Információs Társadalom

[Information Society]

A SOCIAL SCIENCE JOURNAL

Founded in 2001

English Issue Vol. XXIII, No. 4 (2023)

Published by INFONIA Foundation

Principal sponsor: Budapest University of Technology and Economics, Faculty of Economic and Social Sciences

Technical partner: SZTAKI

ISSN 1587-8694 (Print)
ISSN 2063-4552 (Online)
ISSN-L 1587-8694

Produced by Server Line Print & Design, Budapest

The journal Information Society (In Hungarian: Információs Társadalom, abbreviated as InfTars) aims to provide a platform for research and discussion of the theories and applications of Information Society Studies. Currently every second issue is published in English, the rest are in Hungarian.

The journal is fully Open Access and freely available at https://inftars.infonia.hu/

InfTars is indexed in both the *Web of Science Social Sciences Citation Index and Scopus*, and all titles are automatically submitted to *Crossref*.

Since Vol. VIII, No. 1 (2008) the journal has been included in the Thomson Reuters index (Social Sciences Citation Index, Social SciSearch, Journal Citation Reports/Social/Sciences Edition)

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LECTORI SALUTEM

This issue delivers a diverse set of articles.

Máté Julesz discusses some challenges of health data management, focusing on the European Health Data Space.

Márton Pál Iványi takes us to a more theoretical level and investigates the principles of efficacy and joy, technology-centrism, and consumerism from a critical social approach.

Kang and Liang share empirical results on Discrepancies between two groups with different political orientations on a sample from Taiwan.

Oleh Shynkarenko in his essay on Science Fiction in Ukraine explains how the fiction of the 1920s promoted the ideology of naive techno-communism, but during the next forty years, it became obvious that the Soviet project had reached a dead end, and its positivist component had not brought the desired results. Ukrainian SF writers then turned to mysticism and denial of a rational view of the world. This essay has part 2, which will be published in an upcoming English language issue.

Roman Krzanowski presents the various conceptualizations of information, including biological information, natural information, pragmatic information, physical information, quantum information, quantified information, relative information, semantic information, semiotic information, epistemic information, ontological information, and syntactic information, together with some of their variants.

Héder, Gorgul, Akgun, and Mitschke report on the findings of a workshop on the current state of engineering ethics education, mostly focusing on gaps, as well as the perceived challenges of the future.

Finally, Yao Lu reviews the book “Breached!: Why Data Security Law Fails and How to Improve it, by Daniel J. Solove and Woodrow Hartzog, Oxford University Press.

A perspective on the European Health Data Space

At the time of writing this article, the European Health Data Space (EHDS) is under development. A legal definition of the primary and secondary use of health data at the supranational level is a given; however, the practice of cross-border e-health still needs to be both legally and technically reinforced. Healthcare equality and technological justice need to be observed when legislating on e-health at the national and supranational levels. Data altruism is a positive phenomenon in the secondary use of health data; nonetheless, the unethical exploitation of the health-related data of digital citizens living with a chronic illness or other ailments should be eliminated. While the extension of the European digital society to include other digital societies as a whole might happen in the far future, the early results of the already interconnected European e-health infrastructures are promising. Nevertheless, there is much to do to ensure patient safety via e-health.

Keywords: *European Health Data Space, health data protection, healthcare equality, technological justice, health data altruism, patient's right to digital self-determination*

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How to cite this article:
Julesz, Máté. "A perspective on the European Health Data Space".
Információs Társadalom XXIII, no. 4 (2023): 9–21.
https://dx.doi.org/10.22503/inftars.XXIII.2023.4.1

1. Introduction

Health data constitute a national asset that may be used for various purposes. While it is important to respect patients' interests in the protection of their health data, we should not restrict the use of already existing health data for such purposes as providing healthcare services outside national borders or for secondary use. The infringement of patient's right to health data protection is not only a problem for civil and administrative law, it could also lead to criminal liability of the offender. Criminal liability is, however, the last resort of the state, and its application varies from country to country.

The administrative law on health data protection and the possible civil law consequences of a violation of the personal right to health data protection are normally a sufficient deterrent to protect health data from abuse, with no need for criminal protection.

The future European Health Data Space (EHDS) necessitates protection by law to ensure the safe operation of this e-health system across the EU. However, the development of this cross-border institution and system will likely take many years because of the prerequisite for both the legal and technical harmonization of Member States' national e-health systems.

A properly operated EHDS is a common EU goal, and all Member States' national e-health systems will join it sooner or later. National steps towards harmonization can accelerate this process. The earlier the EHDS can be put in place, the earlier the Member States' national e-health infrastructures will be integrated into this supranational e-health infrastructure. Work in this area is driven by the Member States' aim to supply their citizens with the higher level of patient safety and healthcare quality that the EHDS can provide.

2. Cybersecurity and the protection of health data

On 3 May 2022, the European Commission put forward a proposal for regulation of the EHDS to apply across the EU. National legislatures in Member States have until 2025 to respond to avoid any inconsistency between the proposed EU EHDS Regulation and their own in the same field. The EHDS Regulation will be applicable in all EU Member States from twelve months after coming into effect.

EHDS Regulation Proposal, Art. 8, declares as follows: "Where a Member State accepts the provision of telemedicine services, it shall, under the same conditions, accept the provision of the services of the same type by healthcare providers located in other Member States". The law on telemedicine has long been a battlefield for health data protection. Health data communicated through the Internet is at risk of exposure to cyberattacks. The European Network and Information Security Agency (ENISA) was thus founded by Regulation 460/2004 of the European Parliament and of the Council to strengthen trust in the digital economy, boost the resilience of the EU's infrastructure, and, ultimately, keep EU citizens digitally safe, particularly from

cyber attacks. In the period from April 2020 to June 2021, over 100 incidents were reported to ENISA from the e-health sector alone.

Both legal and ethical problems can arise from the primary and secondary use of the EHDS that is under development. For instance, in Hungary, the National eHealth Infrastructure (EESZT) was launched in 2017 with the participation of public healthcare providers and pharmacies. Under this system, from 1 January 2020, all private healthcare providers, including private dentists alike, had to join this eHealth Infrastructure and start reporting from 1 June 2020. According to Julesz (2022, 32), "Telemedicine provides an ample source of health data. There is a fine line between a legally permitted derogation from data protection and a violation of law" (see also Julesz 2020; Kovács 2022; Nyitrai 2022). This statement mainly points to the secondary use of health data, that is, the regulatory, scientific, and other important objectives that might infringe on patient privacy in a legally permitted way. In February 2021, the Finnish Innovation Fund, Sitra, started a joint action with the participation of twenty-five countries in Europe known as "Towards the European Health Data Space (TEHDAS)". The goal of TEHDAS is to offer support to EU Member States and to the European Commission in developing guidelines to foster the secondary use of health data, especially in managing and sharing data (Hendolin 2021, 16).

Health data are sensitive in most countries; however, the quality and measure of this sensitivity largely depend on the functioning of the rule of law in specific countries. Whether the GDP or wealth of a country influences the observation of health data protection at the national level is debatable, though there might be a remote correlation. The quality of the rule of law can indeed have an immediate effect on health data protection, while the level of patient safety and that of legal certainty together affect the rule of law in daily practice.

Cybersecurity is an important aspect that must be ensured, directly or partly indirectly, by the state to promote the legal rights of patients. This factor is at the root of digital data protection. As early as 1998, Marsh (1998, 180) contended that "making the medical information systems accessible by the Web raises problems of unlawful access. Therefore, another building block in society should control the Privacy and Security of the stored data". At that time, Euromed-ETS, a project financed by the EU, was engaged in telemedicine security on the Internet.

Of course, cybersecurity has other facets as well. Bányász, Tóth, and László (2022, 100) hold that "cybersecurity has become more important in many respects, as vaccine research institutions have found themselves high on the list of targets for attackers. An even more serious challenge is the vaccine-infodemic state, in which many fake news stories are spread aimed at influencing public attitudes towards certain vaccines". This is another relevant problem that has attracted the attention of today's scientists and lawmakers. The Internet is a forum for both valid and false information, and is only partly regulated by legislative measures. Ethical behaviour among Internet users is simultaneously needed to provide patients/citizens with trustworthy information on healthcare products and to keep patient health data safe and secure.

Krzanowski and Polak (2022, 44) contend that the Internet as an epistemic agent endeavours to rid us of our individual worldviews and substitute them for those that favour its own epistemic agency positions and objectives (see also Héder et al. 2022). This assertion is obviously true; however, there are many other factors that impact individuals' opinions on their respective national healthcare systems and healthcare in general. The universal values expressed by international legal documents highlight the basic principles that regulate the doctor–patient relationship. In fact, protecting patient health data is one of the most important tasks for healthcare providers today. The Treaty on the Functioning of the European Union, Art. 16, para. 2, declares that the European Parliament and the Council shall "lay down the rules relating to the protection of individuals with regard to the processing of personal data by Union institutions, bodies, offices, and agencies, and by the Member States when carrying out activities which fall within the scope of Union law, and the rules relating to the free movement of such data".

3. The European Health Union and data ownership

Sandra Gallina, head of the European Commission's Directorate General for Health and Food Safety, argues that "The EU4Health programme will add €5.3 billion in health promotion, diagnosis and treatment, and care to help countries boost their health systems, strengthen their healthcare workforce, invest in trainings and advance their digital transformation" (Gallina 2023, 2). Gallina underlines the importance of the creation of a well-functioning European Health Union. I hold the same position. The EU4Health programme and similar initiatives provide financial aid to the construction of this long-awaited legal institution. Indeed, the practice of health law is strongly linked to health data, and, without safe health data processing, European health law would remain a lame duck.

The EHDS, the creation of which is envisaged at the moment of writing this article, would be a domain-specific common European data space. It would serve to protect individuals' health data and provide them with the opportunity to control their data. It would also help scholars, statisticians, health policymakers, and legislators retrieve the data necessary for the *commoda publica*. This last possibility (the secondary use of health data) requires a fair balance between patients' individual interests and the political, civil, economic, social, and cultural development of society as a whole. MedTech Europe was founded in 2012 to promote the medical technology industry. Horgan et al. (2022, 10) point out that "MedTech Europe highlighted the need for a health data ecosystem that fosters trust and protects individuals' rights while unlocking the great potential of health data".

Article 12, para. 4, of the European Commission's proposed EHDS regulation declares the following: "The Commission shall, by means of implementing acts, adopt the necessary measures for the technical development of MyHealth@EU." Via MyHealth@EU, the citizens of an EU Member State can safely communicate their health data in the language of another Member State. Healthcare documentation is thus available not only in the patient's language, but also in the language of physicians

practising in other Member States. The data safety ensured by the GDPR (General Data Protection Regulation) needs to be respected when putting the free movement of health data into practice. I would also wish to emphasize the role of electronic health data in the administrative health law of national legal systems. This is an opportunity that is also found in the institution of the EHDS. In my opinion, it is always best to build on already existing infrastructure and legal institutions. In this respect, MyHealth@EU represents common ground in the EU. The existing technologies furnish e-health with immeasurable experience that newly set-up technologies could only make possible in the long run.

According to Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare, it is already possible, for example, to obtain medicine in an EU Member State that has been prescribed in another EU Member State. Unfortunately, this has not yet been applied in all Member States. According to a recent survey, "most responses highlighted that most EU countries have not yet fully implemented open infrastructures for data sharing" (Hussein et al. 2023, 4). However, if medicine is e-prescribed in Hungary, it is obtainable in a pharmacy in Poland. In addition, in Croatia, the Electronic Health Record contains information on a patient's condition (such as an allergy) in Czech, English, Spanish, and other languages, which might be life-saving for that EU citizen in an emergency situation where the attending physician needs instant knowledge of the patient's history. Stellmach et al. (2022, 135) maintain that "The recommendations set out in the EIT [European Institute of Innovation & Technology] would need to be addressed by the European Commission in the future so that developers and providers of EHR [Electronic Health Record] systems, products and services can be given a catalogue of approved international interoperability standards for semantics and syntax that need to be adopted". The already existing International Patient Summary could be one of those standards. These patient summaries only contain the essential health information linked to a patient, thus making it possible to treat the patient abroad when necessary. However, this information might not be sufficient to initiate medical malpractice litigation. More detailed healthcare documentation would be required for that purpose. On the one hand, the EHDS certainly would not provide the patient's lawyer with sufficient evidence to use against the healthcare provider. On the other hand, the provider would not be able to build their defence merely on health information retrieved from the EHDS. The electronic healthcare documentation necessary for litigation should be sought in the national e-health systems of the Member States, such as the National eHealth Infrastructure (EESZT) in Hungary.

Ursitti (2022, 126) argues that, "In the pre-industrial era, the gap between producing and imagining was imperceptible, worthless and harmless; today, that is no longer the case". I share this opinion. Directive 2011/24/EU, Art. 14, declares that "The Union shall support and facilitate cooperation and the exchange of information among Member States working within a voluntary network connecting national authorities responsible for eHealth designated by the Member States". However, it could be postulated that providing patients with the right to the control of and access to their e-health data has partly remained a dream in EU Member States because of its voluntariness.

The values represented by the supranational EU law mostly derive from universal values. Nevertheless, there might be some conflicts between laws at the national and EU levels. Generally, however, Member States' legislation tends to strictly abide by EU law. In my opinion, with regard to personal rights to health and health data protection, there is no inconsistency between the supranational and national legislation. Hussein et al. (2023, 4) arrived at the following result: "Concerning data ownership, most responses from the EU countries indicated that citizens own their health data. This result could be a direct reflection of the wide implementation of the GDPR across Europe". Hussein et al. (2023, 4) also concluded that "the results of the trustworthiness of health data are relatively high".

4. Healthcare equality and technological justice

Genovese et al. (2022, 369) maintain that "None of the big health data transitions can happen without society's trust in the process". I think that, among other relevant aspects, the principle of healthcare equality also applies. The same level of healthcare should be provided for all patients, regardless of their real chance of gaining digital access to their health data. Patients should be assured that they can receive a standard level of healthcare within the EU independently of their ability to digitally control and manage their health data. Yet today, the same level of healthcare cannot be found in all EU Member States.

In addition to these remarks, there are also other noticeable comments on the EHDS in the professional literature. For example, van Kessel et al. (2022, 1) contend that "the EHDS might unintentionally disadvantage certain populations, including older people, refugees, those on low incomes, those living with chronic conditions, and some ethnic minority communities". All these groups have special features that preclude them from normal life. Positive discrimination is thus a legal and ethical must to attain social justice and technological justice. EU court practice has already acknowledged the legality of similar positive discrimination, for example, in the case of job applications. Indeed, positive discrimination is rooted in the fabric of European law and values, and needs to be maintained and even further developed. Furthermore, the EU Member States should constitutionalize the institution of positive discrimination in legal matters as well as in the functioning of the state, society, and economy as a whole. There is still a constitutional gap in this area in some European legal systems, which reflects ethical defects that need to be overcome by regulatory measures. Digitally disadvantaged minorities, whether ethnic or other kinds, should be integrated into the digital society so as to finally establish supranational technological justice. This would be the first step towards the creation of a global, or at least a regional, digital society without the need for political globalization.

In its 2022 EHDS proposal, the Commission alluded to the subsidiarity of the regulation when referring to the present-day deficiency of health data portability and to the lack of interoperability of national, regional and local e-health information systems. These deficiencies increase healthcare inequalities and should be

remedied by EU law. The existing technological injustice hampers social cohesion. While the EU's legislative efforts in this area are clear, it is too early to predict the possible outcomes of putting the EHDS into action.

Butcher (2009, 57) argues that "by maximizing the liberties (freedom to use, freedom to distribute, freedom to modify and so on) associated with certain computer software, an incentives-rich and stable environment can be established in ICT [Information and Communication Technology] that will foster development of the information economy among the information poor." I agree. However, the "information oligarchy", also noted by Butcher (2009, 59), might pose a real threat to society and the economy. I think we should have earlier prevented the technological, legal and economic predominance of a relatively small number of information-wealthy social actors. Now, it seems too late. Legislators' hands are tied by the digital practice in effect today. There is thus little space remaining for the state to place the information society, including e-health, not only on a legal footing, but also on an ethical one. All that might lead to deficiencies in technological justice, entailing healthcare inequalities as well.

Nutbeam and Lloyd (2021, 162) differentiate between functional, interactive and critical health literacy; whereby, functional health literacy refers to knowing how to use the health system; interactive health literacy encompasses the application of health information to the circumstances, including interactions with other people, to make decisions; and critical health literacy is the ability to critically analyse health information taken from various sources, resulting in an in-depth understanding of the social, environmental and economic determinants of health. I think all three types of health literacy are necessary for healthcare equality. I hold that interactive and critical health literacy cannot work without functional health literacy. In fact, the EHDS can only function well in societies where digital citizens recognize the relevance of this triad.

I side with Csótó in accentuating that, although economic poverty often goes hand in hand with information poverty, there is not necessarily a causal connection between the two; indeed, a better-off citizen may also be information poor (Csótó 2017, 26). I think, nowadays, this argument is highly significant because our information society tends to exclude the information poor. This tendency needs to be overcome by promoting social justice – and not only legislatively. I am convinced that patients whose e-health literacy is not in line with that of the majority patient population might suffer healthcare inequalities in the long run. There are many who do not use digital devices. Rab and Török (2022, 95) found that in Hungary, for example, 9.2% of the adult population has no smartphone, smart TV, laptop, PC or smart watch and is therefore excluded from the information society and thus e-health. I suppose the imminence of the EHDS can accelerate the digitalization of the European social strata now lagging behind. However, we should concentrate not on the states themselves, but rather on the disadvantaged groups within the European societies. Help ought to be given to those excluded from technological justice and facing healthcare inequality. While the principle of equality is rooted in ethics, its realization is largely dependent on social capital.

5. Health data altruism

In its 2022 regulatory proposal, the European Commission considered the EHDS as a cornerstone of the European Health Union. The Commission stressed the difficulties that EU citizens face because of insufficiencies in the implementation of the GDPR in Member States. The Commission also referred to the COVID-19 pandemic, which has recently highlighted the necessity for a safe and secure cross-border access to health data.

While it is true that the COVID-19 pandemic refined the aims of the EHDS, the basic values and legal norms tied to the EHDS have not changed. Privacy and health data protection remain primary, and legal exceptions are intended to promote the greater good, that is, public health and scientific research. Undoubtedly though, community health gained in importance during the pandemic. In my opinion, the EHDS should also be a tool in the service of promoting community health. Healthcare workers and local volunteers should be granted authorization to retrieve health data when necessary for the maintenance of the community health. This is a sensitive question because a great many individual patients certainly would not agree to this kind of disclosure of their health data. Therefore, there should be adequately elaborated checks and balances to extend the scope of the EHDS to include community health.

Health data altruism is the disclosing of patients' health data voluntarily and free of charge. With the introduction of the EHDS, the EU also aims to stress the control of data altruism. A rulebook should be implemented to determine the necessary criteria for data altruism tied to health data. It may be necessary, for example, to permit authorized persons to gain access to health data purely to promote their work in the service of the public. However, I think data altruism may lead to possible abuse of data, which would be counterproductive both for patients and society. In a top-down way, a rigorous rulebook would help determine the framework for data altruism as concerns the EHDS. The Data Governance Act will introduce the institution of data altruism in the EU from September 2023. Bottom-up data altruism remains an ethical option for individuals. Therefore, these individuals should enjoy some sort of legal protection by the EU and the Member States. Certainly, there will be legal disputes on how it is introduced, and the acceptable measure and quality of data altruism will likely arise from those disputes at the national and supranational levels. Shabani (2022, 1359) contends that "Newly proposed data altruism consent … integrates the element of multiple secondary uses of data. The upcoming EHDS regulation should clarify how these consent models will interplay in the context of secondary uses of data in the framework of the EHDS".

As a result of a global study involving 880 participants, Gefen et al. (2020, 552) concluded that "Our findings show that 99% of people were willing to contribute their data in exchange for monetary compensation and an analysis of their data, while 53% were willing to pay to have their data analyzed". As to the EHDS, I think payments to data owners could be permitted for the secondary use of their health data. I believe this option would not run counter to the EU's basic rights and values.

I thus admit that a price could be put on health data. This price would be compensation for patients abandoning their right to privacy. Naturally, however, personal rights are of an absolute character, so everyone must observe them. Indeed, Art. 16, para. 1, of the Treaty on the Functioning of the European Union declares that "everyone has the right to the protection of personal data concerning them". Nonetheless, this does not exclude data owners' right to accept payment in exchange for the commercial use of their data. In my opinion, payment would only be acceptable for a commercial secondary use of health data. All other secondary uses should be either based on data altruism or legal permission. Ethically, data altruism precedes the commercialization of health data. In today's legal, social and economic environments, the use of health data is too important to renounce for financial reasons. There is a fine line between legally and ethically acceptable data altruism and individuals monetizing their health data. In the EU, the personal data economy is increasingly fuelling present-day public governance.

I believe that the use of health data cannot be restricted to healthcare facilities and pharmacies. National e-health infrastructures are linked to national health administration systems, and individuals' health data are ultimately also used in administrative and judicial procedures. In my opinion, such use of health data should not be onerous, and data owners should not be allowed to request payment. However, digital citizens may at times be unaware of the fact that software processes their health-related data, which has been collected from web browsers. This kind of health data use seems to be controversial both economically and legally. I think those who draw profit from it should either pay for the health information under civil law or forsake this practice. The effective administrative or criminal sanctioning of health data abuses is a public law response to the issue. We should put an end to the unethical exploitation of digital citizens living with health problems by all means.

6. The patient's right to digital self-determination

Cingolani et al. (2023, 5) argue that "the implementation of AI [artificial intelligence] must be accompanied by careful reflection on the part of the legislator to ensure that the rights of citizens and patients are truly protected. For example, there is the question of consent to the processing of personal health data by artificial intelligence systems" (see also Héder 2021). Normally, governments and firms make use of artificial intelligence in processing big data. As a consequence, some countries have taken measures to account for this. In Germany, for example, a "computer fundamental right" was defined by the Federal Constitutional Court on 27 February 2008 to prevent any abuse of information systems (Hooghiemstra 2019, 172).

According to GDPR, Art. 9, the processing of health data is prohibited as a general rule. Nevertheless, it is permitted when necessary for such areas as medical diagnosis and treatment or for protection against serious cross-border threats to health. Article 9, para. 4, declares *expressis verbis* that "Member States may maintain or

introduce further conditions, including limitations, with regard to the processing of genetic data, biometric data or data concerning health". This rule defers to national legislatures to adopt stricter rules when necessary. If it is consistent with this right, a Member State's national legislation cannot be successfully challenged before the EU Court of Justice. Usually, a legally protected interest may enjoy more rigorous protection than required by an EU directive. A number of EU regulations also contain a similar extension of the protection by national law.

