ARE WE CONDEMNED TO BE CRUSHED BY THE INFORMATION OVERLOAD?

by

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Resumen

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El exceso de información parece haber llegado para quedarse por largo tiempo. En nuestro alrededor hay demasiada información relativa a la Ciencia, la Tecnología y la Sociedad. La gente se siente agobiada por el diluvio de información y bajo esta presión, paradójicamente, cada nueva solución genera un nuevo conjunto de problemas. Cabe preguntarnos si estamos condenados a ser aplastados por el cúmulo de información. Acá se trata este problema haciendo énfasis en el desarrollo racional de un nuevo alfabetismo tecnológico que busca los fundamentos de una solución fértil y creativa.

Summary

Information overload seems to be here to stay for a long while. At the very heart ot our lives there is too much information dealing with Science, Technology and Society. People feel to be drowning within a deluge of information and its high pressure yields a puzzling consequence: every new solution is the cause of a new set of problems.

Therefore, one is led to ask whether we are condemned to be crushed by the information overload.

This comunication deals with this subject matter with special emphasis on the rational development of technological literacy pointing out the essentials for a fertile and creative solution.

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I. Introduction

The explosion of knowledge and the associate overgrowth of information is one of the most remarkable trends in contemporary science. In fact, Garfield (1) estimates that between 20 and 25 million publications have appeared since the invention of the printing press, and assuredly the growth of publications is beyond doubt speeded up. A dreadful volume of papers has been brought forth over last years in every active scientific field, new journals have appeared, and the number of scientists has greatly increased. Although all this activity stands for the happy prospect of swiftly advancing knowledge on many fronts, the often recognized drawback is that any scientist can be up to date with just a minor amount of literature in even his own research field.

This information overload embodies very serious consequences that demand intense attention since everyone appears to be drowning in a flood of information.

The question is: what to do? Several answers have been given with different (frequently opposed) contents. But perhaps a more preceding question is: is it possible to do something?

I deem that, ultimately, each of us has to find his own particular solution in order to avoid to be crushed by the information overload.

Due to the fact overinformation phenomenon closely entails many dilemmas and paradoxes, a way to be well equipped to face the issue is to know about them. This will enable us to understand the subject in several different ways.

Many approaches to overinformation analysis follow the general trend of considering the phenomenon of such a sheer complexity, ambiguity and paradoxical character that if seems nearly impossible to deal with. The real challenge is to learn to manage this complexity.

The aim of the discussion offered here points to a way in which we can begin to take up this challenge by relying on the most valuable asset we have: our capacity for critical thinking (2).

I believe that by building on the knowledge of information dilemmas and paradoxes, we have a mean of enhancing out capacity for creative yet disciplined thought, in a way that allows us to grasp and deal with the many-sided character of information overload. And in doing so. I believe that we can find new ways of handling information and alternative avenues to approaching and solving information overload problems.

II. Some dilemmas and paradoxes on information overload

Journal proliferation

Whether or not one wholly adheres to the "publish or perish" saying, it is beyond doubt that the goal of scientific research is publication (3). This is so because a scientific experiment is not brought to its proper end until the results are published. Since the number of scientists and the research productivity have greatly increased over last years, it has led to the journal proliferation. According to some people the production of more and more scientific journals has conduced to a critical state of affairs of existing too many journals (4, 5). The availability of funds to keep up with their present rate of growth is a central point in this crisis. Keeping up with present subscription lists in driving the libraries into bankruptcy. Furthermore, most researchers have dozens of books, articles, and reviews waiting to be read. It is sometimes an uncomfortable feeling to be running constantly just to keep in place.

Although several proposals have been set up to surmount this problem (4, 14), no definitive answers seem to be available and meantime the demand to publish grows and no one seems prepared to give way first.

But, on the other hand, Garfield (15) considers the issue of too many journals as pure monsense because when discussing the ever-expanding scientific literature authors frequently indulge in superficial analysis that distort reality, whether through misunderstanding or exaggeration. Lock (16) points out that this so—called journal explosion is an illusion since the rate of expansion from the beginning of serious publication in 1665 has been a constant 5 to 7% a year (17). Notwithstanding some current estimates put the total number of scientific journals at 100,000, a very impressive figure indeed, there are many more scientists around than there ever have been, and there is a cogent suggestion that the proportion of the number of journals to the number of scientists is constant.

