Információs Társadalom

[Information Society]

A SOCIAL SCIENCE JOURNAL

Founded in 2001

English Issue Vol. XXI, No. 4 (2021)

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)

E-mail: inftars-lapman@ponens.org

CONTENTS

LECTORI SALUTEM!

As is so often the case, this issue of InfTars deals with a variety of diverse topics.

Yahya Aydın investigates the effect of the Covid pandemic on Turkey's university libraries, based on a broad set of samples. He finds that digitalisation effectively equalises these different universities in terms of access to resources, regardless of their history, ranking, structure or the city in which they are physically established.

István Danka and János Tanács investigate another, very different disaster; they study how rule violations that contributed to the Chernobyl nuclear disaster were able to happen. In their unique take, which is based on informal logic, they identify six excuses that could have allowed the operators to rationalise their rule violations. These excuses could have affected how the operators interpreted the applicability of the rules to the situation(s) in which they were involved, leading them to ultimately violate the operational rules. Based on this case they draw theoretical and practical consequences for the future.

Zoltán Gellér, Tanja Jevremov, Karlo Bala, Dubravka Valić Nedeljković and Mirjana Ivanović analyse data on the prior knowledge that freshmen at the Faculty of Philosophy at the University of Novi Sad, Serbia have about basic concepts in computer and information literacy. The results could be used to devise a better way of teaching at university level that takes into account knowledge that students already accumulated during their primary and secondary education. The results reveal significant deficiencies in the subjects in this area; such findings may become the basis for action.

In another Covid-related study, Babar Hussain Shah, Zaheer Khan and Saqib Riaz investigate the influence of mass media and interpersonal communication channels on adoption of preventive measures against the pandemic. The study hypothesises that higher exposure to media content increases interpersonal communication, which, in turn, is positively associated with adoption of preventive behaviour. The study uses a survey to test this hypothesis. The results, when assessed through a Pearson correlation, show a strong association between media exposure and both increased interpersonal communication and increased adoption of Covid prevention measures.

Finally, Ürmösné Gabriella Simon and Endre Nyitrai analyse the phenomena of deepfakes and fake news, together with their linguistic fingerprints, to understand how these may influence the public, including in their decision-making. The study provides an insight into the contributions of linguist and forensic linguist experts to the work of investigative authorities.

The editorial board wishes you a splendid time while reading this issue.

Comparing University Libraries in Different Cities in Turkey with regards to Digitalisation and the Impact of the COVID-19 Pandemic

Due to the COVID-19 pandemic, many universities worldwide halted face-to-face education and instead began focusing on distance learning/education. Accordingly, it is necessary to consider the impact of this new digital era in terms of access to university libraries. Thus, the aim of this paper is to examine the digital services provided by university libraries in general and the solutions they have proposed to overcome the impact of COVID-19 on the higher education system in particular. To this end, secondary data from 30 selected state universities related to their library services, as accessed from their websites, is analysed to clarify the suitability of the existing digitalisation process in Turkish universities. It was found that digitalisation effectively equalises these different universities in terms of access to resources, regardless of their history/ranking/ structure or the cities they are physically established in.

Keywords: *COVID-19, digital library, university, e-book, location, distance education*

Author Information

Yahya Aydın, Ankara Yildirim Beyazit University, Faculty of Humanities and Social Sciences, Department of Sociology
https://orcid.org/0000-0001-5082-0187

How to cite this article:

Aydın, Yahya. "Comparing University Libraries in Different Cities in Turkey with regards to Digitalisation and the Impact of the COVID-19 Pandemic".
Információs Társadalom XXI, no. 4 (2021): 9–18.
https://dx.doi.org/10.22503/inftars.XXI.2021.4.1

1. Introduction

Internet access and its active use is one of the most important changes that humanity has experienced since the mid-1990s (though especially since 2010). In 2020, 59% of the world's population (4.54 billion) could actively gain internet access (Kemp 2020). According to the Turkish Statistical Institute (2021), 92% of the Turkish population in 2021 had access to the internet, with the associated data suggesting a constantly rising trend. Furthermore, given the current COVID-19 epidemic, this percentage, or its prevalence of use, will likely have increased and will further continue to increase post-2021 as people need to go online to meet their varied demands and needs in many different areas, ranging from their work and education needs to entertainment, and more.

The accessibility, cost, distribution, sharing and accessing of information, data, resources, services, smart services (Chen 2012; Temiz and Salelkar 2020) are key points to comprehend the popularity of and the opportunities offered by the internet in the contemporary world. In terms of libraries as the focus of this paper, it is clear that while libraries have long been crucial to learning, the role of digital libraries has become increasingly key in learning at all the different stages of education with the rise of the internet era (Marchionini and Maurer 1995). Digital libraries allow users to access sources of information at any suitable time and place (Abifarin et al. 2019) and without differentiation between (in)formal and professional learning (Marchionini and Maurer 1995). With digital libraries, any limitations with regard to time and place are effectively negated, but, perhaps far more importantly, the contribution they makes to reducing inequalities in society is perhaps one of the most significant contributions made by this digitalisation (Abbasi and Zardary 2012). While digitalisation within education is not itself a new concept, especially with regard to libraries and library services, the extent and pace to which this has enhanced such access, both worldwide and in Turkey, are unprecedented.

According to official statistics, the number of new libraries in Turkey is increasing every year, and in 2019, there were 610 university libraries, among 32,411 libraries in total, in Turkey (Turkish Statistical Institute 2019). As Table 1 below illustrates, there has also been an exponential increase in library resources, especially digital resources.

	Number of books	**Number of e-books**
2015	15.3 million	86.4 million
2016	15.2 million	87.1 million
2017	16.4 million	83.2 million
2018	17.6 million	92.0 million
2019	17.9 million	98.3 million

Table 1. Number of books and e-books available at university libraries between 2015 and 2019 in Turkey (Sources: Turkish Statistical Institute (2019))

One should note in particular that these statistics were produced before the COVID-19 pandemic effectively forced an almost complete digitalisation of such resources, so the numbers are likely to be much greater now. Based on this, digitalisation has rapidly become more popular in the university education system and for students to access literature sources.

2. Background Discussion

Digitalisation has become a significant trend in both social and scientific disciplines. The ability to access the right information, sources, and data is not always possible, or at least not practical, in physical-only libraries; so, digital libraries offer an alternative way to quickly and easily access a significant number of sources (Abifarin et al. 2019). Based on this, regardless of the quality of one's university or institution, or its ranking or history, if one has appropriate permission and an internet connection, it is possible to access the same sources as any student from any part of the world.

Many studies on COVID-19 have widely discussed its effects, or possible effects, on today's world and the near future, especially in the fields of medicine/health (Bonadio and Baldini 2020), economics (Makridis and Hartley 2020), and politics (Bond and Gostyriska-Jakubowska 2020). Additionally, distance education (Özer and Suna 2020) has been extensively discussed as a result of COVID-19; in particular, the associated need for distance education, and the difficulties of achieving this, such as the need to adopt new systems, as well as the opportunities and difficulties from developing distance education systems and their use in universities. However, both lecturers and students or researchers already use online libraries to access material and sources to prepare their homework or to support their research. Therefore, there is a vital need for research to focus on libraries in terms of the aspects of digitalisation within a compulsory distance education environment. Consequently, this study compares 30 different state universities established at different times and in different parts of Turkey. The aim of this research is to answer the following two research questions:

- How is the COVID-19 pandemic affecting universities' digital libraries?
- How are digital libraries organised in universities in response to the COVID-19 pandemic?

3. Methodology

In this paper, secondary data analysis, as a subcategory of a qualitative method, was relied upon to collect and analyse our data. This method is preferred to better answer the research questions of this paper due to the COVID-19 lockdown/limitations and the availability of digital data. The official statistics used are mainly derived from 30 selected state universities' library websites. This method allowed us to overcome the time, funding, and transportation limitations (Clarke and Cossette 2000; Bryman 2008) of performing this research during the COVID-19 pandemic.

As noted above, 30 different state universities in different parts of Turkey were included as case studies to address the research questions. The data collected from their library websites was analysed from a comparative perspective. The 30 universities are: Afyon Kocatepe University, Akdeniz University, Ankara University, Ankara Haci Bayram Veli University, Ankara Yildirim Beyazit University, Artvin Coruh University, Atatürk University, Bingöl University, Boğazici University, Ege University, Gazi University, Hacettepe University, Hakkari University, Hatay Mustafa Kemal University, Iğdır University, İnönü University, İstanbul University, İstanbul Medeniyet University, İstanbul Technical University, Karadeniz Technical University, Mardin Artuklu University, Mersin University, Middle East and Technical University, Muğla Sıtkı Koçman University, Selçuk University, Sinop University, Sivas Cumhuriyet University, Social Sciences University of Ankara, Trakya University, and the University of Health Science, and can be seen in Figure 1.

