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What is the Real Threat of Information Explosion?

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Abstract

The text is devoted to a consideration of the "information explosion" phenomenon. The exponential growth of publications is compared to the (similarly exponential) growth of population, especially in the countries where most of the publications are created. The increasing tertiary education gross enrolment ratio (naturally associated with involvement in the publication process) is also taken into account. The text comes to a conclusion that either the exponential growth of publications must decrease its base value in our future, or we are heading towards a time point where an increasing number of publications find no readers (if that point is not yet behind us).

Keywords

Information explosion; Exponential growth; Publication activity; Scholar publications.

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1 Introduction

It is now generally accepted that the growth of publication activity all over the world can be approximately described by an exponential function (e.g., Price, 1956), i.e., the number of new publications multiplies by a number n every t years. Different sources vary in the exact values of these n and t. For example, in the area of biology, "the research activities (to the extent that these are revealed by the numbers of papers published and abstracted) approximately doubled during the five-year period" (Schmidt, 1962). Zaid (2003) shows that the number of books published every year quadrupled in the period 1950–2000. (That means that $n \approx 1.028$ for $t = 1$.) Another similar observation (Luijendijk, 1993) communicates that the number of publications in scientific journals grows about 3 times in 50 years. (That means $n \approx 1.022$ for $t = 1$.) Yet another source (Pinkas, 2002) states that the number of magazine titles increased *tenfold* between 1950 and 2000. Similar considerations (leading to even higher values of our n) have been published about the total volume of data produced and processed in various organizations, e.g., that it "is expanding by 35–50% every year" (Beath et al., 2012).

The term "information explosion" is generally used for this phenomenon, although it is usually not explained too clearly what is to explode and how. Anyway, some "threat of explosion" is evident: how long can this trend continue before *something* really explodes and (maybe *something else*) falls to the ground?

For the sake of objectivity, it should also be mentioned that it is appropriate to distinguish the (real) "information production" (information-generating activities in the narrowest sense) and "information distribution" (including the number of books published and similar indicators). As has been stated by Williams & Clark (1992), "no clear evidence exists to support the contention that growth rates in information production have been explosive; however, there is considerable evidence that growth rates in information distribution have been explosive". Of course, the "explosive growth of information distribution" has much to do with the fact that authors build on past knowledge and add their own contributions, which usually represent the smaller part of the whole publication's volume – if it were possible to remove from each book everything that has already been described elsewhere, the number of existing publications would be reduced so radically that the threat of an information explosion would be delayed, but, of course, it is not possible (EFI, 1995).

In courses on information processing, we naturally emphasize the necessity of appropriate indexing and retrieval methods to overcome the indicated growth of information production. However, we leave aside the question how this growing production will be paid for. Of course, the basic premise of the economic efficiency of publishing is that every magazine will find *some* readers.

Let us now suppose that at *some* time point t_0 – no matter whether it is in the past, in the present or in the future – a standard professional in the area of research and development spends (or spent, or will spend) two hours a day watching professional publications.[1] How would this situation change during the next 50 years? Let us proceed from Luijendijk (1993) – articles in scientific journals are very likely the most important material to be watched regularly. If the same number of professionals had to watch all the publications at the time point $t_0 + 50$ years (i.e., 3 times more publications), then every one of them would probably have to spend six hours a day by this activity. Then, however, s/he would have almost no time left for other activities. How would this evolve after another 50 years? Our abstract professional would need 18 hours every day to watch literature, so s/he could hardly find time to sleep, not to mention anything else.

[1] By the word "watching" as it is used here we should understand all the activities starting with information retrieval and browsing documents that might be interesting, ending with careful studying of the really interesting texts.

This would certainly be a real *explosion* of its kind – but we must also take into account that the above-mentioned *number of professionals* able to work with the publications changes in time in its way. This phenomenon will be studied in the next section.