Patients' right to self-determination is a basic right that should be observed not only by national e-health infrastructures, but also by the EHDS. Access to patients' health data on areas such as addictive and psychiatric diseases, AIDS and sexually transmitted diseases, ought to be restricted *a priori*. The sensitivity of health data varies, but unless the patient explicitly grants permission to disclose such data, they should not be accessible. The EHDS must not be permitted to lead to data abuse. Overall, patients ought to be allowed to limit access to any of their health data. These data should only be available to the attending physician without restriction in the case of an emergency to save the patient's or another natural person's life and health. In addition, the person, the date and the reason for access should be indicated, so that, later, the legality of such access may be checked.

Patients should be entitled to restrict access to their healthcare documents and other health data in a way that only the treating doctor and the primary care physician can see them. Pharmacists' access to health data could also be limited to e-prescription data.

It is important to protect health data; however, patients exercising their right to restrict access to their health data have to bear some responsibility too. A lack of information might mislead the healthcare provider. The patient's right to self-determination is constitutionalized in most democratic states under the rule of law. In healthcare, from a legal aspect, digital self-determination essentially differs from the old perception of self-determination. Furthermore, e-health may result in a legally more transparent medical practice because of the rigorous application of its clear-cut rules. I wish to stress that the exercise of a citizen's right to self-determination must not be detrimental to other citizens' right to life and health. In healthcare, the duty of professional secrecy may be overriden in such a situation. This is more than an ethical question: it is the community's legal right to self-defence that is recognised by the social actors as well as by the judiciary.

Patient autonomy has been the focus of a great many discussions on healthcare. I hold that patient autonomy can strengthen a healthcare provider's sense of security because the patient thus takes over ethical responsibility from the provider to a certain extent. Indeed, e-health may be instrumental in the realisation of patient autonomy. I believe that, considering the pros and cons of e-health, the pros prevail. The patient's right to self-determination is at the core of healthcare practice, while the patient's consent is a precondition for healthcare services, including making a diagnosis, medical treatment and any other matter entailing health data processing.

7. Conclusion

The EHDS is an EU e-health infrastructure project currently under development. Besides the primary use of health data, its secondary use is also of great importance. Health data constitute a national asset, which could be expanded supranationally. Health data altruism is not only an ethical topic. In my opinion, digital citizens' health data should not be exposed to commercial data harvesting without informed consent and monetary compensation. However, the secondary use of health data for scientific purposes or for the making of health policy or in legal procedures needs to remain free of charge.

National e-health infrastructures should be connected to the EHDS to advance telemedicine, patient safety and the secondary use of health data at the supranational level. Yet while some EU Member States' national e-health infrastructures are already interlinked, there is still a long road ahead to link them all. For instance, medicine e-prescribed in Hungary may be obtained in pharmacies in Poland.

Certainly, cybersecurity is a key issue in health data protection. Further, patients' right to digital self-determination may serve to provide legal protection for health data. Indeed, I believe achieving healthcare equality and technological justice should be fundamental social aims of the EU because an adequately operated supranational e-health infrastructure impacts not only the quality of cross-border healthcare, but also the functioning of European societies. Importantly, widespread e-health literacy – mainly though not only – in the eastern part of the EU is a precondition for putting the EHDS into effect. As a consequence of digital globalisation, technological justice and healthcare equality are strongly interrelated. In addition to legislative measures, bottom-up social effects may also improve the quality of e-health in the EU. Connecting the forthcoming EHDS to the e-health infrastructures in other (groups of) democratic countries (such as that of the US) safely and securely could give rise to a global digital society without the need for political globalisation.

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Advent of the online Neo-subject

ICT as an accelerator of ultra-subjectivation in light of social practices – Central European horizons

Arguably, from a post-Foucauldian perspective, information and communications technology (ICT) offers an arena for ongoing subjectivation aligned with societal or moral guidelines, such as the principles of efficacy and joy, technology-centrism and consumerism. In line with the tradition of critical social theory, the present paper offers a theoretical and a Central and Eastern Europe (CEE)-centred empirical framework based on recent social practices.

Keywords: *Critical social theory, ICT, information society, innovation, postmodernism, neoliberalism*

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How to cite this article:
Iványi, Márton Pál. "Advent of the online Neo-subject ".
Információs Társadalom XXIII, no. 4 (2023): 22–37.
https://dx.doi.org/10.22503/inftars.XXIII.2023.4.2

1. Introduction and the traditions of postmodern critique

"It is a system in which reality itself (that is people's material/symbolic existence) is entirely captured" wrote Spanish sociologist Manuel Castells at some point in the second half of the nineties (1996, I, 371-372) referring to the interactions between society and technology. In a subsequent work co-edited with Portuguese colleague Gustavo Cardoso, it was further pointed out that "the new technological system" in the modern information age is supposed to be "rooted in microelectronics, computing, and digital communication, with its growing connection to the biological revolution and its derivative, genetic engineering" (Castells and Cardoso 2005, 3).

Our interdisciplinary research described below aims both to 1) project the former understanding of the "new" communicative environment described by Castells onto current usage and (self-)representation of ICT, and to 2) juxtapose that with the tradition of social critiquing to the broader framework of evolutive processes that give rise to ICT and maintain its the politico-economic hegemony with its ever-growing expansion in various spheres of social life.

Both sociocultural and critical traditions in the field of communication theory (Craig 1999, 144-149) have been engaged in understanding and discussing the "force field" of communication. For Craig, sociocultural communication theory represents communication, under the influence of semiotic thought, within the intellectual traditions of sociology and anthropology. "Communication in these traditions is typically theorised as a symbolic process that produces and reproduces shared sociocultural patterns." So conceived, Craig goes on to say, "communication explains how social order (a macro-level phenomenon) is created, realised, sustained, and transformed in micro-level interaction processes". Thus, "we exist in a sociocultural environment that is constituted and maintained in large part by symbolic codes and media of communication" (ibid.).

At the same time, the premise of critical communication theory is that the basic "problem of communication" in society lies in the fact that "material and ideological forces [...] preclude or distort discursive reflection" (Craig 1999, 147). Consequently, this latter tradition is inclined to revolve around the powers, potential inequalities and oppressions, and different privileges of the communicating society.

Corresponding postmodern tendencies aim to explore how certain representations become dominant and permanently shape the ways in which reality is viewed and acted upon. Foucault's (1978, 1994) work on the dynamics of discourse and power in the representation of social reality, in particular, has been instrumental in revealing the mechanisms by which a certain order of discourse produces permissible modes of being and thinking while disqualifying and even making others impossible (Escobar 2012, 5). The essence of Foucault's notions, which are crucial for our current train of thought, is that power [fr. *pouvoir*] may achieve an effect over the social life of the population only when it becomes an integral, vital function that the individual itself embraces and reactivates.

It is worth exposing these traditions also to the "system" described by Castells (1996, I, 371-2; 2011) in his introduction and even beyond, to the realm of ICT and the surrounding communicative "force field".

This paper, once having overviewed the relevant literature on the complex concept and phenomenon of neoliberalism and its intersections with ICT, without any claim to completeness, intends to grasp the relevant trends in ICT by considering six case studies involving major recent conferences held in Central and Eastern Europe. Textual analysis (Fairclough 2013) of the agendas of these conferences in Hungary, Poland, Slovakia and the Czech Republic indicates the corresponding orders of discourse in this field and arguably go beyond the direct milieu of these events themselves. Namely, they point towards a new (neoliberal) way of the world, as Dardot and Laval (2013, 2014a, 2014b) put it, or "system", using the description of Castells above.

Ultimately, innovations in technology, competitive entrepreneurship and consumptive practices become integrated in a discursive order (Escobar 2012, 5), or, in the words of Fairclough (2013, 382) an "order of a discourse" that paves the way not only for ultra-subjectivation (Dardot and Laval 2013, 297), (Dardot and Laval 2014b) but also the corresponding ICT usage and growth. Here, a crucial need arises to define such orders of discourse, which involves, for Fairclough (2013, 291) once again, the "social structuring of semiotic difference and variation".

2. Neoliberalism and the information society

At the intersection of our sociocultural focus on identity and the postmodern critique's field of vision lies the information society, as a framework of ICT, which is interwoven with and furnished by a number of aspects of neoliberalism.

It is evident here, that communication theory, itself an interdisciplinary field, overlaps with other scientific disciplines, and so the move towards an interdisciplinary interpretation of the multidimensional concept of neoliberalism seems perhaps inevitable.

In line with our intention to employ our theoretical framework, immediately the questions arise: i) what is neoliberalism? and ii) why it is crucial to grasp this "vague and highly contested" (Rondelez 2021, 1-2) or "slippery, hazy and contentious" (Wacquant 2012, 68) concept, which has been a central, key term of academic debate since the 1990s, and iii) what relevance does it carry for ICT-related discussions?

Milton Friedman is usually considered an epitome of neoliberal thought, at least in view of his hegemonic economic model anchored by variants of market rule (Wacquant 2012, 66-69). Milton postulates on the notion of "private enterprise operating in a free market as a system of economic freedom and a necessary condition for political freedom" (2020, 6).

Friedman here followed in the footsteps of earlier authors, such as Dicey, Mises, Simons and Hayek, whose "emphasis was on economic freedom as a means toward political freedom" (2020, 15). In particular, Hayek, in his analysis of the process, titled *Road to Serfdom*, recognizes the importance of "autonomous spheres in which the ends of the individuals are supreme" (2006, 60). Accordingly, Milton Friedman argues that "individual freedom to choose, and competition of private enterprises

for custom, would promote improvements in the kinds of contracts available, and foster variety and diversity to meet individual need" (2020, 222).

Such approaches that postulate "economic freedom is also an indispensable means toward the achievement of political freedom" (Friedman 2020, 11) gave rise to the paradigm of neoliberalism based on a Foucauldian understanding that can be, *tout court*, grasped as the art of shaping populations (subjection) and the self (subjectivation) (Wacquant 2012, 69; Lorenzini 2018, 154; Iványi 2023, 648).

There is indeed also a wide-ranging corpus that suggests, based on these latter grounds, that "at the individual-level, neoliberalism insists that rationality, individuality, and self-interest guide all actions". Accordingly, in fact, the relevant ideology views itself as a global social science capable of explaining all human behaviour since all behaviour is thought to be directed by logical, individualistic, and selfish goals (Peters 2001; Smith 2012; Dardot and Laval 2014a, 2014b).

However, we also have to acknowledge here that the (post-)Foucauldian governmentality-focused interpretations of neoliberalism have provoked critique from numerous angles. First, in summarizing the corresponding traditions, Wacquant states that it remains "unclear what makes a technology of conduct neoliberal: certainly, such bureaucratic techniques as the audit, performance indicators and benchmarks (favourites of the neo-Foucauldian anthropology of neoliberalism) can be used to bolster or foster other logics, as can actuarial techniques". Similarly, he goes on to further state, "there is nothing about norms of transparency, accountability and efficiency that makes them necessary boosters to commodification". Thus, the "trouble with the governmentality approach is that its working characterisation of neoliberalism as 'governing through calculation' is so devoid of specificity as to make it coeval with any minimally proficient regime". In addition, he concludes "as technologies of conduct 'migrate' and 'mutate', neoliberalism is found to be everywhere and nowhere at the same time. It becomes all process and no contents; it resides in flowing form without substance, pattern or direction. In the end, then, the governmentality school gives us a conception of neoliberalism just as thin as that propounded by the economic orthodoxy it wishes to overturn" (Wacquant 2012, 70).

Pieter Rondelez points out that "scholars who reduce all the transformation in (urban) society to a neoliberal force or reality" deprive themselves "of a more complete vision of ongoing change and its concrete mechanisms and processes" (2021, 9). Others, such as Mark Purcell, show the limits of the critical approaches to neoliberalism from within the critical camp, arguing, instead of an "obsession" with neoliberalism, "we need to train ourselves to think not in terms of negating what exists, but in terms of producing what we desire. We need to be attentive to and discover our excellence, our power, our ability to imagine and create new objects, new relations, and new forms of life" (Purcell 2016, 616). Here Purcell refers to already existing frameworks, such as Deleuze and Guattari's collaborative work that teach us to focus our attention on our power to produce and create the world. At the same time, Rondelez points out that "Deleuze and Guattari do not argue that we should entirely neglect apparatuses of capital and the state—which indeed have a controlling function on our power to produce" (Rondelez 2021, 9).

Nevertheless, Dardot and Laval's (2013, 2014a, 2014b) focus arguably stands on firm grounds in as much as they outline the characteristics of neoliberalism where its essence is represented by the necessity to establish an adaptable alignment between individuals and institutions, expressed through the concept of the "enterprise man" (cf. Foucault 2008, 226) and simultaneously, an economic dynamics that is inherently subject to change due to its foundation in the fundamental principle of competition.

Information society indeed encounters most of the existing and contradictory definitions of neoliberalism, polarised along the market rule versus the Foucauldian *governmentality*[1] axis (Wacquant 2012, 68-70; cf. Dardot and Laval 2013, 272). Thus, information society can be interpreted as a macrocosm, i.e. a powerful set of ideas and institutional (Escobar 2012, viii) and political-economic (Harvey 2005, 2) practices, and its essential, individual constituent as a microcosm, such as in post-Foucauldian notions of the so-called "entrepreneurial subject" (Dardot and Laval 2013, 2014a, 2014b).

Anthropologist David Harvey (2005, 3-4) highlights such intertwinements, covering the entire spectrum between both poles above, attributing to neoliberalism the disruption of the divisions of labour, social relations, welfare provisions, technological mixes, ways of life and thought, and reproductive activities, in so far as neoliberalism values market exchange as "an ethic in itself", and by doing that "it seeks to bring all human action into the domain of the market".

These manoeuvres require, Harvey (ibid.) goes on to point out, "technologies of information creation and capacities to accumulate, store, transfer, analyse, and use massive databases to guide decisions in the global marketplace". Therefore, a symbiotic relation is suggested between these two spheres (cf. Wacquant 2012, 69).

3. Neoliberalism and cultural evolution: social and anthropological aspects

As anticipated above, neoliberalism has prevailed in a number of spheres of individual social life (Escobar 2012; Wacquant 2012), such as in the microcosm of the entrepreneurial subject (Dardot and Laval 2013, 2014a) and in the macrocosm of the global market (Harvey 2005).

3.1. Citius, altius, fortius: *the entrepreneurial ethos and the spirit of self-accomplishment*

The influence of neoliberalism on culture and subjectivity is well documented. Authors from various backgrounds (Foucault 1978, 1994; Guattari 2000; Harvey 2005;

[1] As Wacquant (2012, 69) notes: "Students of governmentality propound a 'messy' view of neoliberalism as a flowing and flexible conglomeration of calculative notions, strategies and technologies aimed at fashioning populations and people". This view derives from Foucault's writings and 1978–1979 lecture course at the College de France on The birth of biopolitics (Foucault 2008), which have inspired a general research programme on "governmentality" as the art of shaping populations (subjection) and the self (subjectification). (ibid.)

Mignolo 2011[2]; Dardot and Laval 2013, 2014a, 2014b; Türken et al. 2015) have explored how subject formation has taken place in multiple and contradictory ways in recent years and how it is related to the paradigm of neoliberalism.

In modern capitalist societies, competition and personal success, both economically and politically as well as in the world of entertainment and sport, is encouraged, celebrated and rewarded (Mignolo 2011, 255; Dardot and Laval 2013, 2014b). Such dynamics already given in the real (offline) world are arguably only amplified by ICT, as will be shown soon.

Guattari (2000, 6) argues that the system of post-industrial capitalism, which we may substitute for neoliberalism in view of their common grounds and shared values, has been engaged in an insidious and invisible "penetration of people's attitudes, sensibility and minds".

Accordingly, a new type of individual, namely, a competitive one, is being shaped and moulded by the unseen pressure of neoliberal discursive sets (Escobar 2012) and corresponding market forces (Harvey 2005).

In the interpretation of sociologist Mark Featherstone (2017, 100), the neoliberal subject, or, in the words of Dardot and Laval, the neo-subject *tout court*, "is always in excess of itself, endlessly looking to overcome its own limitations, in a world that is similarly unbounded and endless" (Dardot and Laval 2013, 279). This definition is of crucial importance both in terms of the hypothesis described earlier and the empirical findings to be demonstrated later on.

As argued above, this process occurs with the involvement of beings themselves and, we may add, in developed (Western) societies in particular.

The neoliberal subject is a man of competition and of power. The new subject, i.e. the ideal entrepreneur, is presented as a person of competition and performance. The self-entrepreneur is a being made to "succeed", to "win" (Dardot and Laval 2014b).

The new subject must be grasped in line with the discursive and institutional practices that engendered the figure of the man-enterprise or "entrepreneurial subject" in the late twentieth century, by encouraging the institution of a mesh of sanctions, incentives, and commitments, whose effect is to generate new kinds of psychic functioning. "As a way of being of the human ego", personal enterprise is supposed to be "a way of governing oneself according to principles and values" (Dardot and Laval 2014a; cf. Wacquant 2012, 70). Social theorist Nikolas Rose (1996, 154) identifies some of those principles and values as "energy, initiative, ambition, calculation and personal responsibility".

[2] In the words of Mignolo, accordingly, "The technological revolution together with the corporate values that were prioritised in Western Europe and the United States [...] made management itself the prime centre of social life and knowledge. Corporate values require efficiency — the more you produce, the larger the gains, the happier you are supposed to be. And technology has trained its own experts who are paid to 'improve' technological management of everything. In the case of nurturing and education, the technological revolution is creating a new type of subject whose 'knowledge' consists in spending time to package 'knowledge' according to the technological options on the menu. 'Technological thinking' takes the place of thinking in general and of disciplines like philosophy and the philosophical aspect of all knowledge, reducing them to a technological packaging of options. Nevertheless, this is happening to [...] the population that has the 'privilege and the benefit' of economic and energy resources that enable them to 'enjoy' technology" (Mignolo 2011, 15).

Accordingly, the new person always has to produce and enjoy "even more", so he or she becomes directly "addicted to systematic enjoyment". Thus, according to Dardot and Laval (2013, 2014a, 2014b), life in its entirety becomes an element of production, performance and pleasure.

For the neo-subject, the target of the new power is the desire to realise oneself, the project one wishes to pursue, the motivation that inspires the "collaborator" of the enterprise, and, ultimately, "desire" by whatever name one chooses to call it. The desiring being is not only the point of application of this power; it is the relay of apparatuses for steering conduct (Dardot and Laval 2013, 260).

This is the twin sense of a performance-focused managerial attitude or even the "palming off" advertising slogans described later on. If we did not take the importance of the tradition of critical social theory (Craig 1999) into account, we would underestimate the "even more" imperative that targets the increase in individual efficiency in all spheres of life that is always in demand. "We are the champions" has become the anthem of the new entrepreneurial man (Dardot and Laval 2013, 102-106). In the text of this song, also the line "No time for losers!" can be heard (Dardot and Laval 2013, 283), (Dardot and Laval 2014b), encapsulating the spirit of the age of self-mastery (2013, 267).

In this perspective, today's beings are required to "go beyond themselves" and to "expand their boundaries". This particular requirement of the system is based on "growth" (i.e. capital accumulation) conditions that the entrepreneurial self and human capital fuses. "Extra pleasure" extruded from ourselves is the driving force that propels the new subject and the new competitive system.

Here an unprecedented degree of subjectivation, namely "ultra-subjectivation", emerges, the purpose of which is no longer the ultimate and stable state of "self-possession", but rather the self-perpetuating transcendence of the self, which is in its system most closely aligned with the logic of the universal principle of competition (i.e. enterprise), and beyond that, with the "cosmos" of the global market.

The corresponding transformations, driven by the individual and collective internalisation of the spirit of entrepreneurial competitiveness as a general behavioural and/or user model, are also materialized in patterns of ICT promotion and the sharing of online content, representing an internal conformity to "self-accomplishment" (Dardot and Laval 2013, 267). The search for excellence by constant self-work or self-improvement is embodied in the usage and (self-)representation of ICT, with a continuous, and now even enhanced emphasis not only on innovation, but also on competitiveness, as will be shown later on.

3.2. Semper aliquid novi: *fetishization of innovation and technology*

Arguably, discursive and institutional practices have been promoting innovation within and surrounding digital media as a normative logic that results in constant changes manifested in a number of contexts. These include the regular modifications of media surfaces, new available apps and the behaviour patterns of ever-changing

user environments. Accordingly, innovation and technology have become both the driving forces and displays of ICT growth.

The transformations at hand, accompanied by "the restructuring and re-scaling of network relations between social practises" (Fairclough 2013, 126), all depend upon new technologies.

It is evident that along with neoliberalism there has been an extraordinary boom in information technologies, which have become a privileged arena of neoliberalism. In line with this, the main arenas of production that have gained from this boom in ICT are the emergent cultural industries (films, videos, video games, music, advertising, art shows), which use IT as a basis for innovation and the marketing of new products. These processes, described thoroughly already by Harvey (2005, 157-158), result in a "hype around these new sectors". In addition, "the neoliberal theory of technological change relies upon the coercive powers of competition to drive the search for new products, new production methods, and new organisational forms. This drive becomes so deeply embedded in entrepreneurial common sense, however, that it becomes sort of a fetish belief: that there is a technological fix for each and every problem. To the degree that this takes hold not only within corporations", but also various – if not all — spheres of life, "producing powerful independent trends of technological change" (Harvey 2005, 68-69).

Analysis has a significant contribution to make to research on the relationship between technological change, mediation, economic change, and wider social change – both in terms of how the integration of new technologies into economic, political, social and cultural processes is instantiated through new genres (i.e. elements of orders of discourse), and in terms of how textual elements are woven into the fabric of the "information society" (cf. Castells 2010).

3.3. Sumptus effusi *and the hegemony of consumptive practices*

Consumptive practices have arisen and been driven by "market demands", i.e. an economics dynamics reflected by and dovetailing conveniently with advertisements and tracking strategies targeting online activities. Thus, innovation and competitiveness are shaped according to the principles of performance and pleasure, which frame both ICT usage and its (self-)presentation or marketing.

According to the post-Foucauldian interpretation of Rose (2007, 131, 252), in the context of the "politics of life itself" and, in Foucauldian terms, "bio-politics", we may well agree with semiotician Walter Mignolo (2011, 144), who states that "political and economic strategies for controlling life join forces with consumerism in a particular way: consumers are seduced to consume not because of the value of having such and such an object, but because consuming that would ensure a better and happier life. What is being sold and bought is not merely the commodity but the commodity as the ticket to enter the dream-world of a longer and better life". This politics of life itself extends into the macrocosm of the global market (Dardot and Laval 2014a).