The level of internet access in Turkey is reach to 92% in 2021 (Turkish Statistical Institute 2021). Like other universities in Turkey, these universities provided digital library access before or during the COVID-19 pandemic. In addition, the inclusion of these universities, which were established in different times ranging from 1926 to 2017, allow comparisons to be made in this regard as well. In other words, these different examples allow the impact of digitalisation on historically or recently established universities' library systems to be clarified. Additionally, these universities are in either the top fifteen or last fifteen ranking universities in Turkey's higher education system. Specifically, these universities clearly have different histories, rankings, and locations, giving a diverse sample set.

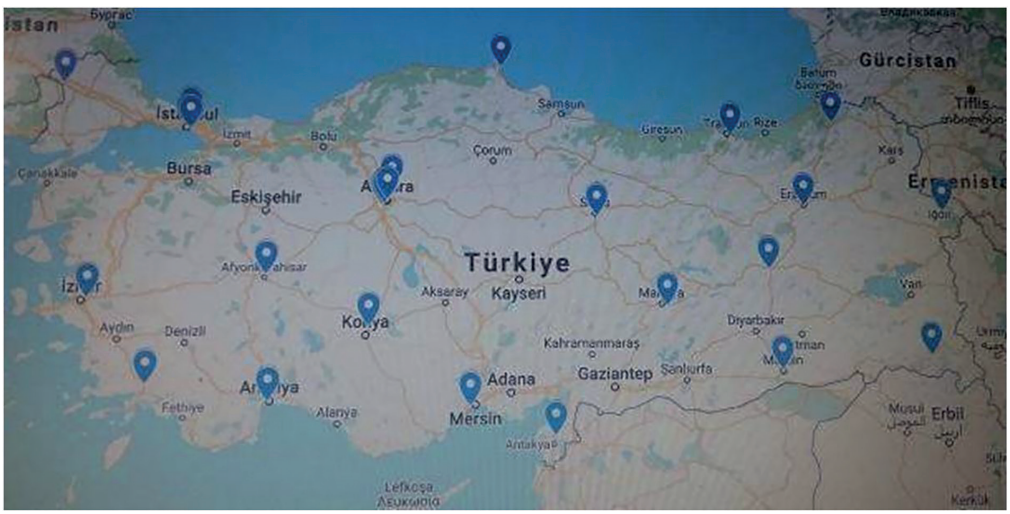

Figure 1. Location of the included universities in Turkey
(Sources: Figure created by author via Google Maps)

The data produced from the above-noted universities' library websites was organised and analysed using the thematic analysis technique. Accessibility of the physical

libraries, accessibility of the digital libraries, and accessibility of the resources were the key themes gleamed from the original data. At this stage, with the help of the NVivo analysis program and by minimizing any relevant data that might be missing, a systematic analysis was performed (Bryman 2008) to identify the key points and to inform the discussion of the existing data. The following section focuses on these findings.

4. Accessibility of Physical Libraries

The COVID-19 pandemic has deeply affected universities with regard to the provision of library services to their students. The above-listed university libraries (in section 3) have been experiencing severe difficulties and limitations since the first case of COVID-19 was recorded in Turkey in March 2020; indeed, during the lockdown from March 2020 to June 2020, they were even completely closed. They later reopened, but with new regulations in place, such as the need to ensure a minimum distance between study tables, a limited number of users, and limited opening times (usually working hours on weekdays), and the need for prior appointments/registration before any visits. This is in direct contrast to before the pandemic, when most university libraries were accessible 12 to 24 hours per day and were typically open during the weekends as well.

The impact of the COVID-19 pandemic is quite clear in terms of the physical access to university libraries. The rules and organisation of library routines (e.g. limited working hours, the required distance between study tables, the number of users at any one time, and postponing the due dates of borrowed sources) have been almost universally adopted regardless of the university's history, location, number of students, and independent structure or organisation.

5. Accessibility of Digital Libraries and Resources

This section also confirms the similarities between the selected 30 universities' practices due to the COVID-19 outbreak and their solutions to such in terms of the accessibility of their digital libraries. All the universities in our cohort allow and even actively promote access for their students and academic staff to digital resources (e.g. articles and e-books). These situations have emerged as alternative ways to overcome the negative impact of the COVID- 19 pandemic on libraries.

All the universities have agreements allowing access to key resources in academia, such as Sage Journals, Proquest Central, Jstor Books, e-Book Academic Collection, and Cambridge Journals Online. These kinds of resources are available and accessible in all the listed universities. Additionally, almost all the universities (such as AYBU, ASBU, and METU) prepared listings for their users, giving new open access resources to users due to the COVID-19 pandemic. These extra resources include those from Turkey itself and from around the world as well.

At this point, it is important to note that while the digitalisation of university libraries had already started before the COVID-19 outbreak (see Table 1), based on the num-

ber of new agreements in place (e.g. with journals and the membership of e-books websites) and announcements on university websites, it is clear that the digitalisation of university libraries has been increasing at a rapid rate during the pandemic, regardless of the universities' history, ranking, or city they are physically established in.

Another significant point is that all university libraries have now organised online education seminars, meetings, or activities about how to use key programs (e.g. EndNote, Mendeley, Turnitin, academic writing, presentation skills, publishing high impact factor journals) and websites (e.g. Web of Science, ProQuest, Wiley, Sage) more productively. These organised programs are vital for both students and academics to optimise their usage. Without time and place limitations, the library staff have organised these kinds of events to interact with user, to give instruction, and to help solve the issues being experienced by their users. Additionally, all university libraries now recommended communication via email due to their limited working hours and the ongoing risks posed by the pandemic.

Finally, some of the examined Turkish universities teach in English as well and because of that, there are many international students/academicians in these universities. However, typically the university libraries' English version websites are not as well organised as the Turkish versions. Furthermore, there are not so many events organised by the universities librarians in English. This situation has emerged as an issue for the international students and academics wishing to access the opportunities provided by the libraries in these universities. To provide equal opportunities for all users, universities must solve this issue.

6. Discussions and Conclusion

In this study, the above-noted university libraries were examined to address the two key research questions. The 30 universities that were included as the study cohort were established at different times, and mostly in different cities in Turkey and have different rankings and so represent a diverse body. While some of them have quite long histories as part of Turkey's higher education system, a significant number in this list were only established within the last ten years (i.e. since 2010). These universities are mostly different to the older universities in terms of their rankings and student/academic staff numbers.

This paper has clearly demonstrated that the COVID-19 pandemic affects all the universities established in a given country (here, Turkey), even though they may be located in different regions and have different histories and backgrounds. Before the COVID-19 pandemic, it was normal to discuss the quality of university libraries in terms of their physical environment, available resources, or their organisation. However, with the pandemic, all university libraries in Turkey remained closed for a significant period of time (from March to June 2020) and then reopened, but for only a limited time with additional new and similar restrictions and rules for all. The structure and physical environment of such libraries has now becomes less important and at the same time less accessible to university library users during the COVID- 19 pandemic.

However, as noted when discussing the general situation about these universities in the beginning of this section, while there are significant differences between these universities, they all use the same digital tools and platforms to give their users the opportunity to access the same kinds of resources from their homes, or otherwise outside the physical environment of the university, in response to the COVID-19 restrictions. This effectively has equalised these different universities to some degree, at least in terms of accessing resources, regardless of their history, ranking or structure.

However, in the modern internet era and with digitalisation now a common theme, the gap between the universities has been decreasing when considering access to resources and information. With the COVID-19 pandemic, this has become even more apparent and most probably experienced by many students, researchers, and academicians, both in Turkey and, indeed, the rest of the world. Library digitalisation is emerging as an opportunity for all universities, both those established in Turkey and in different parts of the world, to compete on a level footing regardless of their establishment date or the library's physical structure. This situation can be used as an opportunity to reduce any gaps or inequality between different contemporary universities and users as well.

References

Abbasi, Fahime, and Solmaz Zardary. "Digital Libraries and Its Role on Supporting E-learning." *AWERPocedia Information Technology & Computer Science* no. 1 (2012): 809–813.