2 Other Factors

It has been stated (Scholarcy, 2019) that the numbers of publishing scientists worldwide grow at a rate of 4–5% per year, but this can hardly be taken as a real constant in time, as such a growth rate would greatly exceed the world population growth rate. The same will surely apply to the number of professionals able to watch and make use of the publications. (It even seems very likely that the growth rate of publishing scientists and the growth rate of professionals able to watch and make use of the publications will be either equal or at a constant ratio.) Perhaps we could seriously suppose that the growth rate of professionals working with the publications will be *at least* equal to the population growth rate – but not to the mean value for the whole world, which is now close to 1% per year (Roser et al., 2013; UN, 2017).[2] Naturally, most of the *work with the publications* examined here takes place in large and economically developed countries. For the main examples of such countries, we find substantially lower values of the yearly population growth rate in the last decade (UN, 2017): approx. 0.6% for the USA and the UK, 0.4% for France, 0.3% for China, 0.2% for Germany, and even –0.1% (!) for Japan. (For comparison: the corresponding value for the Czech Republic is 0.06%.) Hence, I think, we could take a very rough estimate that the number of professionals working with the publications might grow by approx. 0.5% per year in the near future.[3]

There could be one more objection to the previous consideration: the ratio of people with higher education also increases – perhaps especially in economically developed countries. As has been stated (Martin & Godonoga, 2020), the tertiary education gross enrolment ratio has increased from approx. 25% to approx. 75% (i.e., three times) in the highest income countries, and from approx. 10% to approx. 30% (also three times!) all over the world during the last roughly 50 years. However, such an increase absolutely cannot continue with the same speed because this ratio has a limit *somewhere under 100%*, which limit it will naturally approach more and more slowly. In the most developed and economically strongest countries, it is most probably already near the limit, so that its future increase is practically insignificant in our context.

So, let us now proceed from the 0.5% yearly population growth rate accepted above. This means that if the number of professionals in our consideration is p at the time point t_0, it *might* grow to

$$p \cdot 1.005^{50} \approx 1.3\, p$$

after fifty years. (But we should mention once more that the population growth rate will more probably still decrease before some very radical change of our way of life occurs, so our value 1.3 p is rather the maximum possible.)

In total, we can count on that while the number of publications to work with per year (or per any other time unit we choose) increases three times during fifty years, the number of professionals able to work with them increases (at most) 1.3 times, i.e., the estimated time a professional should devote to the work with the publications increases (at least) by a factor equal to

$$3 / 1.3 \approx 2.3$$

[2] More precisely, this value is not at all constant in time; it has decreased from approx. 2.2% to approx. 1.0% during the last roughly 50 years. So, unless an unexpected change occurs, we can assume that the value will probably be 1% or lower from now on.

[3] By this I absolutely do not mean to say that I prefer the value 0.5 over 0.4 or 0.6 – it is simply beyond my ability of resolution.

instead of the previously assumed value of 3. Hence, the above mentioned two hours a day would change to some 4 hours 36 minutes (if not more). If the trend continued for another fifty years, we would come to approx. 10 hours 30 minutes (or more). This is evidently impossible.

3 Conclusion

We have shown that if the exponential growth of publications detected in the last several decades continues with the same growth factor *and all the publications still find some readers*, then after several decades *from some time point* t_0 the professionals simply would have no time for their own creative work, and after some more decades they would not even have time to work with those publications. This is already a kind of contradiction: in fact, when people do not have time to read all the new publications, it means that some of the publications must remain completely unread. That means completely unused, and completely useless. The question that now arises is: who is to bear the cost of publications read by nobody? I am not an economist; I will not try to answer this question.

In any case, we have used an *abstract* time point t_0 here – we stated in the beginning that we do not try to study whether it was somewhere in the past, is just now or will come in the future. Our conclusion is basically independent of such differences. We can leave it up to each reader to judge how far from the point t_0 we actually are and in which direction in time.

In any case, there seems to be only one *reasonable* possibility: the exponential growth of publications *should ease*. Otherwise, our society would be in danger of a real *explosion* that I would rather not imagine.

Additional Information and Declarations

Conflict of Interests: The author declares no conflict of interest.

Author Contributions: The author confirms being the sole contributor of this work.

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