Consumption as a social reality has been present since well before the advent of ICT. As a consequence, most of us are already living in a consumption economy, which never tires of novelty and citizens have long been turned into consumers of services (Toulmin 1990, 5; Dardot and Laval 2014a).

Canadian economist of Hungarian and Polish background Kari Polanyi Levitt (2013, 207) even ventures to suggest that "consumerism is elevated to the status of the supreme objective governing rational human behaviour".

Way before ICT, traditional media itself had contributed thereto, as "there is a wide range of specific messages in advertisements, suggesting connections between products and lifestyles and between services and states of mind. There is an underlying commonality to almost all advertisements: they are fundamentally about selling, address their audiences as consumers and celebrate and take for granted the consumer-capitalist organisation of society. Their perspective is, of course, decidedly ideological. Ads tell us that happiness and satisfaction can be purchased, that each of us is first and foremost an individual consumption unit, and that market relations of buying and selling are the appropriate – perhaps the only – form of social relations. In this process in question, advertising elevates certain values – specifically, those associated with acquiring wealth and consuming goods – to an almost religious status. All in all, the underlying message in advertising, which permeates our media culture, is the importance of the values of consumerism" (Croteau and Hoynes 2003, 184-188).

Consequently, the "performance/pleasure" apparatus discussed earlier, also becomes "apportioned into diversified mechanisms of control, evaluation, and incentivisation and pertains to all the cogs of production, all modes of consumption, and all forms of social relations" (Dardot and Laval 2014b).

Not surprisingly, consumptive practices have emerged and been propelled by "market demands", i.e. an economics dynamics, and are mirrored by and aligned conveniently also with advertisements and tracking strategies targeting and surrounding online activities.

4. App users vs the rest: Central European case studies of the online neo-subject

4.1. Hypothesis in detail with a hindsight to our theoretical postulata

Our hypothesis, as we have seen, is that neoliberal ideology has had a significant influence on contemporary international conferences dedicated to technology and innovations, shaping the way these events are presented and conducted. These are *inter alia*, the following senses, generally falling under our threefold starting points that were set out above in sections 3.1–3.3 covering the entrepreneurial ethos and the spirit of self-accomplishment; the fetishization of innovation and technology; and the hegemony of consumptive practices. Specifically:

Neoliberalism promotes the idea that markets and competition are the most efficient mechanisms for resource allocation. In the context of innovation conferences, this often means that these events are organized and funded by private entities or corporations seeking to promote their products, services, or brands. These sponsors often influence the agenda and content of the conferences, aligning them with their own market-driven goals.

In addition, neoliberalism encourages globalization and market integration. Thus, innovation conferences frequently have a global perspective, aiming to connect innovators and markets across borders, fostering international collaboration, and promoting free trade and investment.

Neoliberal ideology also strengthens the belief that market-driven solutions are the most efficient. With view to this end, conference themes often concentrate on how technology can solve various problems, with a strong commercial and consumer-oriented perspective. Discussions may explicitly revolve around how technology can optimize business operations, improve customer experiences, and drive profits.

Strong emphasis is placed on entrepreneurship and profit-seeking. Innovation conferences, in this spirit, often focus on showcasing entrepreneurial success stories and promoting the idea that innovation should primarily serve economic growth and profit generation. Attendees are encouraged to pursue innovation for commercial purposes.

Neoliberalism underscores individual initiative and self-reliance. Therefore, current conferences dedicated to innovation and technology tend to highlight individual innovators, entrepreneurs, and tech start-ups, and their innovative achievements, concentrating on personal success stories and achievements (*NB*, this can overshadow the role of collective efforts or public sector initiatives in shaping online technology).

Neoliberal ideology accentuates measurable outcomes and metrics. As a result, innovation conferences may focus on quantifiable results, such as return on investment, market impact, and profitability (while, we may add, at the same time, sometimes neglect broader societal or environmental outcomes).

In summa, neoliberal ideology has influenced innovation conferences by fostering a market-driven, profit-oriented approach to innovation, emphasizing individualism and entrepreneurship, and promoting global market integration.

4.2. Methodology

Bearing in mind that Foucault focuses almost exclusively on texts when trying to grasp neoliberalism (Rondelez 2021, 3), our methodology follows critical discourse analysis. That is, a systematic exploration of "often opaque relationships of causality and determination between (a) discursive practices, events and texts, and (b) wider social and cultural structures, relations and processes; to investigate how such practices, events and texts arise out of and are ideologically shaped by relations of power and struggles over power" (Fairclough 2013, 93).

This was followed with the intention to grasp how values, beliefs and assumptions are communicated in the study genre (Fairclough 2013, 75-79, 939-7) of manually chosen "tech conferences" of 2023 held in Central and Eastern Europe, and how the corresponding language (and phraseology) used related to their social, political and historical contexts (cf. Luo 2019).

4.3. Relevance of the discourse manifested by social practices

The experiences of a series of conferences as forms of social practices (cf. Fairclough 2013, 172–232) from, although regionally connected but separate countries, namely Hungary, Slovakia, the Czech Republic and Poland, represent a similar set of concepts with substantially overlapping imagery, phraseology and vocabulary of texts, i.e. interpretations of social reality arguably constituting an international tendency. The factual reality of the organizing and the taking place of such events demonstrates an existing social engagement, which also has relevance for any scholar of social sciences.

Such an empirical framework can well be juxtaposed to the experiences of international tendencies previously described by already cited scholars, such as Dardot and Laval (2013, 2014a, 2014b). Textual analysis, which was used hereinafter to consider the texts related to the conferences, includes, as the Gramscian scholar Fairclough (2013, 299) points out, "linguistic analysis and social analysis". It also includes, what the author has called "interdiscursive analysis", that is, seeing texts in terms of the different discourses, genres and styles they draw upon and articulate together.

The reason to analyse texts and discourses is to ascertain the significance of ideologies, which also cannot be undervalued. The latter have a durability and stability which transcends individual texts or bodies of texts, they can be associated *inter alia* with discourses as representations. A discourse is thus a particular way of representing some part of the world (cf. Escobar 2012).

Recognizing the importance of the dynamics of discourse and power to any study (cf. Escobar 2012, vii), having all these perspectives and the tradition of critical social theory (Craig 1999) in mind, it was necessary to enter into the social and cultural configurations through discourses that are being produced *in situ*, with a focus on performing a textual analysis (Fairclough 2013) of Central and Eastern European conferences as follows.

4.4. Recent regional reflections of a regime

Although as introduced above, the tendencies of neoliberal subjectivation (Dardot and Laval 2013, 2014a; Türken et al. 2015) in terms of innovation, consumerism, and the principles of performance and pleasure (Dardot and Laval 2014b) far surpass the Central European theatre, it is relevant to identify local, regional concentration points of large, arguably global processes.

In order to capture certain social tendencies of significant magnitude, it is arguably worthwhile to cast a glance based both on a Dardot and Laval-based perspective (2013, 2014a, 2014b) and a textual analysis (Fairclough 2013), on some major conferences in the Central European region, bearing in mind that "social practises involve forms of work, identification, that is the construction of social identities, and representations of the social world" (Fairclough 2013, 172).

The following thematic compositions represent and form discursive sets, at the intersection of which notions of pleasure (joy) and performance (efficacy), (technological) innovation and consumption are to be found, along with a general teleology and the authority of neoliberal ideals.

Conference 1 held in Hungary, in mid-spring of 2023, explicitly presented pleasure and performance not only as natural drives *per se*, but also channelled them into the ICT growth agenda, in the context of the following theme: "Tyrants in our souls. Imagination and desire as (evolutionary) driving forces".

Users of ICT were defined in teleological terms, regularly portrayed as accomplishers of historical or heroic deeds, distinguished in a dichotomous manner from others: "Who buys more meat, app users or those lagging behind?".

In addition, other titles of presentations and panel discussion also echoed this division of society, while at the same time, tended to reflect an overall orientation to the "market": "Content consumption and purchasing habits of the digitally affinitive population".

As a new historical era is being taken for granted (cf. title "Our new place in the New World"), one should not hesitate to join, and, obviously, consume the relevant products.

Conference No. 2, held in Poland in the early autumn of 2023, on the one hand, asserted the ideology of competition already in the context of the call for relevant applications. On the other hand, the criterion of competition between such "visions" becomes the extent to which they serve the cause of an abstract "freedom" that innovation is supposed to promote. In other words, the specific measure of the concept of universal freedom becomes the innovative impulse: "The 'Innovation for Freedom Challenge' calls on you to manifest your vision for a world in which innovation serves as a driver for freedom. Be it through freedom of speech, freedom of action, freedom from oppression, or any other meaningful interpretations of freedom that matters to individuals and communities". Thus, undisguised claims for leading the future were made, offering the choice to be included or fall behind.

Conference No. 3 held in the Czech Republic, in late spring in 2023, once again featured themes such as the Digital Economic (R)evolution. It thus raised the flag of innovation with the following announcement: "The economy is running up against its limits and, if it wants to be successful and prosperous, it must focus on technological transformation leading to higher added value".

As a *differentia specifica*, vis-à-vis the former conferences, an exhibition accompanied the event. In the relevant framework, thus, "Visitors can look forward to robots, a life-size 3D avatar with AI technology enabling voice communication, demonstrations of non-formal education, programming of ozobots, experiments

with a thermal camera and much more". Among those confirmed exhibitors, obviously, one could find numerous representatives of ICT behemoths.

In the context of the "Inspiration track" (already, inherently suggesting a normative logic) series of Conference No. 4, held in Slovakia in late autumn of 2023, the fourth presentation carried the title "Learning Culture: Adapt or Die". The contributor shared thoughts and personal experience about finding the corresponding solution. Accordingly, they tried to focus on people's development from the beginning with a current junior program of "intensive study and experience-building". In the latter framework, participants "have been forced to constantly update and experiment with how to support the learning culture".

The third presentation at the same Conference's same series titled "From kitchen to code: What software testers can learn from a Michelin-star chef about quality and excellence" aimed to highlight the "undeniable" parallels between software testing and cooking. Here, both an explicit mission resulting in excellence and self-realisation and the expansion to other arenas of life are manifested: "From careful ingredient selection and meticulous planning to the use of appropriate techniques and the importance of presentation and continuous improvement, these disciplines share fundamental principles".

Conference No. 5 held in Poland in late autumn was supposed to be "the largest data science community in Poland, based in Warsaw, Poland. It is an informal non-profit organization working to exchange ideas and knowledge about data science, data engineering and so-called artificial intelligence." Its *raison d'être* is, according to the webpage, to "discuss tools, technology and business opportunities related to collecting, processing and visualization of data, as well as machine learning and deep learning". Here again, the neoliberal ideology, which tendentiously places a strong emphasis on benchmarking, i.e. measurable results and metrics, comes into play.

One of the presenters of the "Technology Stage" in Conference 6, held in the Czech Republic, acted as a harbinger to announce that "the beat of the technology drum is certainly relentless". In this spirit, it was also concluded that this former process occurs "with no limits to cloud scale and huge innovations from the biggest brains". In a quite similar tone, another participant at the "Business Stage," offered "valuable insights for managers who plan to maximize the potential of the Power Platform in their organizations (or are already working on it)". Once again, a constant teleological drive to human and enterprise "growth" became fully displayed.

On the basis of our text analytical methodology (cf. Fairclough 2013), the general experience seemed to be that these conferences anticipated that:

1) there are elementary and comprehensive changes in society;
2) it is possible to be at the forefront of them, as kinds of "chosen ones" by making use of "once in a lifetime" opportunities, should the motivations reflect and represent performance and/or enjoyment-related objectives; and
3) digital affinity (i.e. commitment to innovation) and consumerist drives are partly the keys leading to this ability.

5. Conclusion

This paper aimed to explore the recent tendencies of the neoliberal (cf. i.a. Harvey 2005; Mignolo 2011; Wacquant 2012) ultra-subjectivation (cf. Dardot and Laval 2013, 2014a, 2014b) via ICT from a post-Foucauldian (Foucault 1978, 1994; Deleuze and Guattari 2005; Escobar 2012) perspective representing the tradition of critical social theory (Craig 1999, 144-149).

Thus, by including an interdisciplinary framework, the theoretical spectrum of this research aimed to juxtapose ICT with experiences of the microcosm of the entrepreneurial subject (Dardot and Laval 2013, 259) (Dardot and Laval 2014b) and the macrocosm of the global market (Harvey 2005; Mignolo 2011) already established in the "offline" world.

This endeavour relied on a premise that the neoliberal concept of competition, with its inherent inclination for consumption, and a contemporary binary of pleasure and performance both define user attitudes and promotional trends in ICT enforcing an ideologically loaded, normative representation.

Experiences from a textual analysis of six Central and Eastern European conferences as forms of social practices (cf. Fairclough 2013) demonstrate that:

- innovations in technology, competitive entrepreneurship and consumptive practices become integrated in a discursive order (Escobar 2012, 5; cf. Fairclough 2013, 27) that paves the way not only for an ultra-subjectivation by ICT (Dardot and Laval 2013, 297) (Dardot and Laval 2014b) but also the corresponding ICT usage and growth;
- an epistemological regime is formed, which stipulates the compliance of the microcosm of the neo-subjects, who always want to perform (produce) and enjoy (consume) "ever more", even via the macrocosm of the ICT.

These together form the new (neoliberal) way of the world, as Dardot and Laval (2013, 2014a, 2014b) put it, or, *tout court,* the "system" in the description of Castells (1996, I, 2005).

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Determinants of the backfire effect: Discrepancies between two groups with different political orientations

In this study, we explored the determinants of the backfire effect by analysing supporters' reactions to information propagated by the opposition camps. We focused on the topic of pork consumption. The study cohort (N = 971) comprised the supporters of the pan-blue (N = 422) and pan-green (N = 549) camps in Taiwan. Data were collected through an online survey. The echo chambers and message response emerged as robust factors influencing the backfire effect on individuals regardless of their political orientation. Message presentation negatively affected the induction of backfire effects. For the pan-green supporters, behavioural control and animal welfare attitude, respectively, exerted positive and negative influences on the induction of backfire effects. Our findings provide insights into the determinants of the backfire effect, a phenomenon wherein individuals fail to differentiate between fact and fiction despite receiving credible corrective information.

Keywords: *Backfire Effect, Disinformation, Echo Chambers, Message Presentation, Message Response*

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How to cite this article:

Kang, Jen-Chun, Chaoyun Liang. "Determinants of the backfire effect: Discrepancies between two groups with different political orientations".
Információs Társadalom XXIII, no. 4 (2023): 38–57.
https://dx.doi.org/10.22503/inftars.XXIII.2023.4.3

1. Introduction

Taiwan has undergone rapid political and economic development over the past six decades. However, it has also faced extensive diplomatic challenges because of regional politics, which have led to the exclusion of Taiwan from participation in numerous trade associations and international organisations. In particular, political factors often interfere with the import and export of agricultural products. Taiwan has two major political parties: the Kuomintang (KMT) and the Democratic Progressive Party (DPP). The party flags of the KMT and DPP are blue and green, respectively; thus, the terms 'pan-blue' and 'pan-green' are commonly used to denote political affiliations to these parties. KMT supporters are regarded as 'pro-China', whereas DPP supporters are regarded as 'anti-China' (Clark, Tan, and Ho 2018).

After the KMT government's decision in 2012 to lift the ban on the import of ractopamine-containing beef from the United States, the later DPP government announced (2020) its intention to allow the import of US pork containing ractopamine in amounts compliant with international standards, but with strict regulatory measures in place. In response, the KMT—Taiwan's largest opposition party—shared a video on its Facebook page, claiming that ractopamine-fed pig exhibit agitation and twitching, thereby provoking public outcry and disrupting the consumer market (Kang and Liang 2022a). However, the American animal protection group Animal Outlook, who are responsible for the video, later clarified that the epileptic pig in the video had not received any ractopamine diet. Thus, the video was confirmed as being a piece of disinformation aimed at political mobilisation. Although Taiwan's Council of Agriculture immediately clarified this disinformation, it continued to circulate widely. Furthermore, consumers adjusted their purchasing behaviours on the basis of a 'better to have it' mentality, turning pork consumption in Taiwan into a political issue rather than a purely market-driven behaviour (Kang and Liang 2022b).

Studies have indicated that the dissemination of political messages on social media generates echo chambers and backfire effects. In this case, pan-green supporters refuse to believe or make negative remarks against the DPP, which is the current ruling party in Taiwan, whereas pan-blue supporters firmly believe and fuel negative rhetoric against the DPP (Rich 2009). The term "echo chambers" refer to a repetitive exposure to specific agreed-upon ideas in a particular media environment, which can distort these ideas into being perceived as facts by the general public (Sunstein 2009). The backfire effect, also known as the boomerang effect, describes how people react intensely and negatively to counterarguments against information that conflicts with their preferences, solidifying their existing views instead of accepting new information and debate (Nyhan and Reifler 2010; Redlawsk 2002). This effect is often influenced by individuals' political orientation and the manner in which messages are disseminated. Both echo chambers and backfire effects can be influenced by the manner in which people respond to messages on a daily basis and both are considered planned behaviours (Peter and Koch 2016).

Although hundreds of relevant studies have been conducted internationally, few studies have focused on echo chambers and backfire effects in an Asia context.

Therefore, in this study, we compared the backfire effect among Taiwanese people with different political orientations and investigated the effects of planned behaviours, political orientation, information dissemination, message response, and echo chambers on the backfire effect. Through this study, we aimed to identify the determinants of the backfire effect, and to provide recommendations that can be used by relevant organisations and government departments to reconsider their strategies and regulations. In addition, this study serves as a reference for follow-up studies on human communication theories.

2. Literature Review

2.1. Backfire effect

The lack of a gatekeeping mechanism on the Internet, coupled with the anonymity and immediacy it offers, is highly conducive to information dissemination (Himma-Kadakas 2017). At the same time, the decision-making behaviours of individuals are influenced by internal and external message cues (i.e. message sender, message type, dissemination motivation, and surrounding environment) (Wu, Liang, and Ip 2022). When a message is posted online, the general public tends to respond in various manners, such as by liking, commenting, clicking, and sharing (Himma-Kadakas 2017). If the title and content of a message induce negative emotions, such as anxiety, fear, anger, or hatred, the message recipient's mental state can be easily affected.

Furthermore, efforts to correct factual misperceptions can actually increase the dominance of false beliefs and even induce aggressive behaviours, causing backfire effects (Haglin 2017). This effect arises because people tend to prefer information sources that align with their own stance; such that when they encounter perspectives or facts that contradict their beliefs, they may ignore or resist them (Buchanan 2021). Even if they identify information to be false, they may still have preconceived interpretations and make assumptions about follow-up information because of their alignment with the source of such information; this induces a backfire effect (Peter and Koch 2016). The backfire effect is a phenomenon in which attempts to correct incongruent information result in the reinforcement of recipients' original beliefs, and often elicit intense reactions (Nyhan and Reifler 2010; Petrova and Cialdini 2005).

While most of the aforementioned studies used experiment formats, giving the researchers an opportunity to observe belief change over time under controlled conditions, this study used self-reports about the likelihood of actively countering contrarian views; i.e., exploring people's (self-perceived) readiness for active behavioural response when encountering views that they disagree with, to add new theoretical and methodological insights to the literature.

The backfire effect is a form of confirmation bias. Highly controversial or poorly defined messages can easily trigger a backfire effect, but this effect is not necessarily

limited by personal ideology or partisanship (Vedejová and Čavojová 2022). Nyhan (2021) found that when people receive information that has been fact-checked, they tend to accept any clarifications, even if the accuracy-increasing effects of such corrective information are not always sustained or strengthened. Sincere and immediate factual clarifications may be more effective than simple allegations that the original message is false; however, people may still not fact-check because of the backfire effect (Swire-Thompson et al. 2021).

2.2. Political orientation and echo chambers

In the modern world, social media platforms serve as a catalyst for people to participate in politics and change society; however, people usually prefer media and information sources that are aligned with their own stances (Haglin 2017). Individuals can feel threatened when they encounter information that contradicts their beliefs because they tend to judge the authenticity of such information on the basis of their political beliefs (Nyhan and Reifler 2010). Partisan news media frequently invoke negative emotions among the general public, thus enhancing the effectiveness of information dissemination. When negative and extreme responses are generated by political news, the higher is the tendency of the general public to limit open and diverse perspectives and to reduce their trust in politicians (Hasell and Weeks 2016). People's political stances may further affect their communication and consumption behaviours, and highly politicised topics may promote mutual connections. Upon receiving messages that are against their own political beliefs, some individuals may resist or strengthen their own political beliefs (Copeland and Boulianne 2020).

The "echo chambers" is regarded as a phenomenon where information is propagated in a closed system and amplified through repeated communication, causing people to selectively accept information consistent with their own beliefs while ignoring contradictory information. This state of homogeneous reception and sharing leads to confirmation bias; and polarisation in politics and society is thus increased (Bakshy, Messing, and Adamic 2015; Sunstein 2009). Through an algorithmic mechanism, social media platforms filter and divide information such that users are exposed to a substantial amount of information consistent with their beliefs (Kitchens, Johnson, and Gray 2020). People tend to interact with others who share their perspectives. If the authenticity of information cannot be verified, the general public may consider it to be the mainstream opinion because of their frequent exposure to such information; then, secondary transmission occurs and people may gradually develop extreme attitudes (Bakshy, Messing, and Adamic 2015). This phenomenon can also be influenced by various regional or cultural factors and requires different confrontation strategies (Wang and Song 2020).

The segmentation mechanism helps divide a network community into several echo chambers with different orientations. Some echo chambers promote boundary spanning, some focus on broadly popular topics, some emphasise reputation building, and some relate to locally popular phenomena (Lee, Britt, and

Kanthawala 2022). People share articles with similar views and track communities with the same stance as their own, resulting in group polarisation (Currin, Vera, and Khaledi-Nasab 2022). Social media users may exhibit highly prominent and polarised behaviours (Kubin and von Sikorski 2021), and politically mobilising messages strengthen the echo chambers (Jarvis 2010). When individuals observe high homogeneity in their environment in terms of their political ideology, they avoid being overly exposed to opposite narratives; this avoidance is conducive to deep political mobilisation (Boutyline and Wille 2016). Because of the large number of responses reflecting similar ideas, the members of polarised online communities may incorrectly believe that the general public agrees with their opinions and may lead them to take drastic actions, which sometimes can have severe consequences (Luzsa and Mayr 2021).