Abifarin, Fasola Petunola, Shaka Apodoghe Imavah, and Ayodele S. Olobashola. "Design Effectiveness of Academic Library Websites: A Comparison of University, Polytechnic, and College Sites In Nigeria." *The Electronic Library* 37, no. 3 (2019): 577–591. http://repository.futminna.edu.ng:8080/jspui/handle/123456789/5442

Afyon Kocatepe University. "Library Home Page." Accessed February 16, 2021. https://kutuphane.aku.edu.tr/ (Turkish) No English library website available.

Akdeniz University. "Library Home Page." Accessed February 16, 2021. http://kutuphane.akdeniz.edu.tr/ (Turkish) No English library website available.

Ankara University (AU). "Library Home Page." Accessed February 16, 2021. http://kutuphane.ankara.edu.tr/ (Turkish)

Ankara University (AU). "Library Home Page." Accessed February 16, 2021. http://library.en.ankara.edu.tr/ (English)

Ankara Haci Bayram Veli University (AHBVU). "Library Home Page." Accessed February 16, 2021. https://lib.hacibayram.edu.tr/ (Turkish)

Ankara Haci Bayram Veli University (AHBVU). "Library Home Page." Accessed February 16, 2021. https://lib.hacibayram.edu.tr/index.php?goto=home-page (English)

Ankara Yildirim Beyazit University (AYBU). "Library Home Page." Accessed February 16, 2021. https://aybu.edu.tr/kutuphane/ (Turkish)

Ankara Yildirim Beyazit University (AYBU). “Library Home Page.” Accessed February 16, 2021. https://aybu.edu.tr/library/ (English)
Artvin Coruh University. “Library Home Page.” Accessed February 16, 2021. https://kutuphane.artvin.edu.tr/ (Turkish) No English library website available.
Atatürk University. “Library Home Page.” Accessed February 24, 2021. https://kutuphane.atauni.edu.tr/ (Turkish) No English library website available.
Bingöl University. “Library Home Page.” Accessed February 24, 2021. http://kutuphane.bingol.edu.tr/ (Turkish)
Bingöl University. “Library Home Page.” Accessed February 24, 2021. https://kutuphane.bingol.edu.tr/en (English)
Boğazici University. “Library Home Page.” Accessed February 24, 2021. http://www.library.boun.edu.tr/ (Turkish)
Boğazici University. “Library Home Page.” Accessed February 24, 2021. http://www.library.boun.edu.tr/en/index.php (English)
Bonadio, Enrico, and Andrea Baldini. “Covid–19, Patents and the Never- ending Tension Between Proprietary Rights and the Protection of Public Health.” *European Journal of Risk Regulation as part of the Cambridge Coronavirus Collection* (2020): 390–395. https://doi.org/10.1017/err.2020.24.
Bond, Ian, and Agata Gostynska-Jakubowska. “Covid–19: Can the EU Avoid an Epidemic of Authoritarianism.” *Centre for European Reform: Insight* (2020): 1–4. https://www.cer.eu/insights/covid-19-can-eu-avoid-epidemic-authoritarianism
Bryman, Alan. *Social Research Methods.* Oxford: Oxford University Press, 2008.
Clarke, Sean P., and Sylvie Cossette. “Secondary Analysis: Theoretical, Methodological and Practical Considerations.” *Canadian Journal of Nursing Research* 32, no. 3 (2000): 109–129.
Chen, Yen-Kuang. “Challenges and opportunities of Internet of Things, Engineering.” In *17th Asia and South Pacific Design Automation Conference*, 383–388. Sydney, NSW, Australia: IEEE (Institute of Electrical and Electronics Engineers), 2012. http:/DOI: 10.1109/ASPDAC.2012.6164978
Ege University. “Library Home Page.” Accessed February 25, 2021. https://kutuphane.ege.edu.tr/ (Turkish)
Ege University. “Library Home Page.” Accessed February 25, 2021. https://kutuphane.ege.edu.tr/eng-/Homepage.html (English)
Gazi University (GU). “Library Home Page.” Accessed March 10, 2021. http://lib.gazi.edu.tr/ (Turkish)
Gazi University (GU). “Library Home Page.” Accessed March 10, 2021. https://kutuphane.gazi.edu.tr/help (English)
Hacettepe University (HU). “Library Home Page.” Accessed March 10, 2021. http://www.library.hacettepe.edu.tr/ (Turkish)
Hacettepe Universiy (HU). “Library Home Page.” Accessed March 10, 2021. http://library.hacettepe.edu.tr/homepage (English)
Hakkari University. “Library Home Page.” Accessed March 10, 2021. https://www.hakkari.edu.tr/kutuphane/anasayfa (Turkish) No English library website available.
Hatay Mustafa Kemal University. “Library Home Page.” Accessed March 10, 2021 https://www.mku.edu.tr/departments.aspx?birim=83 (Turkish)

Hatay Mustafa Kemal University. “Library Home Page.” Accessed March 10, 2021. https://www.mku.edu.tr/departments.aspx?birim=83 (English)
Iğdır University. “Library Home Page.” Accessed March 11, 2021. https://kutuphane.igdir.edu.tr/ (Turkish)
Iğdır University. “Library Home Page.” Accessed March 11, 2021. https://kutuphane.igdir.edu.tr/home (English)
İnönü University. “Library Home Page.” Accessed March 10, 2021. https://www.inonu.edu.tr/kutuphane (Turkish)
İnönü University. “Library Home Page.” Accessed March 10, 2021. https://www.inonu.edu.tr/kutuphane (English)
İstanbul University. “Library Home Page.” Accessed March 12, 2021. https://kutuphane.istanbulc.edu.tr/tr/_ (Turkish)
İstanbul University. “Library Home Page.” Accessed March 12, 2021. https://kutuphane.istanbul.edu.tr/en/_ (English)
İstanbul Medeniyet University. “Library Home Page.” Accessed March 12, 2021. https://kutuphane.medeniyet.edu.tr/tr (Turkish)
İstanbul Medeniyet University. “Library Home Page.” Accessed March 12, 2021. https://kutuphane.medeniyet.edu.tr/en (English)
İstanbul Technical University. “Library Home Page.” Accessed March 12, 2021. http://kutuphane.itu.edu.tr/ (Turkish)
İstanbul Technical University. “Library Home Page.” Accessed March 12, 2021. http://kutuphane.itu.edu.tr/en/home (English)
Karadeniz Technical University. “Library Home Page.” Accessed March 12, 2021. https://www.ktu.edu.tr/library (Turkish)
Karadeniz Technical University. “Library Home Page.” Accessed March 12, 2021. https://www.ktu.edu.tr/libraryen (English)
Makridis, Christos A., and Jonathan S. Hartley. “The Cost of Covid-19: A Rough Estimate of the 2020 US GDP Impact.” *Policy Brief Special Edition* (2020): 1–7.
Marchionini, Gary, and Harmann A Maurer. “The Roles of Digital Libraries in Teaching and Learning.” *Communication of the ACM* 38, no.4 (1995): 67–75. http:/DOI: 10.1145/205323.205345
Mardin Artuklu University. . “Library Home Page.” Accessed March 12, 2021. https://www.artuklu.edu.tr/kutuphane (Turkish)
Mardin Artuklu University. “Library Home Page.” Accessed March 12, 2021. https://www.artuklu.edu.tr/en/kutuphane (English)
Mersin University. “Library Home Page.” Accessed March 18, 2021. http://kutuphane.mersin.edu.tr/ (Turkish)
Mersin University. “Library Home Page.” Accessed March 18, 2021. http://kutuphane.mersin.edu.tr/ (English)
Middle East and Technical University (METU). “Library Home Page.” Accessed March 18, 2021. https://lib.metu.edu.tr/tr (Turkish)
Middle East and Technical University (METU). “Library Home Page.” Accessed March 18, 2021. http://lib.metu.edu.tr/ (English)
Muğla Sıtkı Koçman University. “Library Home Page.” Accessed March 18, 2021. https://library.mu.edu.tr/ (Turkish) No English library website available.