It is a well—known fact that a mere handful of journals account for the great majority of significant publications in any field (Bradford's law of scattering) (18) and there are probably no more than 25 titles that and individual researcher needs to follow regularly. As part of being a professional scientist, the organized researcher makes use of modern information retrieval tools to scan the rest of the literature. In addition, one can consider that much of the growth is seen as a healthy part of the success and expansion of the scientific enterprise in the present century.

Many other arguments can be set up about for and against journal proliferation, but our aim is just to point out the issue.

The compulsion to publish

From the every beginning as graduate students, scientists are qualified chiefly by their publications and not by their ability to manipulate materials and equipments at laboratory, not by their true knowledge of scientific subjects, and really not by their sparkling or humorous personalities.

Thus, they become known or remain unknown forever by the qualite or/and quantity of their publications.

It is a well-known fact among scientists that a lengthy publication list is a key item to find a good job and to get the necessary funds to afford research.

Many referees of grant committees claim that they evaluate an applicant on the basis of the previous research quality, which presupposes a detailed and in depth analysis of the whole curriculum vitae and research project. However, it is common to know that someone has received a negative answer because of too few publications and no attempt at all has been made to judge the quality. Obviously, this last alternative only requires to count papers from the publication list, which is, by far, an easier task than the former one. Although applicants do not know whether they have been examined on the basis of the quality of their work, one has never heard about anyone who was rejected because of too many publications.

Thus, it is very difficult for researchers to deviate from the "publish or perish" rule and the compulsion to publish is settled down.

I deem that on a bona fide basis, every scientist wants to publish complete reports instead of fragmented results and to get rid of the overwhelming pressure to publish more and more papers for the sake of survival. Time is a so precious good to be wasted in huge proportions when on is urged to produce mere printed matter instead of real and valuable research work.

Naturally, the option here is to set up a serious judgement procedure to go beyond the mere count of papers. But this is easier said than made because it requires a thorough task from the referees which is not always what happens.

True or false?

Scientists are supposed to be moved by a deep motivation of curiosity about nature that would suffice to go through a continuous struggle to discover new truths. This last very word, truth, stands at the centre itself of the scientific scenery and enlightens the search of the unknown.

However, there are a number of well-documented cases of deliberate falsification of research findings (19, 34) and scientific misconduct seems to have increased during last years. Naturally, it is rather difficult to assert what constitutes intellectual dishonesty. Scientific fraud takes a number of forms (35, 37) and divergent classifications of the misbehaviour of scientists contribute to difficulty in arriving at a consensual definition of fraud in individual cases.

Notwithstanding opinions and speculations on the incidence of scientific fraud are plentiful, the fact is that we simply do not know the extent of it.

The competitiveness of science is regarded by many as a significant contributor to scientific misconduct. Along with many other reasons, long lists of publications are often critical in securing for scientists grant, promotion, and tenured positions, so there is an emphasis on getting results and publishing them quickly. Fraud may well be a sign of the stresses in the contemporary scientific enterprise.

All in all, whichsoever are the causes and incidence of misconduct in science, what are its effects and the way to deal with it, scientific fraud and intellectual dishonesty exist and seems to be a second nature of the scientist behaviour, something like a dark shadow projected onto the scenery where truth continues being looked for.

Third World journals

As stated before, a small number of journals are really significant for the great majority of relevant publications in any field, so that there are most likely no more than 25 different journals that a scientist must pursue systematically.

Needless to say, practically all these significant journals are published by First World Societies and Editorials. This fact is well recognized by the whole scientific community, especially Third World Scientists, who want to publish their works in internationally acknowledgeable journals rather than local ones.

However, there are sound reasons to support the suitable publication of existing journals in developing countries and even to promote the edition of new ones when necessary and possible (38). A first argument is related to the universal character of Science and the open possibility that each country has its own journals to offer its scientists a local way to publish their works.

Another usually raised reason to support the developing countries publications is the maintenance of the local tongues. In fact, the first rate journals are mainly published in English and those belonging to the Thir World are not. I deem that the defence of different tongues is a sound argument and a way to do it is to publish science in different languages.

Besides, the having a set of valuable publications is a power factor that every developing country has the right to possess. All over the world, the Third World countries are rapidly loosing out in the shuffle of centers of information preempting power.