2.3. Planned behaviour and information dissemination

The theory of planned behaviour, which is derived from the theory of rational action, proposes that human behaviour is generally influenced by various external and objective environmental factors rather than being regulated by self-will (Ajzen 1991). People often pay attention to certain messages because of their needs, interests, and values (Zaichkowsky 1994); this attention focus affects their behavioural intentions and actual behaviours due to their attitudes, social pressure (i.e. subjective norms), self-confidence, and support from others (i.e. perceived behavioural control) (Sun and Liang 2020). Attitudes refer to a positive or negative emotion experienced by individuals when they receive a message (Ajzen 2020). Subjective norms represent the comprehensive expression of a series of psychological processes and behavioural tendencies; they are also the influence of significant others or the pressure of external groups on individuals when they take specific actions (Bodur et al. 2000). Perceived behavioural control refers to the ability and resources that people require to judge information and the degree to which they can grasp the information (Ajzen 2020). The attitudes of social media users positively influence their intention to share information, and perceived behavioural control is a robust factor that encourages people to use fact-checking platforms (Koohikamali and Sidorova 2017).

Messages can be presented by a dynamic or static approach. Dynamic presentation includes images, sounds, and animations, whereas static presentation includes text, images, and graphics. Dynamic presentations attract more attention than static presentations do; while higher levels of diversity in messages confer better communication effects (Kang and Liang 2022b; Maity, Dass, and Kumar 2018). The publishers of news are closely associated with the content of the published information, and the public judges the fairness and accuracy of such information according to its source; hence, the credibility of officials, experts, and scholars tends to be high. In addition, the degree of professionalism of the publisher is considered by the public when processing the published information (Lewandowsky et al. 2012).

3. Methods

In the present study, we conducted a questionnaire survey in May 2022. The first page of the questionnaire clearly conveyed that that the target sample of this study would comprise individuals with experience in purchasing pork or pork-derived products. In addition to publicising the survey through social media, we contacted the supporters of different political camps at the caucuses of the major political parties in the Legislative Yuan (the highest legislative organ in Taiwan) and the parliamentary caucuses of different political parties in various counties and cities as well as people's representatives and media workers (at all levels) with different political orientations. Questionnaires were also distributed to the employees of various radio stations, online media platforms, and television stations.

This questionnaire helped provide data on the following seven domains: demographics (sex, political orientation, educational level, and age), political stance [three items referring to the study of Copeland and Boulianne (2020)], planned behaviour [12 items referring to the studies of Ajzen (2020), Bodur et al. (2000), and Koohikamali and Sidorova (2017)], information dissemination [seven items referring to the studies of Buchanan (2021) and Maity, Dass, and Kumar (2018)], message response [three items referring to the studies of Ettinger and Jehiel (2021) and Himma-Kadakas (2017)], the echo chambers [four items referring to the studies of Kitchens, Johnson, and Gray (2020) and Sunstein (2009)], and the backfire effect [five items referring to the studies of Nyhan and Reifler (2010) and Peter and Koch (2016)].

The responses were scored on a 6-point Likert-type scale (1, *strongly disagree*; 2, *disagree*; 3, *somewhat disagree*; 4, *somewhat agree*; 5, *agree*; and 6, *strongly agree*). The survey was hosted on SurveyCake. All questions were in multiple choice format, and responding to all questions was mandatory. Because the responses could be submitted anonymously and the questionnaire clarified the study purpose on its first page, the respondents did not have any privacy concerns. After analysing the responses in the pretest stage of this study, we found that each question exhibited high reliability and validity. Data were analysed using SPSS (version 25). Descriptive data were used for demographic variables. We performed factor, variance, and multiple regression analyses.

4. Results

In total, 1,427 questionnaires were returned. We removed invalid questionnaires with 0 variance and the questionnaires completed by respondents with a median political stance (M = 8–13). On the basis of their political stances, 422 respondents with an average political stance value of ≤7 were included in the group supporting the pan-blue, whereas 549 respondents with an average political stance value of ≥14 were included in the group supporting the pan-green. Finally, a total of 971 valid respondents were analysed. Table 1 summarises the demographics of the respondents.

Demographic variables	Percentage (Frequency)		
Sex	Men		Women
	56.7% (551)		43.3% (420)
Political orientation	Pan-blue camp		Pan-green camp
	43.4% (422)		56.6% (549)
Educational level	High school and under	Undergraduate	Postgraduate
	12.8% (124)	63.3% (615)	23.9% (232)
Age	≤35	36–44	≥45
	29.1% (283)	27.8% (270)	43.1% (418)

Note: Own editing.

Table 1. Respondent demographics (*N* = 971)

The criteria used in the factor analysis were having eigenvalues greater than 1 and having factor loadings greater than .4. For the factor analysis of planned behaviour, three factors were extracted, namely attitude, perceived behavioural control, and subjective norms (Table 2). The α value of each factor was higher than .75, which indicated high reliability. The total cumulative explained variance was 63.47%, which indicated high factorial validity.

Factor/Item	a	b	c	*Mean*	*α*	%variance
Attitude (a)				5.53	.77	26.67
Pig farms should maintain satisfactory environmental cleanliness.	.83					
Pig farms should have ample feeding space.	.78					
Healthy eating is important.	.76					
I value food safety.	.71					
Perceived behavioural control (b)				4.56	.80	20.19
I can judge whether information is true and am not easily misled.		.87				
I know various methods for finding correct information regarding food ingredients.		.84				
I do not overinterpret information.		.83				
I have friends who have specialised in agriculture or food and can be consulted if necessary.		.67				

Subjective norm (c)			4.33	.79	16.61
Friends or coworkers influence my choice of food purchases.	.87				
Loved ones influence my choice of food purchases.	.84				
Influencers or Internet celebrities influence my choice of food purchases.	.80				
Government-released inspection data influence my choice of food purchases.	.61				
Total variance explained					63.47

Note: Own editing.

Table 2. Results of the factor analysis for planned behaviour (*N* = 971)

For the information dissemination, two factors were extracted, namely, message presentation and message source (Table 3). The α value of each factor was higher than .6, which indicated good reliability. The total cumulative explained variance was 55.88%, which indicated good factorial validity.

Factor/Item	d	e	*Mean*	*α*	%variance
Message presentation (d)			4.84	.72	40.35
Dynamic information (video or animation) is more likely to attract my attention.	.86				
Illustrated information attracts my attention.	.85				
Positive information attracts my attention.	.60				
Message source (e)			4.55	.64	15.53
I often receive news-related information from certain news media (e.g. television and newspapers).		.77			
I pay attention to information released by government departments.		.71			
I often receive news feeds from social media, such as Facebook, Instagram, and LINE.		.60			
I often receive news information from relatives and friends.		.59			
Total variance explained					55.88

Note: Own editing.

Table 3. Results of the factor analysis for information dissemination (*N* = 971)

In the present study, political stance was an independent variable with a single dimension. The relevant α value was .96, which indicated high reliability. The total cumulative explained variance was 91.89%, which indicated high factorial validity (Table 4).

Factor/Item	Political stance	*Mean*	*α*	%variance
Political stance		3.60	.96	91.89
I believe that the government strictly regulates the inspection of ractopamine-containing pork.	.97			
I believe that importing pork or related products that have passed safety inspections reflects the government's emphasis on food safety.	.96			
I believe that President Tsai values animal welfare.	.60			
Total variance explained				91.89

Note: Own editing.

Table 4. Results of the factor analysis for political stance (*N* = 971)

Message response was an independent variable with a single dimension. The α value was .81, indicating high reliability. The total cumulative explained variance was 72.92%, indicating high factorial validity (Table 5).

Factor/Item	Message response	*Mean*	*α*	%variance
Message response		4.19	.81	72.92
I leave a comment to respond to news or information that I am interested in.	.88			
I share or forward news and messages of interest.	.85			
I press the "Like" button on news or posts I am interested in.	.84			
Total variance explained				72.92

Note: Own editing.

Table 5. Results of the factor analysis for message response (*N* = 971)

The echo chambers was also an independent variable with a single dimension. The α value was higher than .7, indicating high reliability. The total cumulative explained variance was 57.03%, indicating high factorial validity (Table 6).

Factor/Item	Echo chambers	*Mean*	*α*	%variance
Echo chambers		4.13	.72	57.03
I trust the words of like-minded people.	.82			
I like to interact with like-minded members of social media groups.	.80			
I often browse sites that share my philosophy.	.79			
I avoid messages I do not agree with.	.59			
Total variance explained				57.03

Note: Own editing.

Table 6. Results of the factor analysis for the echo chambers (*N* = 971)

The backfire effect was a dependent variable with a single dimension. The α value was .85, indicating high reliability. The total cumulative explained variance was 63.26%, indicating high factorial validity (Table 7).

Factor/Item	Backfire effect	*Mean*	*α*	%variance
Backfire effect		3.43	.85	63.26
I report statements or messages that I disagree with.	.86			
I block comments or messages I disagree with.	.83			
I call friends to correct what I believe to be wrong.	.79			
I refute statements or messages I disagree with.	.78			
I set hidden fields for information sources I do not align with.	.71			
Total variance explained				63.26

Note: Own editing.

Table 7. Results of the factor analysis for the backfire effect (*N* = 971)

An independent samples *t* test was performed, and the results revealed that the average value of the backfire effect of the pan-blue supporters was significantly lower than that of the pan-green supporters (Table 8).

Variable	Pan-blue (n = 422)		Pan-green (n = 549)		*t*	Levene	*df*
	Mean	*SD*	*Mean*	*SD*			
Backfire effect	3.18	1.02	3.63	1.13	−6.42***	10.69	943.87

Note: ***p < .001, own editing.

Table 8. Results of the *t* test for political orientation (N = 971)

We performed a multiple regression analysis of the backfire effect of the pan-blue supporters. The overall model reached statistical significance (p < .001), with an explanatory power of .37 (Table 9). The echo chambers (β = .36; p < .001) was identified as the strongest factor inducing a backfire effect. Message response (β = .35; p < .001) exerted a considerable positive effect, whereas message presentation exerted a negative effect.

Variables		Backfire effect				
		Unstandardised beta coefficient	Standardised beta coefficient	*t*	*p*	VIF
(Constant)		.01		.01	.990	
Planned behaviour						
Attitude		.18	.08	1.94	.054	1.15
Perceived behavioural control		.03	.03	.77	.441	1.12
Subjective norms		.03	.03	.59	.559	1.25
Information dissemination						
Message presentation		.17	−.14	−3.13	.002**	1.30
Message source		−.03	−.03	−.54	.589	1.45
Message response		.31	.35	7.19	.000***	1.56
Echo chambers		.44	.36	7.29	.000***	1.63
Summary	R^2		.37			
	F		36.87			
	p		.000***			

Note: **p < .01 and ***p < .001, own editing.

Table 9. Results of the regression analysis of the backfire effect of the pan-blue supporters (n = 422)

We evaluated the backfire effect of the pan-green supporters. The overall model reached the level of significance ($p < .001$), with an explanatory power of .36 (Table 10). The echo chambers (β = .37; $p < .001$) was identified as the strongest factor, followed by message response (β = .27; $p < .001$), perceived behavioural control (β = .12; $p < .01$), and attitude (β = −.13, $p < .01$). However, message presentation (β = −.12; $p < .01$) exerted a negative effect.

Variables	Backfire effect				
	Unstandardised beta coefficient	Standardised beta coefficient	*t*	*p*	VIF
(Constant)	1.17		2.53	.012	
Planned behaviour					
Attitude	−.27	−.13	−3.27	.001**	1.32
Perceived behavioural control	.17	.12	2.94	.003**	1.32
Subjective norms	.10	.08	2.03	.042	1.19
Information dissemination					
Message presentation	−.21	−.12	−3.04	.002**	1.38
Message source	.00	.00	.06	.956	1.61
Message response	.33	.27	6.36	.000***	1.58
Echo chambers	.50	.37	8.27	.000***	1.69
Summary R^2		.36			
F		45.55			
p		.000***			

Note: **$p < .01$ and ***$p < .001$, own editing.

Table 10. Results of the regression analysis of the backfire effect of the pan-green supporters (n = 549)

5. Discussion

5.1. Factor structure and connotation

We divided the participants into pan-blue and pan-green supporters to explore the differences between them in terms of the backfire effect. According to the results of the factor analysis, the variables of planned behaviour were divided into the following subcategories: attitude, perceived behavioural control, and subjective norms.

Attitude referred to the participants' recognition of the importance of animal welfare and a healthy diet. Perceived behavioural control referred to their participants' confidence in their information judgement or capacity to respond to disinformation regarding food or agriculture. Subjective norms referred to the extent to which the participants were influenced by relatives, friends, and others when purchasing food. The average value of attitude was substantially higher than that of the other two factors, indicating that the participants, regardless of their political orientations, strongly recognised the importance of animal welfare and a healthy diet.

Information dissemination, another independent variable, was divided into the subcategories of message presentation and message source. Message presentation referred to the dynamic or graphic presentation of information to attract attention, and message source referred to the receipt of information from specific channels and government departments. On average, the participants' recognition of message presentation was higher than that of the message source, which suggested that they were more affected by message presentation. We further evaluated the political stances of the participants on the basis of whether they supported the government's policy on the importation of ractopamine-containing pork from the United States. The connotation of this variable included the belief that the government controls and attaches importance to animal welfare and food safety. The reliability and validity of the test were both high. In the present study, message response referred to the manner in which the participants responded to messages pertaining to their interest. Furthermore, the echo chambers referred to the participants' network behaviours in a specific media environment; while the backfire effect referred to their responses to contradictory information and self-reinforcing behaviours.

5.2. Differences between the Pan-blue and Pan-green supporters in terms of the backfire effect

As stated earlier, Taiwan has two major political parties, the KMT and the DPP. The terms 'pan-blue' and 'pan-green' are used to signify political affiliations to the parties. KMT (pan-blue) supporters are regarded as 'pro-China', whereas DPP (pan-green) supporters are regarded as 'anti-China'. When the KMT was in power, its government lifted the ban on the import of ractopamine-containing beef from the United States in 2012, and later when the DPP was in power, its government announced its decision to allow the import of US pork containing ractopamine in amounts compliant with the international standards, with strict regulatory measures in place in 2020. Our results revealed that the average value of the backfire effect of the pan-green supporters was considerably higher than that of the pan-blue supporters. Pan-blue supporters mostly comprised traditional ethnic groups from China. Therefore, these supporters are expected to receive diverse information rapidly. They consider themselves to be intellectuals and are confident of their ability to analyse and judge the information they receive. They supported the importation of ractopamine-containing pork from the United States on the basis of their value-based judgement, political beliefs, and scientific evidence. Therefore, they can be easily caught between

their political orientation and the scientific argument, which reduces the strength of backfire effects. This finding is in line with those of international studies (Peter and Koch 2016; Yang, Qureshi, and Zaman 2020).

Pan-green supporters have traditionally been dominated by pan-blue elites. These individuals might have been dissatisfied with the dominance of a single party when the KMT was in power for prolonged periods and thus started supporting the opposition party. Because of their experience of the 228 incident and other white terror incidents, older pan-green supporters might have been appalled by the heavy-handed ruling methods adopted by the KMT. Therefore, regarding political matters, they can easily develop resistance to the propositions of the pan-blue. The KMT launched a referendum to initiate blue–green confrontation. The pan-green supporters in the Legislative Yuan vigorously protested against pork importation, expressing solidarity with the pan-greens and strengthening their political alignment. The authoritarian control of communication media by the pan-blues has been released through the transformation of Taiwanese society and the rapid advancement of online media. In present-day Taiwan, the general public can voice their opinion through grassroots media. Moreover, beef importation was initiated soon after the pan-blues came into power. Taken together, the aforementioned factors induced the backfire effect of pan-green supporters. Highly politicised topics promote connections among individuals with similar political stances and encourage confrontation towards those with contradictory stances (Copeland and Boulianne 2020; Luzsa and Mayr 2021); this finding is consistent with those of the aforementioned studies.

5.3. Causes of backfire effects

We identified the echo chambers and message responses to be the most resilient positive factors influencing the backfire effect. The Internet has substantially altered media patterns and usage behaviours; and traditional media no longer serve as the only source of information. Online communities have gained popularity as platforms for people to socialise and obtain information. Because most online communities offer anonymity, their members feel comfortable expressing their opinions. Our findings seem to confirm that increased exposure to or association with echo chambers can lead to backfire effects. Thus, the more accustomed individuals are to respond to messages of interest, the more likely they may exhibit the backfire effect. This finding partly echoes that reported by Yang Qureshi, and Zaman (2020) and lays a foundation for further studies on backfire effects.

We noted that message presentation negatively influences the backfire effect of individuals regardless of their political orientations. In particular, a highly graphic and textual dynamic presentation of information may result in an increased suppression of backfire effects. Peter and Koch (2016) reported that if a receiver is prompted to immediately judge the authenticity of the information they have received, the backfire effect will be reduced and the receiver's memory will be prevented from introducing bias. Similarly, Yang Qureshi, and Zaman (2020) stated that the adoption of a pacing and leading strategy upon the receipt of information may

prevent the induction of backfire effects more than a direct argument would. They further indicated that in addition to the immediate response and a pacing and leading strategy, the dynamic presentation of information (pictures and texts) may substantially mitigate the occurrence of backfire effects.

Among pan-blue supporters, an attitude towards promoting animal welfare and a healthy diet did not induce backfire effects; by contrast, in pan-green supporters, this attitude inhibited the induction of backfire effects. In Taiwan, foreign pork products can be imported only after domestic and overseas factory inspections and the provision of evidence of compliance with international standards. Recently, the government has allocated a budget of approximately 44.5 million US dollars (NT$1.35 billion) to promote animal welfare programmes, revised the Animal Protection Law, and incorporated animal protection laws into the country's constitution. The residents of Taiwan generally attach considerable importance to animal welfare and a healthy diet. Therefore, while confronting disinformation regarding the importation of ractopamine-containing pork from the United States, consumers in Taiwan may not exhibit a backfire effect because of their firm attitudes and civic virtues; and even pan-green supporters are likely to suppress their impulsive remarks on this topic. Consequently, most pan-blue supporters may not be politically mobilised in terms of expressing their negative emotions towards this type of disinformation.

In pan-blue supporters, perceptual behavioural control in response to disinformation did not induce backfire effects. However, in pan-green supporters, this behavioural control increased the induction of backfire effects. This difference may be associated with political orientation. Most pan-blue supporters recognised the disinformation regarding ractopamine-containing pork as political mobilisation. The residents of Taiwan are generally accustomed to consuming fresh pork and purchasing it from traditional markets. Imported frozen pork products are sold primarily to restaurants and food processing industries; such products have negligible effects on the livelihood of the general public. Several agricultural and youth groups constitute the traditional supporters of the pan-greens; when they are presented with disinformation regarding importation, they actively reject such information and strengthen their beliefs, thus inducing a backfire effect.

We found that the message source and subjective norms did not induce backfire effects in individuals regardless of their political orientation. As previously indicated, the residents of Taiwan exhibit a high degree of consensus on the importance of animal welfare and a healthy diet. Their sensitivity to disinformation has been increasing gradually. Pork-based foods are consumed daily by most residents of Taiwan. Thus, these individuals are unlikely to boycott pork products because of political mobilisation. The induction of backfire effects is thus unlikely because of the similarities and differences in terms of the message sources or subjective norms.

Nyhan (2021) suggested that the intermediary role of sustaining belief systems must be considered in order to prevent backfire effects. This is because the manners in which corrective information should be targeted and made effective are important. Our findings support those of Nyhan (2021) regarding their recommendation to break the association between group identities and disinformation and to decelerate the spread of disinformation. Our findings suggest that the timing of disruption and

the manner of deceleration are crucial too. Clarification should be provided soon after the spread of disinformation, which will enable individuals to reason instantly and make judgements simultaneously upon receiving information. Furthermore, the presentation of corrective information should be dynamic and nondirective to avoid the spread of disinformation and to present various perspectives reinforced by the media and the elites of society.

6. Conclusions and Recommendations

The residents of Taiwan generally have strong consensus on the importance of animal welfare and a healthy diet. Echo chambers and message responses appear to be the most resilient positive factors influencing the backfire effect of individuals regardless of their political orientation. Individuals who are more accustomed to echo-chamber communicators and responding to messages of interest are more likely to exhibit backfire effects. Furthermore, message presentation was found to negatively influence the backfire effect of people with different political orientations. Dynamic presentation through pictures and texts may suppress the occurrence of backfire effects. Conversely, the message source and subjective norms did not influence backfire effects. The self-confidence of pan-green supporters in responding to disinformation (perceived behavioural control) induced a backfire effect; however, their attitudes towards animal welfare and healthy diets mitigated this effect.

On the basis of the findings of the present and previous studies, we propose four strategies for government legislative and executive departments to mitigate the backfire effects of the general public. First, the government should review previous case histories before promoting new policies (particularly those likely to induce political protests) and invite experts to forthrightly present scientific evidence and related discourses to ensure that corrective information reaches the general public. Corrective information must be widely distributed in communities comprising people with different political orientations, thus reducing the backfire effect related to political confrontations. Second, clarifications must immediately follow the spread of disinformation; this will enable individuals to reason while receiving information. Corrective information should be dynamic and presented through nondirective modes to avoid repeating disinformation and present various perspectives reinforced by the media and the elites of society. Through multiple broadcasts, the public's impression may be strengthened to avoid misunderstanding. When receiving disinformation and clarifications simultaneously, individuals may make rational judgements. Third, the government should encourage the public to use fact-checking platforms. In addition, formal and continual education must be provided for media literacy to improve individuals' steady and factual adherence to favourable attitudes and reduce their extreme confidence towards related disinformation. Fourth, agricultural departments should continue to promote animal welfare and healthy diets among the general public. By following the four aforementioned recommendations, the government can effectively regulate the backfire effect of the general public in the future from, for example, the introduction of controversial agricultural

policies related to the importation of food items from countries that have endured, e.g. nuclear disasters.

Despite receiving credible corrective information, the general public sometimes fails to differentiate fact from fiction. The present study was based on the premise of disinformation regarding pork consumption. We enrich the theoretical knowledge on the backfire effect by introducing several self-report variables (facilitators) of this effect and by investigating their interactive associations. The findings add new theoretical and methodological insights to the literature which may help us defend human civilisation against destruction.

Our study has some limitations. First, we focused on a single regional context and used a single experimental topic related to political consumerism. Second, few in-depth studies have been conducted on the backfire effect related to pork consumption in Taiwan; thus, we found it difficult to validate our findings. Finally, the quantitative design of this study might have introduced biases in the findings related to the social and psychological states of the participants.