Özer, Mahmut, and Eren H. Suna. “Covid–19 Salgını ve Eğitim, Küresel Salgının Anatomisi: İnsan ve Toplumun Geleceği.” *Türkiye Bilimler Akademisi-TÜBA* (2020): 71–192.
Sağlık Bilimleri University. “Library Home Page.” Accessed March 19, 2021. https://sbu.app.deepknowledge.io/ (Turkish)
Sağlık bilimleri University. “Library Home Page.” Accessed March 19, 2021. https://sbu.app.deepknowledge.io/ (English)
Selçuk University. “Library Home Page.” Accessed March 19, 2021. https://www.selcuk.edu.tr/Birim/kutuphane (Turkish)
Selçuk University. . “Library Home Page.” Accessed March 19, 2021. https://www.selcuk.edu.tr/Birim/kutuphane (English)
Simon, Kemp. “Digital 2020: Global Digital Overview.” Accessed January 29, 2021. https://datareportal.com/reports/digital-2020-global-digital-overview
Sinop University. “Library Home Page.” Accessed March 20, 2021. https://kddb.sinop.edu.tr/ (Turkish)
Sinop University. “Library Home Page.” Accessed March 20, 2021. https://kddb.sinop.edu.tr/home/ (English)
Sivas Cumhuriyet University. “Library Home Page.” Accessed March 20, 2021. http://kutuphane.cumhuriyet.edu.tr/ (Turkish)
Sivas Cumhuriyet University. . “Library Home Page.” Accessed March 20, 2021. https://www.cumhuriyet.edu.tr/kutuphane-hizmetleri (English)
Social Sciences University of Ankara (ASBU). “Library Home Page.” Accessed March 20, 2021. https://kutuphane.asbu.edu.tr/tr/node/23 (Turkish)
Social Sciences University of Ankara (ASBU). “Library Home Page.” Accessed March 20, 2021. https://kutuphane.asbu.edu.tr/en (English)
Temiz, Serdar, and Lakshmi Pradip Salelkar. “Innovation during crisis: exploring reaction of Swedish university libraries to COVID–19.” *Emerald Publishing Limited: Digital Library Perspectives* vol. 36, no. 4 (2020): 365–375.
Trakya University. “Library Home Page.” Accessed March 20, 2021. https://kutuphane-en.trakya.edu.tr/ (Turkish)
Trakya University. “Library Home Page.” Accessed March 20, 2021. https://kutuphane-en.trakya.edu.tr/ (English)
Türkiye Yükseköğretim Sistemi. “Hanehalkı Bilişim Teknolojileri (BT) Kullanım Araştırması, 2019.” Accessed January 03, 2021. https://data.tuik.gov.tr/Bulten/OpenPdf?p=x11lj1P0f6uecfk/9XU6D7lziuo3bpAvPpF3JlcCuJ2LFrK/cLStQ/Z5AAROYlb4ae20HGnScj13OcNsblTWim/8UHF6GymvO0b1OINZLDw=
Türkiye Yükseköğretim Sistemi. “Hanehalkı Bilişim Teknolojileri (BT) Kullanım Araştırması, 2021.” Accessed February 05, 2021. https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilisim-Teknolojileri-(BT)-Kullanim-Arastirmasi-2021-37437
Türkiye Yükseköğretim Sistemi. “Kütüphane İstatistikleri, 2019.” Accessed December 20, 2021. https://data.tuik.gov.tr/Bulten/Index?p=Kutuphane-Istatistikleri-2019-33630
Yükseköğretim Kurulu. “Türkiye Yükseköğretim Sistemi.” Ankara, Turkey: Ocak, 2019. https://www.yok.gov.tr/Documents/Yayinlar/Yayinlarimiz/2019/Higher_Education_in_Turkey_2019_tr.pdf

Rationalising Rule Violation in the Case of the Chernobyl Disaster: Six Systematic Excuses

This paper investigates how rule violations that contributed to the Chernobyl nuclear disaster were able to happen. Bringing to the surface what is implicit in historical documents, we argue that six excuses can be identified that could have allowed the operators to rationalise their rule violations. These excuses could have affected how the operators interpreted the applicability of the rules to the situation(s) they were involved in, leading them to ultimately violate the operational rules. As a theoretical consequence, rule-following as (com)pliance or obedience is to be taken as a necessary but insufficient condition of rule-following. As a practical consequence, the concept of 'excuses' can also help to anticipate as well as prevent rule-breaking behaviour in similar future cases.

Keywords: *Chernobyl nuclear disaster, rule-following behaviour, actual rule violation, negligent rule violation, rationalisation*

Acknowledgement

We are grateful to Ákos Horváth, Director General of the Hungarian Academy of Sciences, for his help and consultation. We would also like to thank Tihamér Margitay for his valuable comments and Ákos Gyarmathy for the inspiration to start the research on the present topic.

Author Information

István Danka, Budapest University of Technology and Economics
https://orcid.org/0000-0002-8946-2556
János Tanács, Eötvös Loránd University
https://orcid.org/0000-0003-4653-4991

How to cite this article:

Danka, István, János Tanács. "Rationalising Rule Violation in the Case of the Chernobyl Disaster: Six Systematic Excuses". *Információs Társadalom* XXI, no. 4 (2021): 19–37.
https://dx.doi.org/10.22503/inftars.XXI.2021.4.2

1. Introduction

The International Nuclear Safety Advisory Group (INSAG) of the International Atomic Energy Agency (IAEA) published a second report in 1992 into the Chernobyl Nuclear Power Plant accident (INSAG-7 1992). This second report, INSAG-7, re-evaluated in many ways the first one made in 1986 (which is often referred to as the INSAG-1 report). The most significant changes included the revelation of some design flaws. These flaws became accepted as the root causes of the accident. In the second report, there was also a change in the perception of irregularities committed by the operators: the INSAG-7 report essentially took the burden of non-compliant behaviour off the shoulders of operators and shifted the blame for the accident mainly to design flaws (INSAG-7 1992, 24). According to INSAG-7, with one exception, the violations identified in the first report were either not actually infringements in the absence of relevant provisions (INSAG-7 1992, 24; Szathmáry and Aszódi 2005, 94) or played no role and had no significance in causing the accident, because either their observance would not have prevented the accident or would not have reduced its severity.

Among others, a construction flaw was identified in the design of the control and safety rods; whereby, when a fully withdrawn rod was inserted into the core, an initial positive reactivity occurred.

Due to this effect, the control and safety rods could not decrease the rate of the chain reaction from the very first moment of the insertion but actually increased the rate for a while. The initial insertion of positive reactivity from control and safety rods, when dropped into the core from the fully withdrawn position, is known as the positive scram effect and occurred at Chernobyl due to a deficiency in the design of the reactor and in the rods in particular. The phenomenon of the positive scram effect made the emergency system "not only ineffective but also destructive" (INSAG-7 1992, 18).

Immediately before the accident, 203–205 rods out of the 211 were fully withdrawn. Consequently, when the EPS-5 emergency button was pressed at 01:23:40 on 26 April and the rods were dropped into the reactor, that number of rods was able to insert a serious amount of positive reactivity in the lower half of the core. Therefore, the effect of inserting too many fully withdrawn rods was assessed as "probably a decisive contributory factor" in causing or exacerbating the accident (INSAG-7 1992, 23). The insertion of "too many fully withdrawn rods" implied too low an operating reactivity margin (ORM). The importance of this was seriously underestimated. INSAG-7 ultimately stated that "operation with too low an ORM was a violation of requirements" (INSAG-7 1992, 18).

The operating reactivity margin (ORM) is defined as "the extra reactivity that would arise if all control and safety rods were withdrawn, expressed as a multiple of the total reactivity controlled by a standard rod" (INSAG-7 1992, 6). "Operation with too low an ORM" in the report meant going below the allowed absolute minimum of 15 rods. Under that value, the regulations implied the unit should be immediately shut down. Although the second report did not consider the violation of the ORM to be an initiating cause of the accident, "the scram just before the sharp rise in power that destroyed the reactor may well have been the decisive contributory factor" (INSAG-7 1992, 13).

While INSAG-1 identified six violations as major causes of the accident (INSAG-7 1992, 17), INSAG-7 accepted only one direct violation out of the formerly identified six, namely the "operation with too low an ORM". But even in that case, it was claimed that the violation had been "important for different reasons from those previously understood" (INSAG-7 1992, 18). So, the second report also reconsidered the status of non-compliance, since it no longer claimed that ORM had played a root cause, even if it left this in as the only one of the six factual violations committed by the operators initially identified by the IAEA.

Since the ORM violation was a factual as well as decisive contributory factor in the accident, the second report of the Advisory Group paid more attention to it, making some reflections on the details that could have played a role in the rule-breakings. This allowed us to investigate what the IAEA considers implicitly as important factors concerning the rule-(un)following behaviour.

