should be –when presented to the public- put in a general frame of readable terms that can be easily interpreted by the audience. But the question here will be, to what extent can this simplification affect the scientific truth itself? Are all truths equally able to be simplified without affecting their content? What about the details that can be neglected during the process of simplification and appear later on to be more essential than what was presented? Science speaks the language of charts, diagrams and comparisons to illustrate phenomena that can be sometimes even beyond expectations, and try to reduce the natural unorganized chaos to an artificial organized readable data. This can help with no doubt expand our control on the world we are living in, but epistemologically speaking, do all the mentioned refinements we continuously apply to the scientific text leave a place to believe that the scientific outcome as we absorb matches the scientist’s original observation?

Roughly speaking, there is a degree of complexity after which, the information publicly presented is no more easily readable and understandable. Consequently, simplification appears as an unavoidable step. However, the necessity of simplification when not that applicable in some cases, suggests further worries regarding the accuracy of scientific information. The problem grows bigger and

published; here, I am arguing for different levels of interpretation as can be applied to the same information. These facts transfer-if fully taken by consideration- the problematic nature of writing a scientific report to a more sophisticated level. Because, it is not just that the scientific report should be interpreted; furthermore it can be also interpreted in so many different ways, and the question remains; whose interpretation is right and whose interpretation is wrong?

Roughly speaking, when the scientific expert holds his research, he holds it solely without taking in his consideration any criteria other than the criteria required by the scientific process itself. But when it comes to the announcement of the results of this research, any scientist can find himself obliged to put it in the way that can be both more readable and more convincing for his audience, whatever the nature of this audience might be. George D. Gopen & Judith A. swan asserts this point by writing, "It may seem obvious that a scientific document is incomplete without the interpretation of the writer; it may not be so obvious that the document cannot "exist" without the interpretation of each reader" (George D. Gopen & Judith A. swan, 1990, P16).

Scientists' work alone, but do announce their results while having others in mind; this fact makes it urgent to answer the question: who are those others? As a matter of fact, the nature of the answer can be of a crucial importance in deciding the way in which the scientific report will be received, because amongst the unlimited and even the unexpected varieties of the levels of those who will be interested in the scientific report, just one level will be able of grasping what is really meant by the information released through the published data. This level will be determined by the audience the scientist had in mind as his targeted audience.

Now, more paradoxical questions can be asked here regarding the way in which any scientist identifies exactly the level or the audience he is going to address, and the strategies he is going to adopt for communicating with it. Questions can even be asked about what changes a scientist should apply to released information to be ideally accepted by targeted audience. Obviously, even the identification of what can best be the targeted audience can be a controversial issue; because options can vary unpredictably. Some scientists might be merely interested in other scientists in the same field of specialization? Some might be interested in the wider circle that includes other scientists working in other fields? Or the scientist's targeted audience might pragmatically consist of vast crowds of the common who can support their preferable scientific projects? Or the elite of those who own the financial or the political power needed for approving the fund for some chosen scientific research.

In short, what I want to make clear here is the difference between writing science and writing science while having someone in mind; because the gap that exists between writing and writing for a specific reader involves changes in the content of the scientific knowledge itself, changes that can be sometimes more fundamental to be simply accepted as "scientific".

c. Difficulties related to the personal style of writing:

environment the results must be addressed to? Are they colleges in the same field of specialization, or is it simply the wider surrounding scientific community? Also, in what ways do scientists change their outcomes before presenting them to the public? How can such an alteration affect the structure of the scientific truth after this truth takes the shape of a report? In other words, how can the transformation of the scientific knowledge, from the darkness of the laboratories to the dazzling lightness of scientific conferences affect the core of this knowledge?

However, out of all these questions, the most important question to be answered is about the degree of which we can trust scientists when they claim they are telling us the truth; this question which will be the main concern of this article.

