Protect our environment from information overload

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Humans are sometimes characterized as “informavours”[1] – actively seeking information while solving problems and navigating a complex world. Rapid technological advances and increased global digital connectivity have led to the universal availability of information, revolutionizing our lives but also resulting in an exponential growth of data demanding our attention. This has created a daily information overload (IOL): an abundance of data beyond the human capacity to process it. Although fears about excessive information have troubled humanity for centuries, it has reached an unprecedented scale and prevalence due to smartphones and social media. IOL can trouble humans by decreasing their decision-making performance, increasing tolerance of errors, reducing social activities, lowering job and user satisfaction, causing demotivation, negative emotions, and compromised health[2]. These IOL problems carry a severe financial penalty: a 2011 commercial study estimated that annual IOL global costs were already $1 trillion[3]. IOL therefore threatens our ability to take the time needed to evaluate information and make effective decisions, so we simply cannot sleepwalk through the destruction of the information space as a natural environment.

IOL can be intuitively defined as an inability to make decisions about an issue because of too much information about it to effectively filter or evaluate in the time available. From a psychological perspective, this is a larger scale version of the “magical number of seven plus or minus two”, coined by George Miller in 1950s[4] to describe human short memory capacity. Nevertheless, there is no equivalent precise definition of IOL because of its more general scope of application and less precise effects.

To set IOL in a wider context, the lack of easy access to scientific literature was a crucial factor limiting the development of research in many countries in the 20th century. The costs of journal printing and delivery were substantial and only the richest universities could subscribe to all the journals needed for their researchers. Currently, with widespread open access publishing and the proliferation of low quality publishers, the problem is changing to the filtering out of irrelevant or low quality work[5]. In the same way, during the Industrial Revolution, the massive increase in iron and chemical production was considered to be progress, but now we understand that there are also major risks: smoke from factory chimneys can lead to the degradation of the natural environment and pose a significant threat to mankind. The emergence of environmental protest movements has helped to change our attitudes towards exploiting nature and has forced legal and economic changes to protect our air, water, soil, and food quality. For IOL, terms like “information pollution”[6] and “data smog”[7] have been used since the 1990s to describe informational challenges to society, and it is essential that we now think about our information space as an additional component of our natural environment and start developing methods to protect this space against overloading and polluting. However, first we need to understand how exactly the overload works in various settings.

So far, IOL has been studied from the perspective of specific problems. This has shown that there are at least three levels: (a) neural and cognitive mechanisms at the individual level related to searching for information; (b) information and decisions at the group level, including interpersonal relationships, and (c) societal-level interactions between individuals, groups, and information providers. However, these levels are not independent of each other. It is logical to treat them as a multilevel network[8] with nodes representing individuals, groups, and societies, and connections reflecting interactions between them,

giving a complex system with its own dynamics. However, microscopic and macroscopic dynamics in a complex system are sometimes very different. It can then be hypothesized that while the transition from a manageable information flow to an IOL can be smooth (a continuous phase transition) when observed just for a single, closed system, coupling two or more layers together might lead to a discontinuous phase transition characterized by an abrupt change. A dramatic example[9] of a positive feedback loop in a complex system consisting of two interdependent networks occurred in Italy on the 23rd of September 2003[9], when small power failures triggered larger ones, shutting down Internet access in Italy, and causing a further power breakdown because of failures in the communication system for power supply monitoring. For the effects and causes of IOL to be better understood, it is therefore necessary to develop measures of multilevel IOL in different systems, followed by methods to model it and countermeasures to prevent it.

At the individual level, rules-of-thumb to “beat the data smog”, proposed in the late 1990s[7], included not forwarding chain messages and automatically filtering emails. Nevertheless, some solutions can be double-edged swords: generative AI models (GenAI) might help reduce IOL by allowing for content summarization and document filtering. On the other hand, it can also create fake news, hallucinations, and reinforce biases[10]. This situation calls for organized action, performed simultaneously in three different directions: science, education, and legislation. The first might result in financing calls for collaborative projects on information ecology and multilevel IOL involving interdisciplinary research. The second, as in the case of waste recycling, is to teach information ecology at the school level. Finally, remembering how the Great Smog of London in 1952, which claimed the lives of thousands of citizens, prompted the introduction of the Clean Air Act in the UK in 1956, we should now initiate a discourse on the global implementation of equivalent Clean Information Acts.

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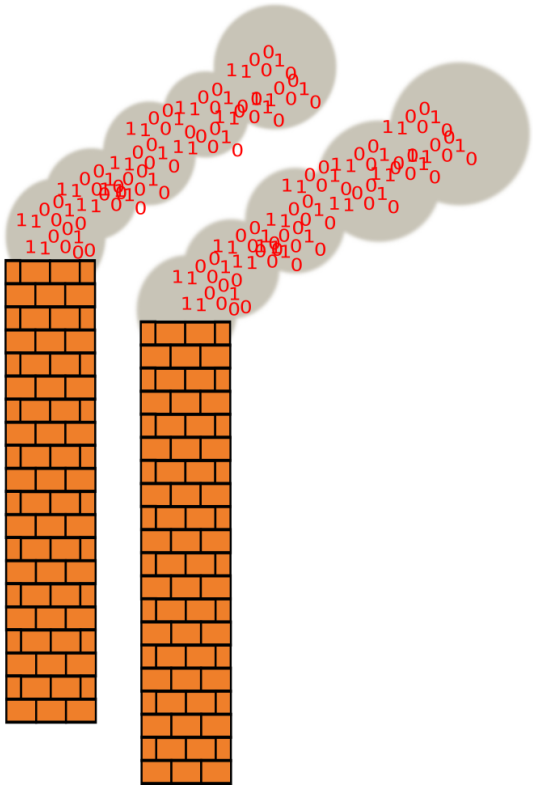
Competing interests

Authors declare no competing interests.



Information space should be considered as an important part of our environment and be protected alongside air, water, and soil. Smoking chimneys were tokens of prosperity during the Technological Revolution in the 19th century but in the second quarter of the 20th century their air pollution threat was fully acknowledged. We cannot sleepwalk through the destruction of the information space as a natural environment in the same manner.