This paper consists of six sections. After this introductory section, Section 2 provides the background to the safety culture or safety management and links rule-compliance with the views expressed in the IAEA documents. Section 3 analyses the remarks in INSAG-7 on ORM rule violations prior to the accident and provides theoretical grounds for the idea that rule-following as (com)pliance must be exceeded in order to explain the situation. Section 4 reconstructs the cases of ORM rule violations as time progressed towards the accident, identifies the work shifts involved in the violation(s), and categorises the types of rule violations that occurred. Section 5 deduces six 'excuses' from INSAG-7 and further historical resources. These excuses are helpful for conceptualising the factors that could have contributed to the rule violations. Section 6 generalises the consequences beyond the Chernobyl case and also offers directions towards possible solutions for avoiding similar problems occurring in future cases, whenever complex rule-following beyond pure (com)pliance or obedience occurs.

2. Rule Violation and Safety Culture

The issue of rule violation is discussed somewhat indirectly in the IAEA papers or INSAG reports. These documents address the issue of compliance as part of safety culture or safety management. INSAG-15 (referring to INSAG-11) states that the organisations behind nuclear plants should go through three phases in developing and strengthening the safety culture (INSAG-15 2002, 2). Stage 1 is when safety is compliance-driven or regulation-based. Stage 2 is when "good safety performance becomes an organizational goal": safety is based on a goal-driven mode of operation. In Stage 3, "safety is seen as a continuing process of improvement", so it is a kind of contribution-based organisational operation.

Therefore, the issue of rule compliance and rule violation is addressed here in the context of Stage 1. In this stage, safety is basically and almost exclusively a technical issue, and "compliance with externally imposed rules and regulations is considered adequate for safety" (INSAG-15 2002, 2). Although the most desirable stage to be in is Stage 3, to reach this level, the former two cannot be skipped or left behind

too early, because "achieving good safety performance requires a rule-based compliance culture" (INSAG-15 2002, 4) to be developed at the earlier stages.

At the same time, the mode of operation expected in Stage 1 seems to be the most problematic among the three. On the one hand, compliance with regulations, rules and procedures is obviously important for safety (IAEA-TECDOC-1329 2002, 11), but on the other hand, at this stage usually "an organization sees safety as an external requirement, and not as an aspect of conduct that will allow it to succeed" (IAEA-TECDOC-1329 2002, 17). As compliance with regulations is seen to be a technical issue and considered an external requirement demanded by the regulatory bodies, "there is little awareness of the behavioural and attitudinal aspects of safety" (IAEA-TECDOC-1329 2002, 17).

However, Stage 1 has two important purposes. First, it must be fulfilled on its own. Second, it prepares for and supports the transition to Stage 2. The problem is that "an organization might possess characteristics associated with each of the three stages" (IAEA-TECDOC-1329 2002, 19), but the characteristics associated typically with Stage 1 may not support the transition from Stage 1 to Stage 2. In order to understand this problem, let us note some typical characteristics of an organisation that is in Stage 1 (IAEA-TECDOC-1329 2002, 18–19):

- People who make mistakes are blamed for their failure to comply with the rules.
- People are viewed as components of the system — the 'mechanistic view'.
- People are rewarded for obedience and results, regardless of the long-term consequences.
- The role of management is to enforce the rules.

In guidance meant to enhance the safety culture, the IAEA emphasises that:

> … a rule-based approach should not be viewed negatively. There will be activities or circumstances in organizational life where strict compliance with rules is essential, e.g. emergency response, or operating with sufficient margin for safety. Cultural awareness is not incompatible with having strict rules; after all, much of culture is about complying or conforming to norms (IAEA-TECDOC-1329 2002, 19).

Taking the above as a framework, our analysis can be considered as follows. A rule-based approach is essential and indispensable in Stage 1, but the circumstances of rule-compliant behaviour as well as the wording and the communication of the rules and regulations must serve as a preparatory stage for the next one. To achieve the latter goal, some problematic or negative characteristics of Stage 1 must be avoided. For example, operators cannot be viewed as components of the system, or rule-compliant behaviour cannot be viewed mechanistically. Rule-following agents are mostly supposed to be rational, but fallible. 'Being rational' in this context means that rule-compliant behaviour must be seen as an intellectually driven behaviour, whereas 'being fallible' means that there are circumstances and factors that can strengthen or weaken the willingness of rule-compliant behaviour. If safety is based on a goal-driven mode of operation as in Stage 2, a mechanistic view is inapplicable

also, insofar as goal-drivenness cannot be grounded purely in compliance with the rules as means.

Our approach is akin to that of Abramova (Abramova 2019, 81–100) who introduced a classification of the incorrect actions of nuclear power plant staff based on the causes of those incorrect actions (Abramova 2019, 95–97). The causes identified by Abramova are heterogenous in a sense that there are external causes as well as internal ones: some of the causes are rooted exclusively in the agents, while others are rooted in the operating conditions. Where our approach differs from Abramova's is that we focus on the operating conditions and circumstances in order to identify their roles in the willingness of rule-compliant behaviour by agents. So, our classification captures the 'excuses' rather than the causes, such as the internal or intellectual transformation of external factors.

3. Reflections on the Violations of the ORM Regulation in the INSAG-7 Report

The second report of the IAEA made the following observation concerning the regulation of ORM. First, in a section on the Operating Procedures, the reactivity, in general, was referred to as an important operating parameter, but the ORM as a special parameter was not included in the list of important parameters (INSAG-7 1992, 72). Second, there was no device available to measure the ORM simply and effectively. Although the operators had two ways to measure the ORM, both were complicated. According to the first way, the operator had to determine the depth of the rods in the core, then correct the results for the non-linearity of the graduation scale, and finally to sum them up. The second way was to instruct the plant computer to receive data and to make the necessary calculations with the PRIZMA program. Both were time-consuming since it took 10–15 minutes to get the actual ORM value either way. The location of the device to measure the ORM also further complicated the process, since it was held approximately 50 metres away from the control console of the operators (INSAG-7 1992, 6, 72). These are the reasons why the report stated that "it seems unreasonable to expect the personnel to treat this parameter [ORM] as a directly controllable one" (INSAG-7 1992, 72).

The third point in the reflections of the report claims that "the Operating Procedures did not draw the attention of the personnel to the importance of the ORM as an essential parameter for ensuring the effectiveness of the emergency protection system" (INSAG-7 1992, 72). This observation means that the Operating Procedures interpreted the ORM as merely a manoeuvring parameter to keep the power distribution balanced throughout such a large and loosely coupled core as that of Unit 4 at Chernobyl NPP, but not a parameter that was important for ensuring the effectiveness of the emergency protection system (INSAG-7 1992, 14, 72). Due to the one-sided and incomplete interpretation of the ORM, the operators were not aware of the emergency aspect of the ORM.

These reflections are important for several reasons. First, INSAG-7 implicitly acknowledges that a naïve or trivial conception of rule-following is insufficient to

understand the operators' situation in which they must follow the rules. This insufficiency results in their not being instructed *properly* to follow the rules. Second, rule-following as pure (com)pliance or obedience is not sufficient for making agents follow rules unconditionally. Third, some factors can strengthen or weaken the intention of rule-followers to follow the regulation in a particular situation. So, in the following sections, following the spirit of INSAG-7, we further investigate the factors that could help, or hinder, rationalising rule-breaking from the subjective perspective of the agent. In order to explore the situation of the ORM violation in a more nuanced way, let us first overview the violations of ORM committed during the 24-hour preparation process leading up to the fatal test.

4. History of the Violations of the Regulations for the Operating Reactivity Margin During the Two-day Preparation for the Turbogenerator Test

The events that led to the accident at Unit 4 of the Chernobyl Nuclear Power Plant at 1:24 on the 26th of April, 1986, started on the 25th of April at 1:06. There was a test scheduled to examine the stability of the operation of the reactor in the event of the loss of the external power sources: this was the so-called turbogenerator test. As a first step in the preparation to carry out this test, the reactor power was gradually reduced to 50% of its nominal power. At 3:47, the reactor was stabilised at a thermal power of 1600 MW. Decreasing the reactor power so significantly in such a short time resulted in a temporary increase in the xenon content. Since xenon is a neutron absorbent, its increase resulted in a reduction of the reactivity. The effect of a reduction of the reactivity caused by a temporary increase in the xenon content is called 'xenon poisoning'. To counter this, the operators had to withdraw some control rods to increase the reactivity in the core in order to compensate for the effect of the xenon poisoning. A continuous withdrawal of the control rods led to a continuous decrease in the operating reactivity margin (ORM).

According to the operating log, the ORM was equivalent to 13.2 standard control rods at 7:10 on the 25th of April (INSAG-7 1992, 53). Section 9 of the Operating Procedures of Unit 4 nailed down what to do when the ORM decreases to 15 rods (or below): "When the ORM falls to 15 rods, the reactor should be shut down immediately" (INSAG-7 1992, 79).