Difficulties of reporting scientific research:

a. Complexity:

It is commonly believed, that science by its very own nature is hard to read. Scientific reports and the academic language they use for explaining their data is more abstract to be understood by the non-expert. Consequently, interpretation appears as a necessity, which without, the scientific report becomes absolutely vulnerable to all kinds of misunderstanding. Scientific theories are notorious for easily becoming a subject to all kinds of misunderstandings and misinterpretations when not being explained by the qualified experts. This problem is more commonly observed when a specific piece of scientific knowledge turns from being a report to an issue of a public interest.

The complexity of the scientific knowledge is an essential element that limits to the minimum the scientists' ability of producing readable as well as accurate reports. This difficulty -despite being widely accepted- was challenged by some as being unfair. In their paper, George D. Gopen and Judith A. swan acknowledge one difficulty of writing scientific reports by saying, "We cannot succeed in making even a single sentence mean one and only one thing; we can only increase the odds that a large majority of readers will tend to interpret our discourse according to our intentions." (George D. Gopen & Judith A. swan, 1990, P7). Therefore, in their paper they introduced some strategies and technicalities that can be used by the scientific writer to make his work more "easily interpreted" by the reader without affecting the complexity of the scientific knowledge. Now, even if we accept such an argument, the need for an interpretation for the scientific report forms by itself a sufficient reason to raise the doubt whether the way we read, and more importantly the way we interpret, the scientific report makes a matching copy of what the scientist originally had in mind when he wrote what we read.

b. Audience related difficulties :

Scientific information is not just written, rather, it is written to be read and to be received by certain audience. Therefore, the variety of the levels of those whom the scientific report will be addressed to affects the way according to the same scientific report should be presented. In other words, if we have argued in favor of the complexity of the scientific knowledge as a major difficulty, which makes interpretation an essential need to make this knowledge understandable when

SCIENTIFIC LANGUAGE CREDIBILITY:

A PHILOSOPHICAL INVESTIGATION

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الاشكالية الفلسفية لموثوقية اللغة العلمية

ملخص

يتناول البحث صعوبات استخدام اللغة العلمية التي تواجه الباحث عند صياغة نتائج أبحاثه بهدف تقديمها للعامة. ويشير البحث إلى صعوبات تصل في الجدية إلى حد يجعل من التساؤل الفلسفي عن موثوقية اللغة المستخدمة لصياغة التقارير العلمية ضرورة ملحة. كما يؤكد البحث على خضوع المادة العلمية لعدة مستويات من التغيرات عند صياغتها كمادة قابلة للنشر قد تصل في عمقها إلى حد تغيير مضمون المادة العلمية- أي كما كانت قبل تسويقها للرأي العام-. هذا البحث يوضح بعضاً من هذه الإشكالات بهدف إلقاء مزيد من الضوء على الإشكالية الفلسفية لموثوقية لغة التقارير العلمية.

Abstract

This article discusses difficulties of communicating scientific knowledge. It argues for the seriousness of those difficulties to the degree that can affect the reliability and credibility of scientific reporting, especially when it comes to reporting to the public. As I argue in this article, scientific knowledge becomes apt to many kinds of changes when introduced to the public; some of these changes are serious enough to raise questions regarding the authenticity of the scientific content. In the paper, I explain those difficulties and call to question the philosophical reasons we have to trust scientific public language.

With no doubt, scientific writing is not like any other kind of writing. The many difficulties that may face any scientist when decides to write, more precisely speaking, when decides to write for the public, causes a problematic kind of change, the change that takes place when the scientific project turns from being an isolated personal effort that takes place in isolated laboratories to a public industry, after the results of this effort are published.

Difficulties of scientific reporting are more related to the process of introducing the scientific research results to the public than being related to the production of the scientific outcomes themselves. But their mere existence suggests the following questions: does the scientific truth remain the same before and after it is published? If not, what changes take place? And how fundamental these changes can be? Do they justify us suspect the originality of the scientific truth or not? More importantly, to whom do scientists address their work? Is it the scientific society or the common? If it is the first, the question will be: which scientific