However, it is clear that in order to go hand in hand with these chaims, Third World publications must raise their standards, personnel get an appropriate training and local scientists be convinced that they are suitable home for their research work. One of the main problems with scientific journals in a developing country in clearly that they are not completely worth accepted by scientists in that own country and they aim at publishing their works in internationally recognized journals rather than local ones.

Science for everybody

Of necessity, scientific literature is very specific and only specialized people can understand it. Furthermore, each publication unit, the paper appearing in the scientific journals, deals with truly special and minute matters so that it is addressed to a reduce number of scientists. Although there exist the review papers which give an overview about a given subject and are supposed to be directed to a wider number of readers, they even make up a sort of specific literature.

But at the same time it is recognized the urgent need to bring science to the public (39) and that scientists must learn how to communicate with the media, just as they had to learn to teach and do research. This urgency arises from the public's right to participate in decisions concerning science and technology that today appears to be securely established. This issue is closely related to several interesting enough topics such as the different ways to involve the public in the science policy process; the manners to make available the technical information on which science policy is founded (40); the role of working science writers as the gate keepers of science news for the country (39); the promotion of science at the popular level; science literacy; its relevance and the possibilities for its improvement (41, 42), the involvement of scientists in promoting public awareness and understanding of science (43), etc.

And making science available to everybody necessarily entails the increase of the written word although there are several alternative ways to deal with these topics. Once again, we are face to face with a real dilemma.

Other dilemmas and paradoxes

The preceding list is just a reduce sample o dilemmas and paradoxes arising from a world dominated by the written word.

Michael (44) gave a really lucid panorama on this nearly disturbing subject matter:

"Information cuts bothways and herein lie the dilemmas or paradoxes arising from ever more information created, processed, and disseminated by proliferation information technologies. More information can result in more control but it also creates circumstances that reduce or defy control. It clarifies some issues but it obscures and complicates others. It enlarges the opportunities for participation in decision making and in doing so it both increases and reduces the incentives for adversial confrontations in the courts and on the streets. It brings more ideas into the marketplace but at the cost of raising the noise level to where nothing can be heard clearly. Unprecedent amounts of information can be brought to bear on issues of policy and action but the persons who must use the information to make decisions become overload and everything gets muddled. In some cases one feels more information really gives an understanding of a situation. In more cases more information deepens a feeling of uncertainty. Information gives some ever greater access to a more complex world while condemning others to deeper isolation and alienation. It facilitates the coherence of groups and, at the same time, helps groups to splinter. It can make for both centralization and decentralization of power. In such ways information entices some into ever more demands for information and others to turn away from more information because it upsets habits of mind and action".

III. Towards a rational development of handlig information overload

Information overload exists and it brings forth lot of consequences. At first sight it seems to be here to stay for a long while and perhaps for ever and this disturbing fact arouses remarkable feelings of doubt the way to handle the phenomenon in itself and its results. Unquestionably, though dilemmas and paradoxes of information usage are not essentially new, they embody very serious consequences that need great attention. When considering these, one feels to be oppressed by a heavy burden next to be crushed by the overweight and a sense of impotence arises at once with respect the way of handling them.

A superficial analysis seems to show that too much information is due to scientists misconduct and many other malpractices which should be solved through proper corrective measures, such as to force redundant journals to expire, to punish severely scientific misconduct and so on and so forth. This sort of solution reminds me that usual attitude of individuals suffering from headache and whose natural first reaction is to get rid of it at whatever price. But we know that the remotion of effects does not imply the removal of causes.

I take the position that the crisis of information overload should be the trigger of creativity in

looking for appropriate paths to deal with it, to use information in the best possible way, to resort to modern electronic devices of information storage and retrieval and even to dare to foretell future situations in this regard.

The dilemmas, paradoxes and contrasting features embodied in the illustrative topics presented in Section II as well as in others pointed out by Michael (44) compose a very rich arena to develope our capacity for creative and critical thinking about information overload.

I deem the question has a clear decisive relevance to the matter of science development and it is pertinent to speculate about it. All along this paper I have tried to say that on spite of the fact that at the very heart of our lives there is too much information dealing with Science, Technology and Society and people feel drowning within a deluge of information, it also exists the possibility of looking for a sensible solution by means of a rational development of critical thinking.

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