However, the value of the ORM was less than 15 rods for a period between 6:00 and 9:00 on the 25th of April. This was the case when Igor Kazachkov, head of the day shift (8:00–16:00) took over the reactor from the dawn shift. Kazachkov later stated that he and his colleagues were aware of the regulation that operating below the value of 15 ORM rods was forbidden, and that the reactor should have been shut down immediately (Plokhy 2018, 90–91).

In the following step of the preparation, at 14:00, the emergency core cooling system (ECCS) was disconnected from the multipass forced circulation circuit (MFCC) (INSAG-7 1992, 53; Szathmáry and Aszódi 2005, 83), but the Kyiv power grid controller asked to postpone the test programme at that time (INSAG-7 1992, 53; Plokhy

2018, 93). According to the original schedule, the turbogenerator test, as well as the shutdown of the reactor for the scheduled medium-term maintenance, should have been finished by 16:00 on the 25th of April.

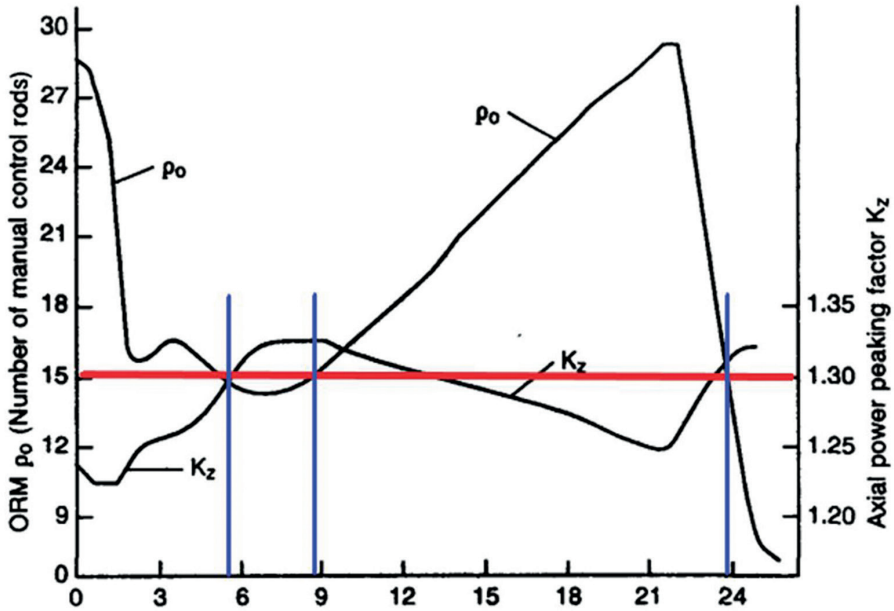

Figure 1. Change in the operating reactivity margin (ρ0) from the beginning of the preparation of the turbogenerator test till the time of the accident (t = 0 is 1:06, 25th of April). The horizontal red line indicates the minimum level of ORM = 15. The vertical blue lines indicate the periods when the ORM was less than 15 rods. Figure taken from INSAG-7 (1992, 117); the red and blue lines were added by us.

The value of the ORM was 16.8 at 15:20, so it was above the prescribed minimum number of 15 rods (INSAG-7 1992, 53). The Kyiv power grid controller permitted disconnecting Unit 4 from the power grid at 23:10. The ORM was 26 rods at that time. Then, a rapid power reduction started again at 23:10. The operators had to withdraw a serious number of control rods to compensate for the reduced reactivity caused by the xenon poisoning. The continuous withdrawal of the control rods resulted in a constant decrease in the ORM.

At 00:28 on the 26th of April, when the local automatic control system was switched over to the global one, a sudden and unexpected event occurred: the thermal power of the reactor fell from 500 MW to approximately 0–30 MW (INSAG-7 1992, 112; Szathmáry and Aszódi 2005, 83). This was a kind of unintentional shutdown and the operators did not have an explanation for the incidence. In order to increase the power after the non-envisaged performance drop, the operator had to withdraw more control rods from the reactor core.

From this moment, the events can be reconstructed in two different ways. According to the first version, there was no entry regarding the value of the ORM in

the operating log after 23:10 on the 25th of April, so the operators did not know the value of the ORM during the critical part of the test (INSAG-7 1992, 11). Not long before the test started at 1:23:10 on the 26th of April, the ORM was significantly lower than the 15 rods allowed: it was approximately 8 rods at 1:22:30 (INSAG-7 1992, 53). According to this historical reconstruction, the operators did not know the value of the ORM of that time; its value was calculated only after the accident (INSAG-7 1992, 113). The second historical reconstruction suggests that at the beginning of the test at 1:23:10, the operators knew the value of the ORM measured at 1:22:30, but not the importance of violating the ORM regulation this way (INSAG-7 1992, 79; Malko 2002, 19).

Taking all this into consideration, it can be stated that during the 24-hour preparation period for the test, the operators violated Section 9 of the Operating Procedures concerning the regulation of the minimum allowable operating reactivity margin *several times*. The ORM was constantly lower than the allowed minimum during two periods in the 24-hour preparation time. The first violation period was between 6:00 and 9:00 on the 25th of April, and two shifts were involved in the violation. The second violation period lasted from midnight of the 25th of April till the accident itself (INSAG-7 1992, 116–117), (see also *Fig. 1*).

During the first violation period, a factual, constant rule-breaking happened, and the operators were aware of the violation of the regulation. During the second violation period, the rule-breaking could be categorised into two different types: If the operators knew the ORM measured at 1:22:30, then the rule-breaking was also factual, but if the ORM was calculated only after the accident for the investigation committee, then the rule-breaking could be considered as a *negligent violation*.

A negligent violation is a case when a person is expected to follow a rule, and therefore he or she is also expected to obtain all the relevant information that is required for following a rule, but in fact, he or she does not obtain some or all the necessary pieces of this information. According to the first historical version, this was exactly the case during the second violation period: the operator had to withdraw control rods constantly in order to compensate for the temporal xenon poisoning, which was due to the further reduction in the power level initiated at 23:10. Even though they knew the regulation that the unit was to be shut down when the ORM went below 15, lacking making an effort to get the ORM value made their behaviour a negligent violation. If the first historical reconstruction is right, the operators did not know all the relevant information (they did not know the actual ORM value) during the second violation period, but they *should have known* that value to ensure they could operate the reactor properly, and they *could have got* the value (even if it was not easy to get). But this was not a direct, factual violation, since a direct, factual violation means that the rule-breakers know all the relevant information and despite that, they still fail to follow a rule.

All in all, it can be said either that four shifts in two violation periods committed the actual violations of the minimum permitted ORM, or two shifts committed factual violations and two committed negligent ones.

5. Conceptualising the Factors Contributing to the Rule Violations as Possible 'Excuses'

From the reconstruction of the rule violations based on INSAG-7 (1992) and consideration of the further historical resources provided above, six factors can be identified as relevant for the rule violations. We shall call these 'excuses', because as far as it can be said on the grounds of historical evidence, they could serve as subjective excuses for the operators violating the ORM rules. These excuses are as follows. First, the reactor was claimed to be fail-safe, and second, similar rule-violations happened regularly with no consequences. These two together made the operators think (as far as it can be seen from the reports) that there was no chance of an accident: the rules could be violated with no negative consequences if the reactor was fail-safe and rule violations had also happened earlier with no negative consequences. There was also an accessibility problem with the ORM values: due to the third excuse, the ORM values were hardly accessible and, due to the fourth, occasionally they could even be temporarily inaccessible. In the case of the lack of proper accessibility, they could not be measured easily or temporally, leading to a negligent violation of the ORM rules. Fifth, the ORM values were not included in the important parameters' list; implicitly suggesting that they were not important. Sixth, the emergency protection functions of the ORM were unknown to the operators, further decreasing the apparent negligibility of the relevant rules, especially in emergencies in which obeying them would have been crucial.

Hence, relations can be drawn among these excuses as follows. The first and second excuses together served as grounds for thinking that there was *no chance of an accident*. The third and the fourth excuses built on the problems of the *accessibility* of relevant information for operating the power plant properly (namely, the ORM values), resulting in potential negligent rule violation(s). Finally, the fifth and sixth factors served as reasons *prima facie* supporting that the ORM values were unimportant. Note that each excuse could serve as a *prima facie* reason for the operators to break the regulations, and together they mutually strengthened the inclination.

In the following sections, we investigate how these excuses contributed to the operators' inclination to violate the ORM rule, partly based on the grounds of their personal reports and partly on historical documents and reconstructions.