Considering the aforementioned limitations, we propose the following recommendations for future studies. To expand the generalisability of these findings, future studies should focus on including examples that are closely related to people's lives. Second, advanced statistical methods should be used to enhance the validity of the findings and to develop strong communication and consumption theories. Finally, qualitative in-depth interviews could be conducted to explore the psychological characteristics of the study participants.

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Science Fiction in Ukraine: 1920–2020

part one

The variability in the genre of Ukrainian science fiction (SF) has always been determined by the requirements of the time and the political situation. That is why the fiction of the 1920s promoted the ideology of naive techno-communism, but during the next forty years it became obvious that the Soviet project had reached a dead end, and its positivist component had not brought the desired results. Ukrainian SF writers then turned to mysticism and denial of a rational view of the world.

Keywords: *Ukraine, science fiction, soviet, communism, mysticism, ideology*

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How to cite this article:

Shynkarenko, Oleh. “Science Fiction in Ukraine: 1920–2020”. *Információs Társadalom* XXIII, no. 4 (2023): 58–72. *https://dx.doi.org/10.22503/inftars.XXIII.2023.4.4*

1. Introduction

When we talk about science fiction (SF) in Ukraine, it is first worth defining certain boundaries of the definition. The first fantastic work written in the territory of modern Ukraine, so-called because it features descriptions of otherworldly creatures, is *The* Paterik *of the Kievan Caves Monastery* (Heppell 1989)—a collection of stories from the thirteenth century about the foundation of the Kyiv-Pechersk Monastery and the everyday lives of its first inhabitants. Some works of Peter Mohyla of the seventeenth century are defined as fantastic as well. The *Cossack Chronicles* of the seventeenth and eighteenth centuries contain stories about folklore creatures; some researchers refer to these as the predecessors of Ukrainian horror literature. Feofan Prokopovich's ([1705] 1961) tragicomedy *Volodymyr1*, created at the beginning of the eighteenth century, contains fantastical elements. All this, of course, is no Ukrainian SF for two reasons:

1) SF literature appeared as a certain reaction to positivism, that is, to the conviction that neither theological nor metaphysical thinking will bring humanity the desired results; both ways of thinking are, in fact, illusions and self-deception. Positivism convincingly proved that only scientific and technological progress has tangible, useful results.

This view is pure illusion, and at the end of the twentieth century there was what I call the "collapse of positivism," which even gave rise to a new SF genre that we call "cyberpunk." But you can get an idea of the popularity of these views if you read the letters of well-known Ukrainian intellectual Ivan Franko (1856–1916) to translator Olga Roshkevich (Franko [1878] 1986):

> *I am convinced that a great, worldwide revolution will slowly destroy the current order and establish a new one. By the word[s] "world revolution" I do not mean a worldwide revolt of the poor against the rich, a worldwide massacre; this can be understood as a revolution only by the world's policemen, who do not know that the invention of steam engines, telegraphs, phonographs, microphones, electric machines, etc., introduces a revolution in the world almost as big as the entire bloody French revolution.*

Franko speaks here as a typical positivist. He hopes that electric machinery will not only change people's lives for the better but also make people better.

Walter Smyrniw (2013) tried to define SF literature in his work *Ukrainian Science Fiction: Historical and Thematic Perspectives*, but he never managed to do it. And in my opinion, it is very simple: **Science fiction literature is an artistic reaction to the spread and the collapse of positivism.**

In total, there are three types of knowledge about reality: theological, metaphysical, and positivist. At the beginning of the twentieth century, it became clear to the most progressive people of this time that theological and metaphysical ways of

[1] The tragicomedy Vladimir was written in 1705 and performed July 3, 1705. It was first published in Tikhonravov, N. S., *Russian Dramatic Works* 1672–1725, vol. 2, 280–344. Spb., 1874.

knowing reality are unproductive. You cannot build a locomotive or an airplane by praying or reading Kant's works; it requires science and technology. Hence the idea that science and technology are not only an ideal way of knowing reality but will also quickly bring maximum positive (or practical) results. Such an idea in literature led to the appearance of SF.

But at the end of the twentieth century, it became clear that, although science and technology are quite productive, they bring not only positive but also negative results. We can call this understanding **"the collapse of positivism."** But, apart from positivism, no other productive ideas were found, which caused a feeling of frustration and hopelessness about the future. This feeling became the impetus for the revival of initially various forms of mysticism (if technology does not bring happiness, then one must open the third eye and go into the astral) and cyberpunk, which depicts a society that has reached a dead end due to positivism.

2) Literary Ukrainian language appeared at the end of the eighteenth century after the publication of Ivan Kotlyarevsky's (2004) *Aeneid,* a burlesque-travesty poem based on the plot of the classic poem of the same name by Roman poet Virgil.

Using these two reasons as filters, we can say that Ukrainian SF did not exist until the beginning of the twentieth century. After all, although Kotlyarevsky's *Aeneid* has fantastic elements, all of them are far from the instructions of positivism. Likewise, Jan Potocki's fantasy-philosophical novel *The Manuscript Found in Saragossa (*Potocki [1815] 2015*)* is often called the first Ukrainian fantasy novel, but Potocki, although he lived in the territory of modern Ukraine, was a Pole, and wrote his novel in French. The same applies to Mykola Gogol: although he was born in Ukraine, all his works were written in Russian and also had nothing to do with positivism.

2. The 1920s: Sandro Kasianyuk and "Red Roaring Twenties" Positivism

In search of the first Ukrainian SF, it is worth paying attention to the authors of the 1920s. In the first two issues of the literary magazine *Ways of Art* for 1922, two short stories were published that were later combined into a cycle called *Machining Humanity* by amateur writer Sandro Kasianyuk. This author's real name was Oleksandr, but he shortened it according to the "modernist" fashion of the time. He was not professionally engaged in writing; in everyday life he was a simple worker at the Kharkiv "Electrosila" plant. Literary critic Oleksandr Biletsky believed that Kasianyuk could very well become the "Ukrainian Wells with proletarian ideology" (Biletsky 1926,122). Kasianyuk is also mentioned in the work of Volodymyr (Walter) Smyrniw (2013).

The dream of flying, becoming a train driver, learning to be a locksmith, a mechanic, an engineer in order to serve the people – this is the pathos of Kasianyuk's works. Man and machine, according to the author, are true friends: "And look how kindly they treat each other"; they have "common interests." Promoting the advantages of the wireless telegraph, Kasianyuk tells about a telegraph-radio operator who "lives in a huge thousands of millions space" thanks to the discoveries of

science. The story "New Utopia" glorifies the greatness of technical reconstruction in the seaport, machines and cranes, electric plows and a "farming school" brought to "higher degrees" on some unknown island (Kasianyuk 1926).

Kasianyuk's works are full of naïve socialist utopianism; they glorify machines and technology. The man of the future in Kasianyuk's works is "only a pointer, only a guide" (Biletsky 1926, 123) for this technique. Kasianyuk's heroes are inspired by ideas for a better life in a socialist society.

The plot of the novel *Atom in Harness* (Blum and Rosen [1929] 2017) is very indicative of that weird cocktail of Russian imperialist and communist propaganda that shaped the consciousness of Ukrainian authors of those times. The novel was written by an unknown writer under the pseudonym Blum and Rosen. The novel takes place in 1939. Humanity is divided between the bloc of Soviet (communist) countries (USSR, China, India, and Germany) and the capitalist bloc (the rest of the world). Capitalist countries formed a kind of federation and parliament in the city of Wellington (the capital of New Zealand). The world capitalist government is called "the Cabinet of Military Affairs and Espionage" (Blum and Rosen [1929] 2017) and also sits in Wellington. This government considers the creation of a radio curtain from the radio transmitters of the USSR to be its main task. The transmitters are obviously broadcasting political propaganda from Moscow for the establishment of a world revolution, as Leo Trotsky dreamed about it. For this purpose, on the borders with the Soviet Union, large balloons with powerful radio stations, which broadcast jazz around the clock, are installed at different heights in the air. This creates a noise wall at the borders, which does not allow radio signals from the USSR to capitalist countries.

The Soviet party leadership perfectly understands that Western liberal culture can create the impression among the youth of the countries occupied by the Moscow invaders that life outside the USSR is not as terrible and hopeless as Soviet propaganda portrays it. For this purpose, a whole campaign of opposition to Western culture is organized, banning certain artists and styles of music, even clothing: a famous story recounts two businessmen in Moscow being executed for trying to sell jeans. For some reason, jazz music causes special hatred among the Soviet authorities. The propagandists even come up with a poetic slogan: "Today you play jazz, and tomorrow you will sell the Motherland." The Soviet people should have remembered that jazz is very dangerous because it can distract from the struggle against capitalism.

The novel begins with the attempt of a young Moscow scientist Zhuravlyov to cross the Black Sea in a hot air balloon; he wants to get to the capitalist federation so that he can improve his invention—the first nuclear reactor. The travelers manage to cross the border and fly to Italy, where they land and are arrested by the local police. Later, Zhuravlyov and his boyfriend manage to escape from the police and hide underground with local communists. At the same time, an intelligence group of agents of the capitalist federation infiltrates Moscow, steals Zhuravlyov's nuclear reactor, and uses it to destroy the building of the former British embassy, at the same time kidnapping a young Komsomol girl, Lyudmila Chudnovska. Lyudmila manages to escape, get the necessary materials for Zhuravlyov, and even prevent the execution of the leader of the pro-communist rebellion in Madagascar. Zhuravlyov,

having stolen inventions from the capitalists, manages to complete his apparatus, with the help of which he destroys most of the military equipment and weapons of the capitalist federation, as well as the seat of the world capitalist government. After that, with the help of Italian and New Zealand communists, Zhuravlyov returns to Moscow, where he speaks to a wide audience with a detailed description of his invention and the prospects for a future communist economy. related to the use of Zhuravlyov's device and atomic energy in general. After the destruction of the military equipment and the headquarters of the world capitalist government, a workers' uprising begins in the capitalist countries. The novel ends with the common singing of "The Internationale."

As can be seen from the plot of this novel, the Ukrainian writer dreamed that Russian communists would destroy Western liberal-democratic society with the help of nuclear weapons stolen from it and then establish a world communist dictatorship centered in Moscow. It seems that Moscow's wishes have not changed over the past hundred years.

In general, it is worth noting that the 1920s were a time of illusory fascination with the communist utopia. It seemed to the authors of fantastic works that machines plus communism (or, as leader of the Russian communists Vladimir Lenin said, "socialism plus electrification of the whole country") would immediately lead to the goal of positivism. To this end, it was proposed to concentrate all efforts on industrial production, to push all theology out of life, and to leave from metaphysics only Marxism-Leninism. Some ten years later, such a view led Ukraine to the first catastrophe in the confrontation with Russian imperialism, which arranged the Holodomor and eliminated the Ukrainian intellectuals. This was the Ukrainian "roaring twenties"; these times literally roared with engines, factories, and plants. It is no coincidence that Volodymyr Vynnychenko's SF novel, published in 1924, was called *Solar Machine* (Vynnychenko 1928).

Vynnychenko was in opposition to the government of Ukraine, which was later captured by the Russian communists. For a short period in 1918, he headed the government of the Ukrainian People's Republic, but Vynnychenko quickly quarreled with opponents of the conservative political camp because he was a committed socialist. As soon as the Russian–Ukrainian war began in 1918, he left politics and emigrated to Austria, where he wrote his memoirs and his SF novel. The oppositionist and emigrant *Solar Machine* was an unheard-of success among readers and had three reprints in Soviet Ukraine from 1928 to 1930. But after 1930, the elimination of Ukrainian national deviations began and Vynnychenko was banned.

In *Solar Machine*, princess Elise agrees to marry capitalist tycoon Mertens in order to later avenge the death of her bankrupt father. The far-left INVARAC (International Vanguard of Revolutionary Action) is gathering at the tycoon's estate, to which Elisa swears allegiance in order to take revenge on Mertens.

Inventor Rudolf Stor is convinced that man is burdened by the need for food, and that he would become truly free if he were fed directly by the sun's rays. In search of a way to do this, he discovered the "solar mineral" helionite, which is capable of turning any organic matter into a nutrient under the influence of light—"solar bread."

With the help of the mineral, he builds a "solar machine" in which it is enough to put grass or leaves in, sprinkle with sweat, and let the sunlight through, to get free food.

INVARAC is interested in the "solar machine." The organization spreads the invention around the world, thereby liberating people from the oppression of capitalists. People no longer need to work for a piece of bread, so factory workers are leaving their jobs. In addition, "solar bread" causes a feeling of euphoria. At first it seems like a good thing, but soon civilization itself collapses—power plants stop working without workers; water pipes and communications fail. People begin to fight for the remnants of the property of their exploiters and against those who do not accept "solar bread." Mertens prepares to clear Berlin of rebels, while enemies are advancing on Germany. Seeing the collapse of all hopes for the further development of humanity, with people reduced to an animal state, Stor gathers the Free Union of Creative Work, which restores the life of the cities. After winter, the desire for work awakens in people, but it is now voluntary, and not forced.

As can be seen from the text of the novel, Vynnychenko was also caught up in the modern illusions of technocratic positivism. It seemed to him that technological inventions would lead to a revolution and the victory of the ideas of socialism. The communist occupation of Ukraine and Moscow's political terror taught him nothing.

The 1930s: Hard Fiction and Futurism

The 1930s saw the start of hard fiction and futurism. These were characterized by the fact that the former fascination with positivist machinery began to be felt as an anachronism and turned from a goal, an idée fixe, into a beautiful decoration. A fantasy novel from the 1930s has been transformed from an intrusive piece of communist propaganda into something that had a quintessential text of liberal pop-culture as a sample to follow.

One of the most striking examples of this is Yuri Smolych's trilogy *Beautiful Disasters* (Smolych [1929–34] 1965). It depicts the mad Romanian scientist Dr. Galvanescu, who uses surgical operations to transform people into robots. This plot clearly imitates *The Island of Dr. Moreau* by Herbert Wells. Smolich does not suggest outright communist propaganda and does not call for a world revolution controlled from Moscow. He simply writes an exciting adventure novel in a "western style." The ideological confrontation in it is more like a domestic quarrel. When Komsomol member and pretty girl Yulia Sakhno tries to find out about the doctor's experiments, she talks to his employee. He is afraid.

– Shut up. You say you came from Germany?

– So.

– But you are Ukrainian?

– Of course.

– An emigrant?

– You see, I studied in Germany and stayed at the department for scientific work. After that I have to go home…

- So you are… a Soviet citizen? … – The stranger backed away from the window and slammed the frame with a curse.

Sakhno could still hear how he huddled near the pinhole, cursing himself and the Soviet government. Stunned and confused, Sakhno stood under the window, not knowing what to do. She would have stood there for a long time, but the window opened once more and the head of the indignant stranger stuck out for a moment.

"If you don't get out of here, you bloody communist bitch, I'll call Dr. Galvanescu immediately!" (Smolych ([1929–34] 1965, 54)

Pavlo Beilin, author of the afterword to Smolich's novels, writes that "the main idea of the book is not to prove that the collapse of the ideas of bourgeois society is beneficial to us. The writer, comparing bourgeois and Soviet medicine, wanted to reveal the misanthropic essence of bourgeois ideology and the humanity and progressiveness of Soviet and socialist science" (Smolych ([1929–34] 1965, 223).

So, in ten years, the desire to seize capitalist countries and forcibly introduce Russian communism there turned into banal envy. Smolych himself was a devoted communist; for many years he cooperated with the Soviet secret police and wrote reports on his colleagues—writers and film directors. These denunciations were so detailed and refined that the history of Ukrainian literature can be studied by them.

Volodymyr Vladko is also a prominent figure in this direction. He created several truly noticeable novels. For example, *The Argonauts of the Universe* (Vladko 1935) was published several times in Japan and Croatia. It also was the first work in Ukrainian literature about flight into space. Interestingly, two Russians and one Chinese go on a space trip to Venus, and a Ukrainian, a student of the Polytechnic Institute, Galina Ryzhko sneaks on board illegally. In the first editions of the novel, instead of the girl-student there was a boy-student Vasyl Ryzhko, but the author received 1500 letters from readers with various tips and realized that the girl would be much better to save from the attacks of the Venus monsters because it would look very sexy. According to the genre, it is a typical novel of hard SF that any American author could have written. Of the Soviet features, it only has a flag of the USSR, which the heroes set on Venus. Interestingly, the author rewrote his novel many times, in each edition changing some essential details there to adjust his text to the requirements of the time. For example, in the versions of the 1950s, Vladko wrote about the leading science of the countries of the socialist camp—Hungary, Bulgaria, and the German Democratic Republic. Of course, in 1935, when the first edition of this novel was published, the mentioned countries were still bourgeois, and Vladko could not write about the leading science in these countries, so as not to have conflicts with communists carrying out surveillance of the literature.

Fiction writers of the so-called socialist camp, which was the zone of military-political influence of the mutation of the former Russian Empire—the USSR—perfectly understood the power of the influence of communist propaganda through the works of SF and exploited this power in every way, until some of them realized its perniciousness. One of the first of such writers was Stanislaw Lem. Lem banned the translation of his first novel, *The Magellanic Cloud*, into Japanese, citing the following reasoning: "Japan has never known a communist regime, and if my novel inclines even one Japanese person to communism, I will burn in hell" (Lem 2005, 12).

Unfortunately, most Ukrainian Soviet fiction writers who survived the collapse of the USSR remained loyal communists and even Russian imperialists. They did not see in this any danger for their country, and, as we see now, they miscalculated cruelly.

Another novel by Volodymyr Vladko, *Aero-torpedos Turn Back* (Vladko 1934), is much more ideologized. It refers to the war of drones between the capitalist countries and the USSR. According to the plot of the novel, "interested states," the Great Saksia, Swabia, and Osteria, make a number of claims to the USSR. The conflict in a few days became the basis for closure of communist newspapers in "interested states"; the press published calls for war with the USSR. The concept of capitalists is that the blow to Moscow should be made by radio-controlled drones—aero-torpedos. But the tactics of the lightning attack did not work, as the Soviet Union also prepared for war and had its high-tech developments. Meanwhile, a Yellow Empire—Japan or China—attacks from the East. Capitalists decide to use bacteriological weapons and infect the Soviet communists with the flu virus. The flu epidemic is striking Moscow, Smolensk, and other regions of Russia. But, in the end, capitalist engineers are aware of the injustice of this war and surrender to the Soviet Army. In the capitalist countries, uprisings begin, and they become communist. At the end, everyone is happy to celebrate the victory of Russian weapons and communist ideology over the insidious world of capitalism. This book is impressive as it places the author's childlike naivété alongside the literal prediction of events that would soon happen.

It is also worth mentioning Vladko's novel *Iron Rebellion* – in the first version *The Robotari Are Going*. This first Ukrainian novel about robots was published in 1929 (Valdko [1929] 2017), just nine years after *R.U.R.* by Karel Čapek (Čapek [1928] 2020). Of course, this book is an undisguised call for the overthrow of the state system in countries outside the USSR and the establishment of a communist dictatorship in them, with the governing center in Moscow. It was planned to do this with the help of advanced technologies.

The events of the novel take place in some capitalist country with a hint of the USA. Jonathan Houston is the owner of the machine-building factories that have stopped working—the workers have announced a multi-day strike and are demanding higher wages. There is a rumor that Houston's company intends to replace live workers with wirelessly powered cybernetic robots. Houston assures that the robots only obey him and do not demand a salary or rest, so soon all workers will be replaced and this will mean the victory of capitalism over socialism.

Meanwhile, Houston's stock is skyrocketing, and robots are cheaper to maintain than live workers. The leader of the ultra-right militants, Thomas Beers, sends the strikebreakers to the committee of strikers and demands that the strike be stopped in the morning. The committee dissolves itself, but does not give up the struggle.

A rally is being held on the square near the plant, against which armored personnel carriers and soldiers who start shooting are brought out. Under the command of the leader of the strikers, Bob Leisley, they manage to de-energize the city and seize weapons with which to fight back. But the city is surrounded by an even bigger army. Houston offers Beers any amount of money if only his factories are saved. He manages to turn on the power and leads the robots into battle. But in a few minutes,

the inventor of the robots, engineer Jefferson, sends a signal that intercepts control. The strikebreakers turn on Houston with Beers and stomp them down. The communist revolution breaks out in the city.

The Soviet authorities liked Volodymyr Vladko so much that he was even appointed head of the Main Repertoire Committee of the Ukrainian SSR (the main Ukrainian censor). However, he did not last long in this position. Once he wrote a critical article for the newspaper *Soviet Art*, where he praised the operetta *Love of an Actress*, which was based on Maupassant's story *Boule de suif*, staged in Lviv. But other censors did not like the performance; they decided that it did not call for a communist revolution but only distracted the audience from it. The play was removed from the repertoire, and then a devastating article called "A Serious Lesson" appeared in the newspaper *Lviv Truth*. They wrote that the theater did not use "the great opportunity to turn to the Soviet theme, to show the wonderful today's revived Lviv region, the patriotic deeds of Lviv residents – Stakhanovites of factories and fields." Instead, "vulgar, vapid vaudeville" was created. Volodymyr Vladko was fired from his job after this story (Lvovska pravda 1953).

The tragic fate of the writer Dmytro Buzko is very telling: he was a staunch Stalinist, but he died because he publicly expressed doubts about Stalin's infallibility. He was immediately fired, arrested, and shot. Buzko wrote the fantastic novel *Crystal Paradise* (1935) two years before his murder by the Stalinists (Buzko [1935] 1959). According to the plot of the novel, a brilliant scientist-chemist from fascist Germany, Fritz Gruber, invents a recipe for super-strong glass, which can be used in many industries and the national economy. Due to the non-recognition of the genius in his homeland and the intrigues of the powerful bourgeoisie, the genius has to emigrate to the Soviet Union. Thanks to his invention, a utopian state is being formed in the USSR. From an artistic point of view, the novel is typical of the Soviet "production" fiction of the 1920s and 1930s. The characters are revealed superficially, represented by peculiar social labels. One of them is a "big bourgeois," another is a "little bourgeois," and the third is a "romantic scientist." Nothing is known about the inner world of the heroes. The plot is described schematically. The actions and dialogues of the heroes are often contrived and implausible. There is a lot of Stalinist propaganda in the novel. It is characteristic that tanks and fighter planes were the first to be manufactured from miracle glass on an industrial scale.