Before turning to the excuses in detail, let us make some clarifications. Our goal is not to absolve the operators. Whether they had subjectively 'good' reasons for the rule violation or not it does not undo the rule violations and their consequences. We are not interested in their moral responsibility or accountability either. Our goal is to understand the (actual or possible) reasons for the rule violations that happened in Chernobyl, which can contribute to an account of the rule-following/violating behaviour on the one hand, and, on the other, it can also help instructors and rule-makers prevent similar reasoning, and hence possible similar accidents, in the future.

5.1. "No chance of an accident"

The false belief of the operators that there was no chance of an accident was built on two premises: first, the reactor was designed and *communicated* to be fail-safe, and second, based on inductive reasoning, if earlier (similar) rule violations had not had consequences, further violations would not have consequences either. The first preceded, but was also constantly supported by, the second, as the second made the first (couple of) rule violations excusable. On the grounds of the first couple of rule violations, which had not entailed any empirical or operating consequences, inductive reasoning could start to work in the background, suggesting that the rule could be violated without consequences. So, the myth of the fail-safety and the inductively confirmed experience of breaking the rule without any consequences contributed to the operators' inclination to violate the ORM rules. In any case, the myth of fail-safety and induction could go hand in hand, increasing one another's strength.

Let us investigate the role of these factors one by one.

5.1.1. The myth of fail-safety

Both INSAG-1 and INSAG-7 claimed that "the primary cause of the accident was an extremely improbable combination of violations by the unit personnel of operating instructions and procedures" (INSAG-7 1992, 30). The circumstances of the Chernobyl disaster were extremely sensitive to the prestige and reputation of the Soviet Union, and this can be an explanation why INSAG-1 emphasised personal faults and "extreme improbabilities" only. In 1992, the year after Gorbachev's resignation and the dissolution of the Soviet Union, INSAG-7 indicated that mistakes in the design and instructions also played a significant role in the disaster. "The weight given in INSAG-1 in 1986 to the Soviet view [...], which laid blame almost entirely on actions of the operating staff, is thereby lessened" (INSAG-7 1992, 24).

The Soviet nuclear programme, as well as the RBMK-type reactor, were taken as symbols of Soviet supremacy over the US (which itself had suffered a loss of reputation regarding nuclear energy safety due to the Three Miles Island accident in 1979 that led to a decline in the expansion of nuclear power plants (Hultman and Koomey 2013)). But the protection of reputation was not the only explanatory factor of why the unit personnel were claimed to be responsible: the myth of fail-safety for the RMBK-type nuclear reactors also prevented an acknowledgement of the design deficiencies. When in 1986, Gorbachev was informed about the explosion accompanied by the nuclear fission emission, his first reaction was amazement, asking how it could have taken place. "After all, the scientists had always assured us, the country's leaders, that the reactor was absolutely safe", he recalled (Plokhy 2018, 148).

One of these scientists was Anatoly Aleksandrov, the principal designer of the RBMK reactor, who "kept telling everyone who would listen that his reactors were safe and sound" (Plokhy 2018, 35). He also spread that "the RBMK reactor could be installed even on Red Square, since it was no more dangerous than a samovar" (Plokhy 2018, 148.) This slogan spread so successfully that plant managers, according to Legasov, echoed Aleksandrov's saying, claiming that "an atomic reactor is a

samovar. It's much simpler than a thermal station, our personnel are experienced, and nothing ever happens" (Medvedev 1990, 369).

The myth of fail-safety was so strong that it ultimately led to denial. Even when the accident actually happened, the operators did not believe for quite some time that it could be a nuclear disaster since they were convinced that "the reactor and its panoply of safety systems were idiot-proof" (Plokhy 2018, 107–108).

So, it was widely believed and communicated nationwide that the reactor was fail-safe, and there was a common belief among operators that the Chernobyl reactor was absolutely safe and there was no chance of an accident at all. In light of these beliefs, it is much less surprising what beliefs the INSAG-7 report attributed to the operators about the positive scram effect of the rods:

> Apparently, there was a widespread view that the conditions under which the positive scram effect would be important would *never* occur [italics added]. However, they did appear in almost every detail in the course of the actions leading to the accident (INSAG-7 1992, 13).

The myth of fail-safety had two important roles. First, it could support the first intentional violation of the rule of the minimum ORM. Second, it could support the interpretation of the results of the repeated rule-breaking.

Violations can happen either accidentally (when one does not know that they are violating a rule but comes to know that later only) or intentionally. Whether the first violation of the ORM rules was accidental or intentional is not known. It is worth examining both assumptions. First, let us suppose that it was accidental. When the operators realised the violation later, their belief that the reactor was fail-safe was reinforced, even if the rules were violated accidentally. This could support their reaction in not preventing future occurrences but rather ignoring them. In this case, inductive reasoning, consciously or unconsciously, by the operators gradually strengthened the "no chance of an accident" excuse by corroborating the fail-safety excuse.

Second, if the first violation(s) had been intentional, the operators would not have had any previous examples of a violation, so their reasons could not have been inductive. Their potential excuse for violation could have been only the belief that the reactor was fail-safe. Then they had the first (few) individual case(s) as grounds for inductive reasoning. Hence, on this horn, the fail-safety myth served directly as a grounds for the first intentional violation(s).

5.1.2. Inductive corroboration of rule-breaking without consequences

Now let us focus on the inductive excuse for rule-breaking. After the first (few) violations, the rule-breakers had some inductive grounds for further breaking the rule. As said, rule-breaking was not unique in the Chernobyl case: even within the 24-hour preparation for the test, the ORM rules were violated several times. The operators' previous experience suggested that there could be no accident because they just repeated operations they had done regularly. Hence, following simple inductive

reasoning, they *prima facie* reasonably supposed, consciously or unconsciously, that no problem could occur if they did the same as they had done before.

From the fact(s) that one violated a rule in t1, t2, t3, ..., tn with no negative consequences, it follows inductively that in tn+1, it is improbable that negative consequences would occur (the greater n, the more improbable a negative consequence would be). The number of rods had gone below 15 several times earlier with no undesirable effects, so the operators *prima facie* reasonably believed that even though the regulations claimed going below ORM = 15 was forbidden, if it had gone that way all the same, nothing would happen, and they could continue the operation.

After some violations, the myth of fail-safety further supported the inductively corroborated belief that breaking the rule had no consequence. Since the no-consequence experience was in accordance with the belief of fail-safety, the latter could help to interpret the former. So, the inductively corroborated no-consequence experience and the myth of fail-safety mutually strengthened one another.

5.2. The accessibility excuses

Violating the ORM rule was therefore not without precedent. However, according to one of the historical reconstructions mentioned above, the violation was not actual but rather negligent at the time of the accident: the operators did not know the actual ORM value (INSAG-7 1992, 113). As said, in this case, the violation that happened should be labelled as a *negligent violation*: not obtaining the relevant information required for following a rule is an omission insofar as the information could have been accessed. Even though this type of violation is not a factual one, it highlights the importance of the conscious character of rule-following and the role of understanding the function as well as the content of the instructions. Let us look at the negligent type of violation in detail.

It can be supposed that the operators did not know the actual ORM value at the time of the accident. That being said, in the morning of the previous day of the accident, the ORM *was measured* as it went to ORM = 13.2, and they *did* know that at one point or another. The reactor should have been shut down at that point in accordance with the requirements of Section 9 of the Operating Procedures. Not shutting down the reactor was presumably not incidental according to INSAG-7: "[t]he Commission assumes that the personnel deliberately violated [Section 9] requirement" (INSAG-7 1992, 71). Furthermore, after the accident, Kazachkov admitted that they knew the regulation that operating below the value of 15 ORM rods was forbidden and that the reactor should have been shut down immediately (Plokhy 2018, 90-91). After 23:10 on the 25th of April, when the ORM measurement indicated a value equivalent with 26 inserted rods, during the process of the continuous power reduction, the operators constantly had to withdraw rods. Even if they did not know the exact value, they must have known that it was constantly decreasing (see also *Fig. 1.*). At least *this* information was available for them, so it would have been a reasonableexpectation for them to check the ORM values more regularly. But, according to the first historical reconstruction, that did not happen on the night in question.

5.2.1. Cumbersome accessibility

INSAG-7 identifies some relevant and important circumstances that could have contributed to the operators' inclination towards negligence. First, as mentioned earlier, measuring the ORM was a complicated and time-costly process. The computer and instrument for measuring the ORM value were placed 50 metres away from the control console (INSAG-7 1992, 6, 72). Getting to the instrument, measuring the status of the rods, making the calculations, getting back to the control room, and getting the results of the measurement required 10–15 minutes (*Ibid*). This can be labelled as a problem of *cumbersome accessibility*.