But not all Ukrainian writers of the 1930s gave their talent to fight for the victory of Russian communism. Unfortunately, the fate of those who avoided it was sad. Ukrainian writer Geo Shkurupii became the first Ukrainian writer who specialized in fantastic works within the framework of futurism. He did not write a single novel that could be called SF. There are only some fantastic episodes in his book *Doors in a Day* (Shkurupii 1931). In general, this novel is written in a bright, expressionist manner; stylistically, it is very diverse and intricate. It could rightly be called the Ukrainian *Ulysses* were it not for its very modest volume—the book has a little more than 200 pages.

Although Shkurupii was a communist, he was not as devoted a communist as, for example, Vladko. There was a lot of truth about the real world in his works, which the communist supervisors could not forgive him. That is why the writer was

arrested on December 3, 1934 on charges of belonging to the "Kyiv terrorist organization UUN" (Union of Ukrainian Nationalists). In 1937, he was executed, and his family was deprived of housing and evicted from Kyiv, as a family of "enemies of the people." After twenty years, Shkurupii was rehabilitated and acquitted due to the absence of a crime. Of course, there was no question of any compensation from the state.

Those who study Ukrainian literature of the Soviet period of the 1920s–1990s may wonder why it looks the way it does, why the writers were so focused on political propaganda and so persistently promoted the idea of a communist revolution and the expansion of Moscow's control over Europe. The answer to this question lies precisely in the early 1920s: during the next twenty years, the Soviet secret police found and physically eliminated most of the "wrong" writers. The total number of Ukrainian artists and intellectuals who disappeared as a result of repression exceeds 1,000. We call this phenomenon "Shot Revival."

4. The 1940s and 1950s: Short-Sighted Fiction

Throughout the 1930s, a methodical elimination of nationally conscious intellectuals took place in Ukraine; after its completion, a command came from Moscow to begin the fight against so-called Ukrainian nationalism. In these times, any manifestation of Ukrainian consciousness had become dangerous. Literature ultimately turned into service of party communist propaganda, and even fiction had to convincingly prove how exactly the Soviet people would soon implement the wild fantasies that were announced at each successive communist party congress. This genre was later called "short-sighted fiction."

A vivid example of this genre is Mykola Trublaini's novel *The Deep Path* (written in 1941 but published seven years later, Trublaini [1948] 2020). There are no amazing and extraordinary events in the book; all its fiction is purely utilitarian. Soviet citizens are building a deep tunnel between Moscow and the Far East for high-speed train traffic, which was of exceptional strategic importance in case of war. However, it is worth noting the peculiarity of Trublaini's authorial manner, which allowed him to remain in the history of Ukrainian literature: his romantic heroes fall in love, dream, drink champagne, and are sure that a strong desire will allow them to defeat nature. Children liked Trublaini's works; there is even a prize named after him in Ukraine.

Lyrical poet, polyglot, and soldier of the Ukrainian Galician Army (this is the armed force of the Western Ukrainian People's Republic, the state that existed in 1918–20), Myroslav Kapii became famous for translating six novels by Jules Verne into Ukrainian. Although Kapii was a radical anti-communist, he hated the USSR, but he can also be included in the stream of "short-sighted fiction" because the author's main task was to predict in detail the technical and social innovations that would appear in the near future. Kapii's novel *The Land of Blue Orchids* (1932) envisions Ukraine in the twenty-first century in great detail. Interestingly, most of the author's predictions came true. The territory of Ukraine, as Kapii saw it in 1932, coincides

with the territory of modern Ukraine: the coat of arms is the trident of Prince Volodymyr, the currency is the hryvnia, the system is democratic presidential-parliamentary, and the name of the parliament is Verkhovna Rada. In addition, Kapii used the word "television" in the novel and predicted Skype communication and the existence of an automobile factory in the city of Kremenchuk. According to the plot, the first manned ship of mankind, the *Queen of Virginia*, goes to Mars, but disappears. A year later, an employee of the Ukrainian observatory, Ihor Kharitonenko, during his observations, discovers an unknown body in space approaching the Earth. It turns out that it is the *Queen of Virginia*. The ship lands near Kyiv in Boryspil, where the international airport is now located. But it was not Americans who arrived on the ship; rather, they were Martians genetically related to Ukrainians.

In Vasyl Berezhny's novel *To the Starry Worlds* (1956), the first Soviet space expedition is sent to study the Moon. The purpose is to find minerals that can be used for the needs of mankind. A rocket with American astronauts lands on the moon secretly from the Soviet cosmonauts. The novel, as one might expect, is full of Soviet propaganda. Before the flight, the head of the Government Committee for the Organization of the Earth-Moon Flight says in his speech: "We want to make the Moon an outpost of advanced science, not a military base, as the imperialist tycoons are planning!" (Berezhny 1956, 34). The whole exciting trip to the moon turned out to be just a convenient backdrop for casually feeding the reader communist propaganda. The book contains many disputes between American and Soviet astronauts, such as:

- The essence of life is not to create material values, said an American astronaut. The point is to use these material values! Don't deny it: I know what you're going to say. "Exploitation of man by man! Extortion" and other similar loud words. But if you seriously thought about the history of mankind, you would see that all of it is a struggle for the redistribution of material goods. Take all the rebellions, revolutions and wars since the Roman Empire. Didn't the slaves rebel to seize wealth? And the French revolution, did it have other ideals? And what does your communist bible say? — "The proletariat has nothing to lose, but it can acquire everything." Acquire!
- You, as I see it, are a theorist!, a Soviet cosmonaut interrupted. It's just a pity that your "philosophy" is wolfish. Homo homini lupus est is your credo. And how can you understand Marxism and the ideals of the socialist revolution, which does not replace one exploiter with another, but destroys all exploitation!
- Ah, what do you communists say, it is better to be rich than poor! Patricians, plebeians, and slaves all died, but the patricians ate from silver and gold dishes and bathed in marble pools, while the plebeians and slaves bent under the heavy burden of life" (Berezhny 1956, 46).

The fate of the writer Mykola Dashkiev vividly testifies to why the works of old Ukrainian fiction writers seem so down-to-earth, such timid, "short-sighted fiction." To explain the conditions in which the writers of that time worked, one eloquent fact can be cited: the building "Slovo" (The Word), where the young writer Dashkiev was given a room in 1948, in those days in Kharkiv was called HPD (House of Pretrial Detention) because many of its residents in the Stalinist times disappeared behind

bars and were executed. This led to unprecedented restrictions. While preparing his novel *The Celebration of Life* (1952) for publication, Dashkiev had to attach to the manuscript a certificate from a leading expert in the field of biology confirming that the scientific plot of the work was quite possible. The novel *Dragon's Teeth* (Dashkiev 1957) tells about the struggle of Soviet and Indian biological scientists with English spies for the right to possess the secrets of "Food of the Gods" and "Dragon's Teeth"—unique biological catalysts, with the help of which it would be possible to solve the primordial problem of hunger throughout the world or perform unique organ transplant operations.

5. The 1960s: Sixtiers and Hippie-Cosmist Oles Berdnyk

In the 1960s, a political thaw began. The USSR liberalized. This led to the emergence of the so-called sixtiers movement. These people—public figures and artists—did not see confrontation with Western countries and the victory of communism as soon as possible at any cost as their goal. The sixtiers were liberal communists. This, among other things, was manifested in the fact that they for the first time abandoned the idea of positivism in its Soviet sense, that is, the idea that scientific progress would help the USSR to quickly establish communism throughout the Earth. Instead, the sixtiers turned to religious mysticism and naive utopianism. Oles Berdnyk, one of the main Ukrainian sixtiers, a writer, was also called a "hippie-cosmist." He was a theoretician and founder of the Ukrainian Spiritual Republic (USR); he believed that a nation is not a random combination of relatives and families but a powerful collective spirit that has its own unique purpose in the evolution of the universe. He saw no division into believers and non-believers; for him, the presence of the spiritual unity of Ukrainians made it possible to eliminate political parties, and ideological and confessional contradictions. If Ukraine chose the path of harmonization, spiritualization of all spheres of life, consolidation of the forces of culture, science, and spirituality, then other nations would follow, and the Brotherhood of the Spiritual Republics of the Earth would be formed. The USR held congresses that were essentially mystical happenings.

Berdnyk served five years behind bars for saying at a theater meeting in 1949 that "Stalin may be a genius for some, but a fool for others." He was sentenced to ten years for alleged treason, but after five years he was pardoned after repentance, which was strange (in the 1930s, he would have been immediately shot for these words). As mentioned, a political thaw was approaching. Liberalization had reached the point where Berdnyk was accepted into the Union of Writers of Ukraine two years after his release from prison. It is worth knowing that the Union of Writers of Ukraine was a special organization where writers verified by communists and the politically loyal were engaged in propaganda in the form of literature. Throughout his life, Berdnyk wrote about twenty novels that were far from communist propaganda. He was also one of the founders of the human rights focused "Ukrainian Helsinki Group." For his activities in this group, Berdnyk was imprisoned again for five years in 1979. But the USSR had already begun to collapse, and Berdnyk repented

again, saying that he was ordered to create the Ukrainian Helsinki Group by the US Central Intelligence Agency.

Berdnyk's novel *The Star Corsair* was written in the 1960s (Berdnyk 1971) and became a real bestseller of those times. It was translated into twenty-six languages, although it caused many scandals. The main reason for this was the unheard-of mystical Ukrainian nationalism of the author, which caused misunderstanding among the surrounding Soviet people. For example, Berdnyk wrote about the fact that in 2082, before the flight, the cosmonauts climbed to the top of the highest mountain in Ukraine, Hoverla, where they saw decorations in the traditions of Ukrainian folklore. Berdnyk's nationalism was so amazing that it caused a shock reaction. After the publication of the novel, the author was expelled from the Writers' Union of Ukraine.

According to the plot of the novel, a young scientist, Serhiy Gorenytsia, wants to invent a time machine. While thinking, he sees the image of a Cossack-Charakternik (a warrior of the ancient Ukrainian state who possessed magical abilities). The Charakternik possessed the Black Gramota—a magical manuscript that allowed changing the flow of time. With the help of hypnosis, the scientist enters the consciousness of the Cossack-magician and learns that the Black Gramota was extracted from the grave of Alexander the Great and buried in Mount Divich. The scientist conducts excavations, extracts the Black Gramota, and, with its help, establishes contact with the Black Papyrus—a mystical being who tells the scientist that the **collapse of positivism,** with which this article about SF began, has taken place, that is, no technological inventions and scientific discoveries will bring positive results. Instead, the Black Papyrus offers a mystical solution: knowing the world through love and mutual understanding. It's just a set of words that don't mean anything, but that's how mysticism works.

Black Papyrus shows the scientist a story about the journey of the Ukrainian spacecraft *Lyubov* to another star system. During the trip, all crew members die from radiation; only two children, who are being raised by a robot, survive. The children become adults and arrive on another planet, where they come into contact with high-tech intelligent flowers. After this, the travelers fly to another planet, where they find a civilization destroyed by positivism: technological advances have finally led to the degradation of civilization from excessive hedonism. On the whole planet there is only one woman, Iswari, who has kept her common sense. She asks the boys to take her with them to Earth and falls in love with a robot on the way. The robot also loves an alien woman, but cannot have sex with her. To overcome this obstacle, the robot creates a body for himself from the remains of the astronauts who died from radiation.

After hearing the story of the Black Papyrus, the scientist is convinced that positivism is really a dead end. Berdnyk offers an alternative to scientific and technical progress in the second part of the novel. One of his characters, an inmate in a psychiatric hospital, Aeras, claims to have attained a level of cosmic consciousness that allows him to go outside his body, levitate, and pass through walls. Together with his accomplices, Aeras escapes to the Asteroid of Freedom, where he finds a colony of dissidents who oppose the society of positivism. The positivists want to destroy the

colonists, but they go to another dimension that is inaccessible to logic and physics. At the end of the novel, the scientist learns that he is actually the leader of the Horikorin group of cosmocrats from the plane of Ara, and his main goal is to unite the people of Earth and the thinking beings of the noosphere.

Through this story, the repression against the dissidents, whom the Soviet authorities sent to psychiatric hospitals in the 1960s, as well as the desire of these dissidents to get out of the power of the communist positivists from Moscow, can be seen quite clearly. Berdnyk's revolutionary mysticism was a kind of protest against Soviet totalitarianism and formed a certain pair with it: time has shown that they cannot exist without each other. As a hypothetical idea for the 1960s, it sounded interesting, but in practice, going beyond the limits of the body and reaching the level of cosmic consciousness turned out to be absolutely impossible, so the impressive body of Berdnyk's work remained in its time. From the standpoint of today, it looks like a vivid dissident happening, but nothing more. It never became an alternative to positivism.

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Information: Modern Concepts

The paper reappraises our understanding of information without favoring any specific perspective. The paper presents the various conceptualizations of information, including biological information, natural information, pragmatic information, physical information, quantum information, quantified information, relative information, semantic information, semiotic information, epistemic information, ontological information, and syntactic information, together with some of their variants. In the search for a unifying perspective on information, the paper looks at two general theories of information: the General Definition of Information (GDI) and the General Theory of Information (GTI), arguing that the GTI appears to be the better of these two options. The paper is intended to be as complete and comprehensive as possible, sacrificing the analytical part (that may be found in referred sources) for the breadth of coverage.

Keywords: *information, epistemic information, ontological information, information in nature, GDI, GTI*

Acknowledgement

I would like to thank the editor for correcting omissions, misspellings and other crimes and misdemeanors committed by the author in this paper. No funding has been received for this paper. The idea of this paper was suggested by Mark Burgin.

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How to cite this article:

Krzanowski, Roman. "Information: Modern Concepts".
Információs Társadalom XXIII, no. 4 (2023): 73–91.
https://dx.doi.org/10.22503/inftars.XXIII.2023.4.5

1. Introduction

The modern concept of information was introduced by Shannon (1948), and later followed up by Shannon and Weaver (1949) and Weaver (1949). Despite a flood of research publications on this topic (e.g. Seising 2009), we are far from being certain what information is.[1] The growing list of novel definitions of information and ongoing discussions on the Internet discussion group dedicated to information[2] and conferences (International Society for Study of Information) attest to this. In fact, the list of questions about the nature of information is wide open,[3] with many research topics left to be investigated. In this paper, we try to provide a comprehensive list of modern concepts of information and unifying theories of information, realizing that such tasks will never be completed because of the dynamics of the problem. Still, we hope that such an overview, despite its shortcomings, may improve the general understanding of information and provide a focus for further studies. Due to the limitations of the allocated space, we sacrifice the analytical part (which may be found in referred sources) because of the breadth of coverage it would require.

We first discuss the various conceptualizations of information. Next, we present two concepts of information — epistemic and ontological — and then two unifying theories of information, namely the General Definition of Information (GDI) and the General Theory of Information (GTI). The references provide an ample resource for exploring the discussed ideas information in greater detail. The paper is a compressed longer research report on the same topic.

2. Varieties of Information

The varieties of information are too numerous to be listed in their entirety. Under the proviso that any selection will inevitably be subjective and incomplete, we discuss several classes of information, including biological information, natural information, pragmatic information, quantum information, quantified information, relative information, semantic information, semiotic information, and syntactic information, together with some of their variants that have been mentioned in publications.

2.1. Information: Variety of Conceptualizations

Biological information: Biological information describes processes related to genetic processes, cellular functions, or other biochemical processes in organisms. We denote this class of information as informationB. Conceptualizations of biological information have been discussed by scholars such as Maynard Smith (2000), Schneider (2000), Griffiths (2001), Godfrey-Smith (2002), Jablonka (2002), Roederer (2003,

[1] For historical notes on the concept of information, see Vreeken (2005), Adriaans (2023), or Gleick (2011).
[2] see <http://listas.unizar.es/cgi-bin/mailman/listinfo/fis>
[3] The more systematic list from Krzanowski (2020, 2022) proposes some open research problems to be investigated.

2005), Stegmann (2005), Yockey (2005), Terzis and Arp (2011), and Moffat (2016). More specifically we have:

Natural information: Natural information is information conveyed by natural signals in a communication process. The source of this message may be a natural phenomenon like a fire (a natural root sign), or it can be a human agent communicating through language, a map, a diagram, and so on. In all these cases, however, the message is carried in natural phenomenon, a physical carrier, and this medium can be considered an *infosign*. Millikan's natural information is connected to the concept of teleosemantics in a theory for the meaningfulness of representation in terms of biological functions (Millikan 2004, 2017). Millikan's concept of natural information is based on Dretske's work on semantic information (Dretske 1999). Baker later extended Dretske's work by proposing concepts like nomic factive information (denoted as informationNf), the counterfactual theory of information (denoted as informationNcf), and even exemplar thermometer information (denoted as informationNt) (Baker 2021). There are also other definitions of natural information. Sweller and Sweller, for example, define natural information (denoted as informationNm) as information that governs activities in natural entities, and this relates to the concepts of morphological computing and biological information processing (Sweller and Sweller 2005). We will refer to this class of information as informationN. Conceptualizations of natural information have been discussed by scholars such as Scarantino and Piccinini (2010), Piccinini and Scarantino (2011), Kraemer (2015), and Symons (2016).

Pragmatic information: Pragmatic information represents the impact of a message on a system. This is considered a perspective-based notion, so it requires an explicit description of the context. The definition of pragmatic information depends on concepts of meaning, complexity, and similarity or dissimilarity. Pragmatic information also covers other concepts of information, such as negative information, information on the way, structural information (see later section), latent information, potential information, and active information. We may surmise that pragmatic information generally represents the impact of a message on a system's pattern or patterns of behaviors. Some claim that pragmatic information is a purely biological concept (e.g. Roederer 2016). Conceptualizations of pragmatic information have been discussed by the likes of Bar-Hillel and Carnap (1953), Gernert (2006), Kornwachs (1998), Weinberger (2002), Andrew (2003), Roederer (2016), and Chen (2018). We will label this class of information informationPr.

Quantum information: Quantum information is defined as information about the state of a quantum system, where the quantum system (e.g., electron, photon) is a carrier of information. Some deny that quantum information exists at all, while others claim that it is not qualitatively different from classical (i.e., non-quantum) information. Nevertheless, quantum information is expressed in qubits, and two-state systems encode information in two quantum states: |0> and |1>. A quantum bit, or qubit, can be in a superposition of different states at the same time, so a qubit can be both in the |0⟩ state and in the |1⟩ state simultaneously. The state of a qubit can be manipulated by quantum gates, which are unitary physical operators that can be represented as rotations on the Bloch sphere, with a qubit often being expressed as a vector in the Bloch sphere.

Quantum information may be seen as a generalization of classical information to quantum systems, so many measures from classical information theory could also be generalized for quantum information, such as Shannon's entropy, which is represented in quantum systems as Von Neumann entropy. We label this class of information informationQ.

Conceptualizations of quantum information have been discussed by among others by Nielsen and Chuang (2000), Le Bellac (2006), Jaeger (2007), Rieffel and Polak (2011), Harshman (2016), Lombardi et al. (2016), Timpson (2008, 2013, 2016), and Zygelman (2018).

Relative information: Relative information was proposed by Rovelli (2016a, 2016b) as information that expresses the number of possible states in which two physical systems can be together relative to the hypothetical number of states that is logically possible for these two systems. Rovelli claimed that relative information is purely physical. Relative information expresses a relation between hypothetical (i.e., nonexistent) states and factual (i.e., that which exists) states. Relative information expresses what-if situations or counterfactual conditions, so it clearly expresses conceptual situations and abstract ideas rather than real ones. We label this class of information informationRl. The conceptualization of relative information has been discussed by Rovelli (2016a, 2016b).

Semantic information: Semantic information is closely related to the concept of communication and the meaning of a message. (In some definitions, message is replaced with data [Duch 1993].) Semantic information may be instructional or factual, and it needs the presence of a cognitive agent, whether artificial or natural, for whom the information has meaning. Semantic information may also refer to a subset of the syntactic statistical correlations between systems, one that has some meaning or significance for a given system. Conceptualizations of semantic information have been discussed by the likes of Bar-Hillel and Carnap (1953), Brillouin (1956), Duch (1993), Dretske (1999), Floridi (2010, 2013, 2019), Johannsen (2015), Zhong (2017), and Kolchynski and Wolpert (2018). We label this class of information and its variants informationSm.

Semiotic information: Semiotic information refers to interpreting information under the theory of signs or semiotics, particularly biosemiotics. It assumes that information is an implicit semiotic term. Semiotic information is a sign that can be interpreted by an agent. A sign carrying information is known as passive information (i.e., it exists objectively), while an interpreted sign is active information (i.e., it carries valuable epistemic knowledge). In the semiotic view, information is seen as either reducing "entropy and favoring adaptation and survival with regard to living entities" (the determinate view) or always being indeterminate due to the "abductive nature of information" (the indeterminate view). The first type of semiotic information above is also referred to as functional information (Cannizzaro 2016). Conceptualizations of semiotic information have been discussed by various scholars, such as Batenson (1979), Sebeok (1991), Sharov (2010), Cannizzarro (2016), and Thellefsen et al. (2018). We label this class of information informationSo.

Syntactic information: Syntactic information is connected by the concept of the structure (syntax) of a message. Syntactic information therefore expresses the

amount of statistical correlation between systems, so, from this perspective, information is seen as it is expressed in Shannon's theory of communication (Shannon 1948). Syntactic information also relates to the grammatical features of a message (grammatical information), assuming that the message is coded in some language – as it must be, being a message. Related terms used in the context of syntactic information are morphosyntactic information (Kamide et al. 2003) or case-marking information. We label this class of information informationSyn. Conceptualizations of syntactic information have been discussed by the likes of Sells (2001), Kamide et al. (2003), and Kolchynski and Wolpert (2018).

Quantified information or measures of information: Quantified information refers to mathematical measures of some form of physical phenomenon that has been designated as either information or a carrier of information. This category of information encompasses, as the better known formulations, Shannon's entropy of information, Chaitin's and Kolmogorov's algorithmic complexity metrics (Chaitin 2004; Kolmogorov 1965), and Fisher's (Frieden 1998) and Klir's (Burgin 2010) information metrics.

Measures of information are operationally useful, but they do not convey what information actually is, so they are not regarded as good definitions of information. From this point of view, referring to Shannon's information is not appropriate, but referring to Shannon's measure of information is. The same logic applies to Kolmogorov's information, Fisher's information, and other similar measures of information. We call this class of information informationQT under the proviso that this term pertains to measures, rather than definitions, of information.

Conceptualizations of quantified information have been discussed by researchers like Shannon (1948), Chaitin (1997, 2004), Peirce (1961), Shannon and Weaver (1949), Kolmogorov (1965), Klir and Folger (1988), Avery (1993), Solomonoff (1997), Frieden (1998), Burgin (2010), Stone (2015), and Ly et al. (2017).

We also cannot rely on measures of information to give us a deeper understanding of what information actually is. For example, Shannon's entropy of information has proved very useful in various applications (Shannon 1948; Shannon and Weaver 1949; Hartley 1928), while other metrics—such as the Fisher metric (Frieden 1998) and Kolmogorov's (1965) and Chaitin's (2004) algorithmic metrics, among others—are mathematical formulas that are called information measures, but they are designed for specific purposes under specific assumptions. These quantified concepts of information are therefore not of general import, even if they have been applied successfully in many domains and "interpreted" as fundamentally defining information.

We mention also Fisher information that is a statistical measure of how much information one may obtain about an unknown parameter from a sample. Technically, Fisher information is the inverse of the variance of the Maximum Likelihood Estimator (MLE) for a parameter Θ from a sample X (for a normally distributed X). (The MLE is the maximum of a function of a specific parameter Θ given a random sample.) To simplify this, the concept of Fisher information allows us to find the value of the parameter(s) of a function fitted to the experimental data such that it minimizes prediction error (see applications of Fisher information in Frieden [1998]

and Ly et al. [2017]). For George Klir (Klir and Folger 1988), information is a reduction of uncertainty. Uncertainty may be considered as ambiguity or vagueness. Such uncertainty may be measured by Shannon's entropy of information (a measure of ambiguity), the Hartley measure (H), or measures of fuzziness. Both Fisher and Klir define information as a reduction in uncertainty based on information from perceived observations, so these concepts clearly belong to the class of epistemic information.

A quite extensive list of quantified models of information is also provided by Burgin (2010, 131–132), but the sheer number (32 formulas—probably more by now) of models for measuring information does not translate into clarity about the nature of what is being measured. In fact, the models listed by Burgin measure quite different properties of abstract constructs, usually probability spaces, so they do not necessarily convey the same concept of information. Multiple measures for information do not translate into a better understanding of what information is—it shows only a range of possible interpretations (Hintikka 1984, 175–181).

Quantified theories of information also include topological information and information geometry. Information geometry was defined by its founder Shun'ichi Amari (2016) as "a method of exploring the world of information by means of modern geometry." Information geometry studies information science (an umbrella term for statistics, information theory, signal processing, machine learning, and artificial intelligence [AI; Nielsen 2020]) through geometry. Information geometry provides a pure, context-free method for studying relations like distances, such as between probability distributions. Information science is viewed as a science for deriving models from data, represented as the geometry of decision making (e.g., curve fitting, classification, etc.) (Nielsen 2020, 2022).

Topological information in turn views information as being topological in the sense that the relations between systems that manipulate and exchange information can be represented topologically. Such a topological representation of information and computing allows for Turing machines and computing to be generalized to the manipulation of information on tangle machines.[4] (For more information on topology, see the work of Moskovich and Carmi [2015] and Carmi and Moskovich [2014].)

The numerous conceptualizations for information convey how the concept of information appears to be fragmented, malleable, and elusive. Thus, is there a way out of this quandary?

3. Ontological and Epistemic Information

To simplify things somewhat, we propose that the concept of information can be viewed from two perspectives, namely epistemic and ontological. The concept of

[4] "Tangle machines are topologically inspired diagrammatic models. The novel feature of tangle machines is their natural notion of equivalence. Equivalent tangle machines may differ locally, but globally they share the same information content. The goal of tangle machine equivalence is to provide a context-independent method to select, from among many ways to perform a task, the 'best' way to perform the task" (Moskovich and Carmi 2015, abstract).

ontological and epistemic is seen as defined by John Searle (Searle 1983, 1998, 2013a, 2013b, 2015a, 2015b).

3.1. Information: The Epistemic View

From this viewpoint, information as a concept is centered on humans or other conscious agents.[5] We call this epistemic information, because it emphasizes its relation to knowledge and meaning and denotes informationE. The concept of epistemic information has seen many incarnations, so there is no single definition that is acceptable to everyone or even some nebulous majority. Take, for example, the works of Bar-Hiller and Carnap (1953), Brooks (1980), Rucker (1987), Buckland (1991), Devlin (1991), Losee (1998), Dretske (1999), Casagrande (1999), Floridi (2010, 2013, 2019), Lenski (2010), Vernon (2014), Dasgupta (2016), Millikan (2017), or Carroll (2017); this list is by no means exhaustive. Each of these authors has created a somewhat different version of epistemic information, but they all associate information with meaning, knowledge, or semantics, thus providing a common thread that allows them to be collected under one heading.

Thus, epistemic information is associated with knowledge, belief, or a communication process in its more generally and broadly understood meaning.[6] We limit the application of meaning to cognitive systems with some form of linguistic capacity, whether artificial or biological. Epistemic information thus exists only if someone or something recognizes it as information.

Epistemic information is defined within the context of a communication system, so there is a sender, a receiver, and a communication process. This communication system may take many forms (e.g. Cherry 1978; Shannon 1948; Maynard Smith 2000; Vernon 2014), but it will follow the general format described by Casti (1989). Epistemic information exists specifically in, and for, the minds, which are broadly understood as complexes of cognitive faculties, of the receiver and the originator. Epistemic information exists when communicated (i.e., created, sent, and received) as a message. This dependency on the sender and the receiver, as well as their cognitive functions, makes information epistemically and ontologically subjective. In other words, this information depends on something else to exist.

3.2. Epistemic Information and Data

When we look at definitions of epistemic information, these definitions often, if not almost always, claim that information (i.e., epistemic information) is “data + meaning” (Floridi 2013). There are similar claims that “information is derived from data”

[5] The term “a conscious agent” may, in some studies, in addition to human agents, include animals and artificial systems.

[6] A review of theories of meaning lays beyond the scope and purpose of this work, but an extensive list of references can be found in Speaks (2021) and other sources.

or “information is data endowed with relevance and purpose” (Davenport 1997; Drucker 2001), “information is organized data” or it is “interpreted data” (Terra and Angeloni 2010). It somehow seems that we need data to get information, that data is some kind of input to the process of creating information, that data differs from information, or that data is some “primitive stuff” from which information is formed. Data certainly seems to be not information—they are different.

It seems that the differentiation between data and information is somewhat arbitrary, a matter of interpretation as to what constitutes raw data versus analyzed data, no special meaning versus assigned meaning, collected versus processed, formal formats (tree, tables, graphs) versus linguistic interpretations, symbols versus ideas, and so on. These differences are not very well accentuated, so the boundary between data and information seems to be somewhat fluid, and the multitude of definitions of data only confirms this impression. Zins (2007) documents no less than 130 definitions for data (see also e.g. Machlub, 1983; Zeleny 2005; Livesley 2006; Rowley 2007; Akerkar and Sajja 2010). For the sake of completeness, we also need to mention the so-called metadata. Metadata, as a concept, represents what we may call “data about data.”[7] Metadata is therefore nothing more than data about data—it does not enjoy any special metaphysical or ontological status.

3.3. Information: The Ontological View

From this alternative viewpoint, we see information as a form or organization of nature. We do not ask, “What is information?” in the context of a specific domain, cognitive agent, or communication process. Instead, we conceive information as an objective, mind-independent phenomenon. We see it as something that is a part of the natural world, so people or other cognitive systems are not generally reference points for it. Information is less frequently conceptualized as an ontological phenomenon, yet, as can be seen from the published studies, it is well justified as such. We denote this information informationO.

The list of researchers conceptualizing information as something ontological includes von Weizsäcker (1971), Turek (1978, 1981), Mynarski (1981), Heller (1987, 2014), Collier (1989), Stonier (1990), Devlin (1991), De Mull (1999), Polikghorne (2000), von Bayers (2006), Seife (2006), Dodig-Crnkovic (2013), Hidalgo (2015), Wilczek (2015), Carroll (2017), Rovelli (2016a), Davies (2019), and Solé and Elena (2019). This list is certainly not exhaustive, but the above sources give a comprehensive overview of the current discussion for this topic.

The idea of information as an ontologically objective phenomenon has been seen in diverse contexts. In these studies, ontological information is regarded as a phenomenon that exists independently of any observer, even artificial or biological

[7] Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information (see Riley 2017; see also Snowden 2019).

ones. Ontological information exists independently of any mind,[8] whether natural or otherwise, or any kind of cognitive system or process. Ontological information is objective in the sense that it is not dependent on any observer. It is a natural phenomenon in the same way as all natural objects and phenomena, an element of nature itself.[9] Researchers often interpret ontological information by recognizing its existence in the structure or order of nature, and it is often equated with the form or shape of a natural object or an artifact,[10] although this is not entirely accurate.

At present, we do not have a physical interpretation of ontological information. We only claim that, from the current studies, it seems that ontological information has several properties that we can attribute to a physical phenomenon.

InformationO and informationE may be succinctly defined thus:

- Ontological information or informationO is defined as a physical phenomenon; it exists objectively, has no intrinsic meaning, and is responsible for the organization of the physical world.
- Epistemic information or informationE is a (artificial or biological) cognitive agent's interpretation of physical stimuli or the abstract and non-linguistic concepts created by a conscious agent without direct link to the outside stimuli. InformationE is relative to a cognitive agent, i.e., it is ontologically subjective (ontologically subjective in Searle's sense).

The precise boundary between ontological and epistemic information depends to a certain degree, ceteris paribus, on our understanding of meaning.

The terms ontological and epistemic information have been used by Zhong (2017) but with a different meaning from the one used here. We denote Zhong's objective information informationZO and epistemic information informationZE. Zhong defines objective information as representing "the set of states at which the object may stay and the pattern with which the states vary."[11] The equivalent name for ontological information is object information. Object information, informationZO, indicates that information about the object comes only from the object itself, without any input from a subject. Epistemic information (or perceived information) is information that an epistemic subject has about an object.[12] Epistemic information,

[8] The word *mind* is understood here as a set of cognitive faculties including consciousness, perception, thought, judgment, and memory. It can also be understood as an artificial system that has a subset of cognitive-like functions.

[9] The word "nature" has many meanings (see, e.g. the entries in Honderich 1995) and (Lalande 1956), and there are obvious differences between the common usage and the scientific and philosophical usage.

[10] The term "relationships among the parts of the physical system" seemed to him the most general term capable of covering "applications in mathematics, physics, chemistry, biology and neuroscience" (von Baeyer 2005, 22).

[11] Definition 1 (Object Information/Ontological Information). The object information concerning an object is defined as "the set of states at which the object may stay and the pattern with which the states vary" presented by the object itself (Zhong 2017).

[12] Definition 2 (Perceived Information/Epistemological Information). The perceived information a subject possesses about an object, which is also termed epistemological information, is defined as the trinity of the form (named the syntactic information), the meaning (the semantic information), and the utility (the pragmatic information), all of which are perceived by the subject from the object information.

informationZE, comprises semantic, syntactic, and pragmatic information, all of which have a source in informationZO. Epistemic information is also denoted comprehensive information (informationZC) by Zhong. Zhong's objective or ontological information represents the state of an object that can be perceived by an epistemic agent. It is not the internal structure of an object as denoted by ontological information in this study – informationO. In fact, informationO is never directly perceived by an epistemic subject as is. InformationZO is more akin to natural information, as discussed later in the paper. InformationZE or equivalently informationZC comprises semantic, syntactic, and pragmatic information (see Zhoong's definitions). This composition would imply that InformationZE already exists in some linguistic form with associated symbolism and syntax. InformationE has a much more generalized form and does not imply symbolic representation. Thus, it accounts for animal cognition or other forms of non-verbalized information—like intuitive knowledge or abstract ideas in human subjects.

4. Unifying Theorems

Floridi's (2010) General Definition of Information (GDI) and Burgin's (2010) General Theory of Information (GTI) attempt to somewhat correct the profusion of various conceptualizations and establish some common ground that underlies these definitions. Both theories have a broad scope and are very rich in content, so, in this short summary, we restrict ourselves to their main postulates.

4.1. General Definition of Information (GDI)

Floridi's (2010) GDI is a fairly comprehensive statement about the perception of information, so it is attached to the concept of information as something expressing meaning or knowledge. In other words, it reflects the epistemic perspective that prevails in current philosophy. Moreover, the GDI assumes the existence of a quasi-physical foundation for information through something called the *infon* (σ). Unfortunately, this foundational infon has a rather ambiguous explanation, and the purely epistemic perspective leaves the whole concept behind the GDI wanting. The GDI is defined as follows (Floridi 2010, 2013, 2019):

GDI σ (an infon) is an instance of semantic information if and only if:

GDI.1 σ consists of n data (d), for n >=1;

GDI.2 the data are well-formed (wfd);

GDI.3 the wfd are meaningful (mwfd = δ).

GDI.1 states that semantic information consists of data, while GDI.2 states that semantic information consists of well-formed data according to some rules. GDI.3 then states that semantic information consists of well-formed data that has a meaning within the specific language system.

The elementary piece of information, a *datum*, is defined as:

datum =def. x being distinct from y

where x and the y are two variables to be defined (i.e., content and domain). The definition pivots on the concept for the lack of uniformity as defined by Batenson (1979).[13]

The datum is a relative concept (Floridi 2013), and something may or may not be a *datum*. Floridi denotes it a "taxonomic neutrality." A datum in GDI is further described through typological neutrality, ontological neutrality, genetic neutrality, and alethic neutrality, which are concepts explained by Floridi (2013). To avoid ambiguity, the GDI further constrains semantic information through the GDI.4 condition:

GDI- σ (an infon) is an instance of semantic information if and only if:
GDI.1 σ consists of n data (d), for n >=1;
GDI.2 the data are well-formed (wfd);
GDI.3 the wfd are meaningful (mwfd = δ);
GDI.4 the δ are truthful.

GDI provides a very detailed account of variants, versions, and interpretations of semantic information; it is about semantic information only. Its physical foundation in infons depending on the concept of data or datum is rather weak.

The infon is a concept described by Stonier (1990), Devlin (1991), Floridi (2013), and Martinez and Sequoiah-Grayson (2023). Infons are positioned as elemental (natural) units of information. Floridi (2013) uses the term infon in his GDI. Floridi's infon is the smallest form of an interpretable something, and it is not physical, so it must be abstract. Infons have also been defined by Devlin (1991, 35) in many ways. It is an "item of information" that is theory absolute or representation-independent; it is like real numbers and independent of the form they are in. Infons are semantic objects within the theory they are in. Their nature is that of numbers. Yet another definition of infons is proposed by Martinez and Sequoiah-Grayson (2023). "Their definition is developed in the context of the situation theory of information" (Martinez and Sequoiah-Grayson 2023). Clearly, the infons of Stonier, Martinez and Sequoiah-Grayson, and Devlin are not the same, even if they all seek to play the role of "elementary units of information." As well, an infon is not elemental in the sense that an elementary particle is in physics, nor is it sufficiently well-defined to use it without qualification.

4.2. General Theory of Information (GTI)

The GTI proposed by Burgin (2010, 2017) and Burgin and Feistel (2017) provides us with a fundamental grounding in the concept of information; as such, it offers a foundation for epistemic and ontological information, as well as other derived concepts. Moreover, the GTI may also position the fundamental ontological properties of information as a physical phenomenon with fundamental structural and causal properties.

[13] "In fact, what we mean by information—the elementary unit of information—is a difference which makes a difference" (Batenson 1973).

As Burgin claims (2010, 2017), (Burgin and Feistel 2017), the GTI has three components:

- the axiomatic foundations
- the mathematical core
- the functional hull.

We focus on axiomatic foundations. The axiomatic foundations consist of principles, postulates, and axioms of the GTI (Burgin 2010, 2017; Burgin and Feistel 2017).

- *Principles* describe and explain the essence and the main regularities of the information terrain.
- *Postulates* are formalized representations of principles.
- *Axioms* describe mathematical and operational structures used in the GTI.

There are two classes of principles:

- *Ontological principles* explain the essence of information as a natural and artificial phenomenon.
- *Axiological principles* explain how to evaluate information and what measures of information are necessary.

There are three groups of ontological principles:

- *Substantial ontological principles* [O1, O2, and its modifications O2g, O2a, O2c] define information.
- *Existential ontological principles* [O3, O4, O7] describe how information exists in the physical world
- *Dynamical ontological principles* [O5, O6] show how information functions.

In a strict sense, information is stratified according to the global structure of the world, as represented by the Existential Triad of the world, which comprises the world's top-level components as a unified whole that reflects the unity of the world. This triadic structure is rooted in the long-standing traditions of Plato and Aristotle and comprises three components: the Physical (i.e., material) World, the Mental World, and the World of Structures (Burgin 2010, 2017). The Physical World represents the physical reality as studied by natural and technological sciences, while the Mental World encompasses different forms and levels of mentality. Finally, the World of Structures comprises various kinds of ideal structures. The Existential Triad involves differentiating information into two fundamental classes: ontological information and mental information. Because of its metaphysical import, the GTI may not be to everyone's liking. But we do not have anything better for now.

5. Conclusions

The sheer volume of ideas that has been produced, and continues to be produced, for information means that any effort "to classify them all" will always be non-exhaustive. The complex of specialized concepts co-associated with information drawing on expertise in physics, mathematics, biology, philosophy of mind, computer sciences, communication, etc.—like mass, matter, energy, complexity, entropy, meaning, chaos, order, form, structure, etc.—makes any single-sided discussion on information a fragile and precarious enterprise (e.g. Reading 2006; Vopson 2019).

Nevertheless, a more coherent picture of the various conceptualizations can be seen to emerge in a form of GTI and GDI.

We therefore have reasons to be both satisfied and disappointed. We know much more, and understand much more, about information than we did in Shannon's time and before it, which is a good thing. However, researchers' attempts to distinguish their own research from that of others by claiming to have discovered something new has resulted in the profusion of information theories that are incomplete and narrow, and that, on the whole, do not form a coherent picture of the concept of information. In other words, the trees have been mistaken for the forest. While we should strive to be precise, the unchecked proliferation of novel concepts makes the idea behind them more vacuous than clear.

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MIHÁLY HÉDER, EMINE GORGUL,
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Current issues and future directions in engineering ethics education

This paper reports on engineering ethics education (EEE)-related issues based on a comparison of three technical universities: Budapest University of Technology and Economics, Friedrich-Alexander University, and Istanbul Technical University. Besides the presentation of the current state of EEE, future challenges are also discussed.

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How to cite this article:
Héder, Mihály, Emine Gorgul, Merve Calimli Akgun, Ralf Mitschke.
"Current issues and future directions in engineering ethics education".
Információs Társadalom XXIII, no. 4 (2023): 92–101.
https://dx.doi.org/10.22503/inftars.XXIII.2023.4.6

Introduction

This paper reports on engineering ethics education (EEE)-related issues discussed at the EELISA TechDiplomacy workshop in Budapest, October 26–27, 2023. After the in-person discussion, work was carried on remotely among the authors in order to cover additional topics and get more accurate information. Ultimately, this research paper was created in the field of EEE.

Besides the authors of this article, there were about three dozen people present at the workshop itself, ranging from senior academic staff through junior academic staff to PhD, graduate, and undergraduate students. Everybody in the audience had ample opportunity to contribute; audience input was, in fact, substantial, and we worked the feedback from the notes taken by several panelists into this report.

Acknowledgments: Great thanks to the main organizer, Balázs Vince Nagy, for offering the possibility of this workshop as part of the larger TechDiplomacy event. This activity is funded under the EELISA InnoCORE project, which in turn received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 101035811. Finally, we are most obliged to the audience who honored us with their presence at this event and contributed to the discussion.

Position in the curriculum

In this section, we provide an overview and compare the position and role of EEE at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Istanbul Technical University (ITU), and Budapest University of Technology and Economics (BME). Naturally, these three institutions are in no way representative of any group; however, the comparison is still worthwhile and some qualitative findings could be of interest to a wider audience.

At ITU, all science, technology, engineering, and math (STEM) students take a mandatory Introduction to Ethics course in the context of their related engineering program. For instance, students enrolled in the civil engineering program must take Introduction to Ethics in Civil Engineering in the first semester of their first year. The course earns them 2 ECTS credits and amounts to almost 6% of the overall number of credits they need to accrue, which is around 31.5 credits. This is a requirement of the accrediting body, ABET (Accreditation Board for Engineering and Technology); all ITU engineering programs must comply with ABET's standardization framework, which includes offering a mandatory introductory course on engineering ethics in addition to the elective courses.[1] Elective courses on ethics are, unfortunately, very limited, with just one available for 4 credits.

[1] Criterion 3 (Student outcome), Article 4: "an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts." https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2023-2024/

Although higher education institutions (HEIs) tend to approach EEE by means of a specific course dedicated to the subject, we should also take into account the ethical dimensions of other courses in a typical engineering curriculum. For example, how does a statistics or research methods course approach ethics? Does it emphasize the fact that science is falsifiable and that the research findings must therefore be shown to be reliable and valid, in such a manner that the researcher can be held accountable?

At BME, there is no universal approach to EEE. In a few curriculums (e.g. civil engineering, human-centered artificial intelligence [AI]) it is mandatory and tailored to the needs of the given discipline. For others it is elective and just one in a sea of over 100 elective courses, on subjects ranging from art to craftsmanship.

At FAU, none of the BA study programs we reviewed includes an explicit ethics module or a significant discussion of ethical topics within the existing curriculum. Similar to BME, the ethics courses and modules at FAU are elective only, i.e. optional, meaning that only a fraction of the students take these classes.

Paths to morality

Regarding the uptake of EEE, there are several crucial questions to discuss. One relates to the timing of such courses. Introducing students to ethics early in their studies (i.e. in their first year) would provide them a better framework on which to hang the rest of their engineering knowledge. A potential downside, however, is that looking at engineering ethics so soon is just too decontextualized; a later-stage engineering student with a related job or internship experience may be more sensitive to the pressures of the engineer's professional life and thus more open to ethics that may offer a framework for handling that pressure.

We want to emphasize that EEE should be embraced through a holistic approach to the overall education ecosystem. In other words, the issue of teaching engineering ethics could be approached much more simply be introducing ethical discourses in earlier stages of education. For example, ethics courses could be offered as part of secondary education and would then constitute a first layer for an ethical foundation of engineering practices. However, due to the lack of a consistent ethics education on the secondary level - except again in the context of electives - throughout the countries with EELISA association, this approach will not have any practical relevance in the foreseeable future.[2]

As we touched on earlier, the subject of engineering ethics should not be taught only through dedicated for-credit courses; ethical dimensions should also be stressed consistently in related courses across the curriculum. If we enable EEE to transcend the boundaries of specific "Ethics" courses, and to become part of all related courses, it will help students to compile a better overall understanding regarding their roles and responsibilities as future engineers, scientists, or scholars. This approach, of

[2] e.g.: School education in Germany is exclusively federally regulated, which results in 16 very diverse curricula.

course, will require renewing and rekindling academics' interest in teaching ethics, but this could be achieved by universities establishing teacher training programs for "teaching ethics in the digital age."

Another interesting question pertains to the issue of formal versus informal EEE. Do students need to participate in actual classes (formalized setting)? Perhaps, instead, they could enroll in Engineers Without Borders or undertake some community coaching. An advantage is that these charitable activities would not require any curriculum design, though they would still require an active on-campus life where students could be recruited. Furthermore, in today's highly competitive educational landscape, such extracurricular activities will most likely be considered a unnecessary luxury or time-consuming disadvantage, or just attract students, which have enough financial and timely resources to be able to afford them.

In terms of what motivates ethical conduct in engineering, we found that, besides internal morality drivers, compliance with regulations is an important external motivation. That is, ethics codes and regulations — the need for explicit ethical considerations in research and development — generate a demand for formal education. While regulation and compliance requirements help the EEE mission by providing a way in to the curricula, external pressures may be handled by a list of dos and don'ts, checklists, and other superficial methods that have long been known to be lacking as a basis of moral education. An example here would be the so called „Green Washing" of technologies and technology related practices, where marketing oriented methods like framing, wording and story-telling-techniques are used, to purposefully imitate ethic driven developing practices, without introducing ethical concerns in concrete practices.A provocative question that summarizes the problem of sustainably anchoring ethics in engineering studies could be: Can a society even afford to forgo a comprehensive ethical education for engineers when their work is having an increasingly extensive and profound impact on society, be it in AI research, robotics, algorithmic control and many other disruptive technologies?

Content

We found that a wide variety of approaches are in use when it comes to selecting the content of EEE. For instance, at BME the engineering ethics class begins with a meta-ethical overview that explains moral realism vs. anti-realism and consequentialism vs. deontology (Pettit 1989). This is followed by an introduction to the concept of divine command theories, without focusing on any religion in particular. Kant/Kantianism and Utilitarianism come next, after which moral anti-realism is exemplified through the social contract theory of Thomas Hobbes. Responding to contemporary anxiety, Just War Theory (Elshtain 1992) and the moral basis of the Geneva Conventions (Meron 1987) are explained. Finally, the discussion turns to cognitive biases, social pressures, conformity, and other potential obstacles to moral deliberation. The class uses engineering issues and case studies all the way through, as examples of various moral theories in practice. This course thus reflects the view

that engineering ethics is just contextualized general ethics, rather than a subject with its own meta-ethical place.

The BME course on the ethics of AI is more focused. For instance, it looks at technological lock-in and, to some extent, technological determinism vs. social control (Héder 2021); the more epistemological issue of explainability (Héder 2023) and transparency; the responsibility gap and the bystander effect, exemplified through Peter Singer's work (Singer 2016); and the bias and/or fairness of algorithms, supported by *Justice as Fairness* by John Rawls (Rawls 2001). Social contract theory is also covered here in the context of whether new technologies require new social contracts and how these should be constructed. Finally, the course explores "the Machine Question" (Gunkel 2012), that is, the moral and social status of AI agents and possible ways of thinking about that; and the European Union's (EU) draft AI Act , together with the IEEE's (Institute of Electrical and Electronics Engineers) ethics standards on AI (7000-2021 and P7001; see Winfield 2021). A clear issue with both of the BME courses is that they are clearly Western-centric.

What is the difference between generic ethics and engineering ethics?

To answer this question, we should perhaps ask another: is technology — or, in this case, engineering — an end in itself or does it serve a higher public good? Is it a means to an end, or is engineering/technology an end in itself? In this sense, the most specific thing that differentiates engineering ethics from generic ethics is the emphasis on this intricate "end vs. means" issue in engineering and technology. We argue that engineering ethics embodies an innate obligation to or responsibility for the public good. However, this ethical standpoint poses a puzzle. With the today's unprecedented technological advances, engineers are much more capable of *doing*; *tekne*, derived from the Greek word for craft or art, can be understood in the context of this paper as engineering. However, there is a gap as regards how engineers can fulfil this expectation in society. In other words, the technology is advancing so rapidly that research on the means, actions, and codes of conduct by which engineers can fulfil their responsibilities in such a manner that they improve the well-being of the public is lagging behind. At least this is the case if ethics is limited to a very narrow understanding of objectively applied ethics in the manner of the dos and don'ts mentioned above.

Thus, there is an expectation vs. capability gap, and it is this gap that could be closed through a thorough EEE that constructs the necessary imperatives to delineate an ethical framework. Although this discussion sounds abstract on first hearing, it can be reified. One way of doing this might be the Capabilities Approach (CA) developed by Amartya Sen and Martha Nussbaum (Alexander 2016). CA purports that rather than predefined well-being conditions, there are constituent conditions for developing public well-being that can be identified. In this sense, the Sustainable Development Goals (SDGs; Katila et al. 2019) adopted by the United Nations (UN) in 2015 as an action framework for our responsibilities to end poverty, protect the planet, and maintain peace and prosperity, which are to be fulfilled by 2030, can be

considered and defined as a framework that delineates the conditions for achieving the well-being of our societies and dignity for all livelihoods on the planet.

In addition to the issue of the gap between expectations and capabilities, we also need to engage in a fundamental epistemological discussion about the nature of technology itself. In his highly influential essay „Die Frage nach der Technik" („The Question Concerning Technology") originally written in 1955, Heidegger states: „So ist denn auch das Wesen der Technik ganz und gar nichts Technisches."[3] (Heidegger 2000, p7). So, the idea of technology as a mere means to an end or even a tool with a particular purpose is highly questionable and maybe even dangerous: „*Am* ärgsten *sind wir jedoch der Technik ausgeliefert, wenn wir sie als etwas Neutrales betrachten; denn diese Vorstellung, der man heute besonders gern huldigt, macht uns vollends blind gegen das Wesen der Technik*."[4]

Technology at large, and especially engineering, is dealing directly with this two-sided aspect, the perception, or rather ideology, of technology as objective artefacts supposedly outside of society and the deeply social nature of technology itself. Heidegger's characterization of technology "as a frame" (Gestell) (Heidegger 2000, p20), as an enhancement of the body, but also as a skeleton reflects on the deeply interwoven relationship between humans and technology: Technology reaches within the user, especially the creator and carries with it much more of its world views, biases, needs and self-stylization, which in turn is influenced by the ideology of neutrality (see: Horkheimer 1947)

It has to be noted, that Heidegger developed his view on technology in discussion with Ernst Jünger, especially as a reflection to his work "Der Arbeiter" ("The Worker"; see Schwarz 1967). In Jünger's conception of it, the machine is also not at all a means to an end for a specific, rational task; rather, it is a tool to overcome the limitations of humans (which only refer to men). Jünger's workers were identical with soldiers, who serve a higher calling far beyond their concrete tasks and intentions. To take something of a provocative standpoint, we could argue that the "means to an end" aspect is negligible in comparison to the ideological value of technology as a way of the fulfilling for the "Übermensch" ("more man"). This aspect may be studied further in relation to the idea of technological solutionism (Morozov 2013) and the dark enlightenment movement (Peter Thiel 2015) or the different branches of the transhumanists movement.

As a concrete method regarding the practical application of EEE, the practice of engineering should always be reflected in terms of its potential implemented higher purposes (societal bias, political agendas, personal gratification, other forms of "higher callings") in relation to the public good. Cara Daggett's work on the concept of "Petro-masculinity" is a prime example for a supposedly "objective" technology trajectory, which rather feeds on ideological then technological necessities (Daggett 2017).

[3] „So the essence of technology is nothing technical at all" (own translation)
[4] „However, we are most at the mercy of technology when we regard it as something neutral, because this idea, which is particularly popular today, completely blinds us to the essence of technology." (own translation)

Current challenges and a constructivist approach

Teaching engineering ethics is complex and multifaceted, composed of different norms and ideas that work at different levels. Therefore, to be analytically facilitative, we would like to offer a toolkit based on an agent–structure model, with reference to social constructivism, so that we can unravel the existing challenges in the discipline of engineering ethics.

The word *agent* in this context refers to the actors that carry and transmit the ethics and responsibilities inherent in engineering, science, and technology — these include learners and teachers, HEIs, regulatory organizations, intergovernmental bodies, supranational bodies, the UN, the EU, companies, entrepreneurs, etc. These actors operate within a structure — the structure is the education ecosystem — that is in a mutually constitutive relationship with other agents. Hence, we embark from a constructivist point of view, by emphasizing this agent–structure relationship to identify the challenges we currently face at the agent and the structure levels.

First, at the agent level, the main challenge here is creating the appropriate pedagogical approach so as to break the resistance of STEM students to ethics, rekindle their interest, and make EEE a part of sustainable higher education. A related challenge pertains to EEE methodology. We need to construct a revised disciplinary understanding among academics as to the design of ethics courses and ethical dimensions across curriculums.

Second, at the structure level (i.e. in relation to higher education or a similar learning milieu represented by formal and non-formal learning systems such as universities, nongovernmental organizations [NGOs], engineering associations, companies, etc.; engineering programs and other undergraduate, graduate, and PhD-level programs are also considered structures), the key concern is curriculum design. When and how should ethics be integrated into programs and what weight should be given to it? The HEIs' current vision on ethics and the learning objectives and learning outcomes of programs and assessments needs to be coherently and consistently revised. It could even be beneficial, if tools and platforms could be created, which bypass traditional pathways of education, for example, an interdisciplinary certificate that is accepted across the board, at least in the EU realm. As a result, we could argue that the main challenge is to come up with a clear conceptual foundation to underlie EEE, based on an innovative learning approach. EEE needs to be revised from a sociotechnological angle, if we are to face the challenges of the current Anthropocene era that we are living through, emphasizing that human actions have a dominant impact on our planet.

Curriculum extension in the future

There are several emerging topics to consider for addition to these curriculums. In order to include non-Western approaches, Ubuntu (Ujomudike 2016) ethics and Confucianism (Yao 2000) could be integrated. An increased emphasis on the Frankfurt School and on virtue ethics would not go amiss. Also, to enrich the curriculum with

modern, internationally grounded theories, the CA (Akire 2005), mentioned earlier, could be introduced.

In terms of delivery method, the big post-Covid question, of course, is what role online elements should play in EEE. Here the workshop panelists aired their concerns about whether EEE is suited to online education, while also emphasizing that remote access might have an important role in removing barriers to EEE.

Online education is not fundamentally incompatible with EEE, and we could argue that we have an obligation to make it accessible for everyone. But we also believe in the power of public deliberation. With reference to Habermas, deliberation among equals by means of logic and reason helps to ensure legitimacy as regards the responsibilities of engineers.

Another direction to explore is whether there are different expectations from the different generations (Z and alpha) in general, and in relation to online content in particular.

Development of EEE has been rather slow so far because engineering is considered to be normatively neutral or amoral; thus, EEE is unnecessary. One of the most crucial aspects that needs extension is a sociotechnical orientation in engineering curriculums for ethics. There is a need for engineers to understand the ethical responsibility that accompanies their practices while they undertake research and innovation. This can be elaborated by focusing on challenges from the real world in cooperation with relevant stakeholders. One solution to this might be to adopt the principles of challenge-based learning for EEE, based on real-world issues/problems. To undertake such an approach, however, the instructors/tutors would first need to be trained. Thus, HEIs should develop a "training of the trainers" program to cover ethical, sociotechnical, and politico-ethical issues within a broader understanding of engineering training in order to be open to professionals, educators and scholars alike.

Another opinion calls for a more radical change in engineering studies. The field of engineering and the creation of technology must be understood as a highly normative endeavour as it has already been discussed above. Therefore, the normative aspects must be the foundation, not an expansion of engineering and technology studies; otherwise, students may not acquire the ability to critically reflect on their work as embedded in specific values, viewpoints, and ideologies. In this sense, engineering could not be engaged outside of ethical and social imperatives.

On TechDiplomacy

From a critical perspective, a reflection on the history and the methods of TechDiplomacy should be an integral part of any ethics curriculum in all engineering and technology-based studies. Not only is TechDiplomacy a "hot issue" in the contemporary, global struggle for talents between the old and the new superpowers in the *informatization age* — particularly in relation to the US, Northwestern Europe, the former Asian Dragons, China, India, and the rest of the BRICS alliance (Brazil, Russia, and South Africa) – but, with topics like intellectual property, standardization

and safety regulations, and the potential of new bi- and multilevel collaborations, TechDiplomacy is also a critical means of so-called soft power. Added to this, the materialistic and geopolitical aspects of technology, like the mining of rare materials, are interlinked with TechDiplomacy, especially in the post-colonial regions, where most of these resources can be found. Regarding the exploitation of brains and ores alike, ethics is at the centre of TechDiplomacy and, therefore, of engineering in a global world.

Another approach to TechDiplomacy is to revisit Marcuse's (1941) account of the implications of technology and how "technocracy" could enlighten our efforts to rekindle interest in EEE, in addition to Arendt's (1958) account of the instrumentality of technology.

Concluding remarks

Perhaps this quote from "Some social implications of modern technology" (Marcuse 1941) is at least an interesting remark on the illusion that technology is a "neutral" force for the enlightened development of all humankind: "*Technics hampers individual development only insofar as they are tied to a social apparatus which perpetuates scarcity, and this same apparatus has released forces which may shatter the special historical form in which technics is utilized.*" It emphasizes that technology can be seen only through the eyes of the society that created and utilizes it.

In reflection of the previous discussion documented in the essay, EEE could not only be a add-on to engineering education. If we take the (ethical) challenges of a rapidly transforming VUCA[5] world seriously, we not only need technology that can deal resiliently with challenges such as climate change, pandemics, social inequality and military conflicts, but also engineers who can deal resiliently with the ethical challenges posed by authoritarian competitors and human rights issues.

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[5] VUCA is an ancronym mainly used in military and management enviroments. It stands for volatility, uncertainty, complexity und ambiguity and is regarded as a main driver for adoptive innovation.

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Holistic Data Security: A Balanced Approach to Data and Privacy

The expansion of the data economy has raised a multitude of concerns that scholars worldwide are working towards overcoming. Given the divergent views on data in fields such as law, economics, and sociology, varying approaches to data governance have been suggested. However, regardless of the approach chosen, the multi-dimensional aspects of data should not be disregarded. This book incorporates various research viewpoints on data governance and introduces the innovative notion of "Holistic Data Security", which can offer fresh avenues for exploration by academics across diverse fields of study.

Keywords: *Privacy, Data Law, Data Security, Holistic Data Security*

Acknowledgement

This work received financial support from the Beijing Municipal Education Commission (Research Program *Research on the Model Construction and Scale Development of the Learning Environment in the Capital's Senior University in the Internet Era,* Grant No. AIDB231).

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How to cite this article:

Lu, Yao. "Holistic Data Security: A Balanced Approach to Data and Privacy". *Információs Társadalom* XXIII, no. 4 (2023): 102–105.
https://dx.doi.org/10.22503/inftars.XXIII.2023.4.7

Holistic Data Security: A Balanced Approach to Data and Privacy

Breached!: Why Data Security Law Fails and How to Improve it, by Daniel J. Solove and Woodrow Hartzog, New York: Oxford University Press, 2022, £22.99 (Hardcover), 256 pp., ISBN:9780190940553.

It is now considered that the world has fully entered the digital economy era, and the importance of data is self-evident in this new age. As a new production factor that drives the development of the digital economy and empowers social governance and technological innovation, data is as important as oil was to the second industrial revolution. Daniel J. Solove and Woodrow Hartzog bring us a book on how to improve the approach to data security in law. Daniel J. Solove is the John Marshall Harlan Research Professor of Law at the George Washington University Law School, while Woodrow Hartzog is a Professor of Law and Computer Science at Northeastern University School of Law and the Khoury College of Computer Sciences. In this book, the authors propose a different approach to the laws governing data security. It is important to note that this book focuses on data security in relation to personal data, and as such, the term "data" primarily refers to data related to personal information. In this book, the authors make an important point that differs from the point of view many other researchers: that data breaches are a product of systemic problems and that the law should focus on the entire data processing system and the participants in it, rather than just on the breaches, in what the authors call a "holistic approach" to data security law.

In the introduction to the book, the authors outline a broad set of principles that could help bring consistency to the relevant legal systems. Their argument rests on one overarching point: In order to improve the rules for protecting personal information, policymakers need to counter-intuitively shift the focus of the law beyond just the data breaches themselves. The current data security law is effectively a "breach law" that overemphasizes the breach itself and ignores the other actors and factors that led to the breach. The authors offer an alternative, broader vision of data security policy in three areas: accountability, redress, and technical design.

The first part of the book focuses on the challenges facing data security and how the law does not adequately address these challenges. In Chapter 2, the authors briefly review the history of data security in this century and list nine common reasons for data breaches (big lapses in oversight, human error, hacking of vendors, too much data being kept and stored together, lost or stolen devices, data not encrypted, phishing, failure to learn from the lessons of previous data breaches, careless simple mistakes), from which it is easy to see how individuals, companies, and governments alike can fall victim to data breaches. In Chapter 3, the authors divide current data security laws into three categories (Breach Notification Laws, Security Safeguards Laws, Private Litigation), and then describe and analyse their strengths and weaknesses in detail. However, by revealing the imperfections of the existing law here, the authors are not advocating abandoning the path of legal regulation; quite

the contrary, they recognize that the law can play a large role in improving data security, but that it requires a significant shift in its focus and means of adjustment.

After presenting the background to the privacy–data use problem, the authors propose a different approach to data security in the second and core part of the book, which they call "holistic data security". In Chapters 4 to 8, the authors introduce the core values of "holistic data security", the relationship between privacy and security, and propose the concepts of "Maximizing Data Minimization" and "Data Mapping" as an attempt to bridge the reality of data security in the privacy–data use divide. In addition to the fragmentation between privacy and the need for data, human error plays an important role in most data intrusions. Therefore, the authors argue that the law could achieve the goal of ensuring data security through direct restrictions or by using a mix of incentives and disincentives, and suggest that this could be achieved by "Changing the Default Settings", "Promoting Mutual Trust", "Encouraging Balanced Security Measures" and "Sending Sensible Signals" to achieve good law and good governance in the field of data. Finally, the authors summarize the book in Chapter 9 and come up with some detailed revisions for their data method, such as "The law should recognize that data security is a systemic and societal problem, one where the effects of one's poor security can affect many others".

As a Chinese scholar, I would like to emphasize the value of this book to the readers of this article from the perspective of China's law. A series of legal issues concerning data have been widely discussed in this book, and controversies exist on how to define the connotation and extension of data, the attribution of data, and the attributes of rights and the content of those rights. Among these, determination and legalization of the attribution of data rights is the legal basis and prerequisite for the construction of a unified data market, but this has not been clearly stipulated in China's current civil legislation. Article 127 of the Civil Code of the People's Republic of China rather provides: "Where there are laws particularly providing for the protection of data and online virtual assets, such provisions shall be followed". From the content of this article, the current Civil Code only provides for the protection of data in principle, and establishes the principle of data protection in accordance with the law at the level of the basic civil law. The reason for this is that the process of codification of the Civil Code remains controversial, and there is still no consensus yet on the relevant theories, at home or abroad, so it is not appropriate to make more institutional arrangements for data in the various parts of the Civil Code at this time; at the same time, in terms of legislative techniques, the positioning and chapter structure of the General Provisions cannot provide systematic and detailed provisions for this series of systems. Therefore, the current Civil Code can only provide for the protection of data in principle under the General Provisions, with a view to reaching a consensus in practice and filling the institutional gaps in the future based on the recommendations from subsequent academic and practical circles. The data security issues discussed by the authors in this book actually involve not only the concept of data or privacy, but also a debate on property rights in economics. In China and even in some civil law countries, scholars have tended to focus on the "ownership of data" due to research inertia, resulting in data security laws effectively becoming "violation laws". At the same time, treating data rights as ownership rights could

make it difficult to address the issues of data monopoly and personal data rights, resulting in a fragmentation of privacy, property rights and data. In China, most of the literature on data rights is vague in terms of the concept of data, and it is not possible to effectively conduct dialogue between different disciplines; the research method is singular, and there are few papers that have conducted comprehensive, multi-path and interdisciplinary research on data rights, and it remains difficult to grasp the "pain points" of data rights from a global perspective. As a result, the current research is not deep enough, and the relevance and practicability of the ideas proposed so far are weak. The reason for these problems is that it is difficult for scholars to see past the property rights perspective of "data". Nevertheless, there is a clear need for Chinese scholars to conduct research on data rights. The institutional advantages of data rights include the potential to stop disputes, correct market failures, establish an effective market for data circulation and utilization, and realize the concept of "constant production before constant mind" in the field of data. Further, the more far-reaching significance of resolving the data rights issue is to realize the self-determination of personal information through the domination of data property rights, and to guarantee people's autonomy and security in building their digital living space in the information society.

This book presents a comprehensive and vivid picture of data security with a wealth of detailed case studies and a down-to-earth approach to writing, allowing a glimpse of future rights beyond data rights in rem. At the same time, this book can assist scholars in developing a pluralistic perspective on data and may also be advantageous for countries in regard to assisting their data legislation. From this point of view, this book would be helpful for the improvement of China's Civil Code and Data Security Law, and this help would not only be applicable in China, I believe that scholars in other countries could also benefit from this book. Notably, this book is not about cybersecurity in the broadest sense; rather, its focus is on data security. The authors recognize that data security laws are currently in an awkward space between cybersecurity and privacy, and are unable to balance these cybersecurity and privacy aspects. At the same time, the authors keenly observe the nature of data security and propose a new research paradigm. The dichotomy of "data and privacy" proposed by the authors is, however, questionable, as it does not strike a good balance between the individual, the enterprise, and the public. However, the "holistic data security" approach proposed in this book is actually an approach that focuses not only on data security as a whole, but also on scenarios and details, which will inspire readers interested in privacy and data, data governance and the digital society.

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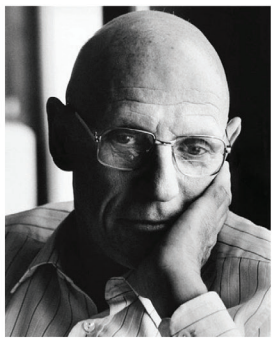

Foucault – Történelem, hatalom, kormányozhatóság

Szerkesztette: Kömüves Dániel

A magyar underground zene kezdetei