5.2.2. Temporal inaccessibility

In addition, there is a note in the senior reactor control engineer's operating log claiming that "[t]he PRIZMA calculation code was found to be unreliable at this time, because it did not take into account the position of the rods of automatic regulators Nos 1, 2 and 3 (a total of 12 rods)" (INSAG-7 1992, 71). Hence, if the operators had intended to check the ORM values, they would have had to measure them manually in the core and then make non-linearity corrections. Whether it was possible in the actual energy range is uncertain though. If it was possible that negligent rule-violation was apparent: they should have regularly measured the ORM values manually. If it was not possible, then the ORM values would be temporarily inaccessible for the operators, creating a 'grey zone' because there was no regulation for such cases: "[t]he Operating Procedures and other operating documentation did not prescribe the actions to be taken by personnel under such circumstances (in the event of unreliable calculation) and similar circumstances (for example, in the event of complete failure of the PRIZMA code to determine the ORM)" (INSAG-7 1992, 71). This can be labelled as a problem of *temporal inaccessibility.*

These are the cases for which operators should have prepared especially carefully. These cases also reveal that the naïve conception of obedient or compliant rule-following is insufficient to provide adequate rule-following behaviour. There could be circumstances when it is somewhat cumbersome to acquire the relevant data that are required for determining whether a situation falls within the scope of a regulation (cumbersome accessibility problem), or when it is straightforwardly impossible to do so (temporal inaccessibility problem). These suggest that in addition to conscious and proactive self-regulation, proper rule-following also requires an *understanding* of the role of the instructions.

As we have seen so far, there were difficulties with measuring and controlling the ORM, and that can provide some excuse for the operators: if they could not access up-to-date ORM values constantly and easily, it becomes unrealistic to expect them to follow a rule related to those values. These difficulties could have contributed to the operators' inclination towards negligence, thereby providing further excuses for the rule-breaking.

5.3. The importance excuses

In the previous section, we investigated the case scenario that the operators were not aware of the *ORM values* at the time of the accident. Now we shall see what consequences it would have had if they were not aware of the *importance* of those values. As mentioned, one of the historical reconstructions suggests that at the beginning of the test at 1:23:10, the operators knew the value of the ORM measured at 1:22:30, but not the danger of violating the ORM regulation this way (INSAG-7 1992, 78; Malko 2002, 19). How could that be the case? The answer is that the importance of the ORM rules was not clarified to them.

Regulations are never self-explanatory; they require interpretation. Reflections made by the IAEA in the INSAG-7 report confirmed the expectation that if the rule-follower does not understand the importance of a rule (he/she does not understand the function of the rule in the operation of the system, he/she is unaware of the possible consequences of violating that rule, etc.), this fact strengthens his/her inclination to violate the rule.

In the Chernobyl case, two problems with importance were apparent that can be taken as further excuses for the rule-breaking. First, the ORM regulations did not qualify as important rules. Some parameters were treated as important, while others were not, with the ORM parameters among the latter. This had an indirect consequence that the ORM regulations were considered less important than the other regulations. This possibly made it tempting for the operators to ignore them. Second, some important functions of the ORM were not explained in the regulations at all. The operators did not know the extreme importance of the ORM in emergencies. This led to a fatal misunderstanding of the role of the ORM. Let us look at these problems in detail.

5.3.1 ORM and the important parameters list

As we have seen in the previous section, it was not an easy task to keep the ORM values up to date. This could have also strengthened the operators' impression that the ORM was unimportant. As deputy chief engineer Anatoly Dyatlov claimed, "the operator has to perform up to 1000 manipulations per hour and monitor about 4000 parameters simultaneously. In these circumstances, it is somewhat cynical to accuse him of overlooking something" (Dyatlov 2006). Selecting some parameters was part of the job of operators so that they could focus on the parameters only which were important in that situation.

An obvious choice for what should be 'overlooked' (i.e. unselected) is those parameters that are not claimed to be important. The ORM was one of those. There was some sort of clarification of the importance of the regulations: a list in the *Operating Procedures* document distinguished several parameters so that the regulations connected to these parameters were taken as priorities. But the ORM was not included in this list (INSAG-7 1992, 72).

Even though *post-factum* discussion of the Chernobyl disaster regularly arrives at the ORM problem, this was not the case prior to the accident. When controlling

the reactor at lower power levels, the operators were required to control approx. 1000 operations per person per hour (INSAG-7 1992, 5). The ORM was only one of the parameters to be monitored regularly, and it was even not claimed to be important. Its lack of inclusion in the list might also have implicitly suggested to the operators that the ORM was not important because it was not claimed to be important.

5.3.2 The emergency function of the ORM

But why was the ORM that important, and if it was, why was its importance underestimated? The ORM had two fundamental functions. First, it provided power control and manoeuvring potential by the insertion/withdrawal of rods. Second, it functioned as an emergency protection system that was suitable for instant safety actions when all the rods had been dropped into the core completely. The efficiency and significance of the second function were not clarified; however, the instructions explained explicitly the first function only (INSAG-7 1992, 72).

Hence, the operators were aware of how the ORM functioned under normal circumstances, but they were unaware of exactly how it functioned in an emergency. More precisely, it was not clarified that under certain circumstances, the role of the ORM was emergency protection, and hence its importance was dramatically increased under those circumstances. Since the ORM functions differed in normal cases from emergency cases, because, in low energy ranges, a low ORM value was an indicator of instability, the fact that the operators were not prepared for receiving this indication could, and did, result in dramatic consequences.

To sum up the importance excuses, the operators' breaking of the ORM regulations created an emergency, and their lack of knowledge that the ORM also functioned as an emergency protection tool further increased the chances of an accident. Hence, *unimportance* is also a twofold excuse for the operators' disregarding the ORM regulations for at least three reasons. First, they were not informed that the ORM regulations were *important* regulations. Second, they were indirectly informed that the ORM regulations were straightforwardly *unimportant*. Third, they were not informed that the ORM regulations were *especially important* (in fact, crucial) in emergency cases created by disregarding the ORM regulations. This does not release them from violating the regulations, but better informing them about the importance of the ORM could have prevented the disaster. Rule-makers may expect blind rule-following, but in order to be super-safe, they must also consider rule-breaking. Making explicit which rules are *absolutely* unbreakable is a necessary step in narrowing the logical space of possible excuses that might pseudo-rationalise rule violation.

6. Consequences Generalised

The above-mentioned six excuses derived from INSAG-7 and other historical resources explicate the operators' possible rationalisations for violating the ORM rules. These violations, even if not triggered, significantly contributed to the Cher-

nobyl accident. Discussing these excuses does not serve to objectively rationalise the operators' acts, and our goal was not their exculpation, or to transfer responsibility to the designers either. Our aim was to understand the operators' potential internal defence mechanisms that could serve as subjective grounds for the rationalisation of what they presumably intended to do and what they finally did. As rationalisations, these excuses contributed to the disaster. In light of INSAG-7, in order to avoid future disasters, understanding and properly managing them is necessary. Regulations must reflect on these (and similar) excuses and find ways of preventing their occurrence, whether they are objectively rational or not.

A reason for the necessity of reflection is that even if the excuses were not objectively rational, they contributed to decreasing the subjective irrationality of breaking the rules. In order to make the rationalisation mechanism explicit, we provide a reconstruction of these excuses as potential premises for an argument.

The 'no chance of an accident' excuses
(E1) The reactor is fail-safe.
(E2) ORM rule violations happened several times before with no consequences.
(NE) ORM rules can be violated with no negative consequences.

The accessibility excuses
(E3) ORM values are cumbersome to access.
(E4) ORM values are sometimes temporarily inaccessible.
(AE) ORM values are not easy to keep up to date in order to comply with the ORM rules.

The importance excuses
(E5) ORM values are not included in the important parameters list.
(E6) ORM values are believed to be unimportant in emergencies.
(IE) ORM rules are not as important as the other rules.

From (NE&AE&IE), operators could conclude that
(C) Violating ORM rules is excusable.

(E1 & E2), i.e. the myth of fail-safety along with inductive generalisation supported (NE) the false belief that there was no chance of an accident, and hence it was excusable to violate the rules because no serious problem could occur from that violation (see E1), and furthermore, the same rules had been violated earlier with no serious consequences (see E2). Both (E1) and (E2) could be separately sufficient for serving as a reason for breaking the ORM rules, but as demonstrated, they also mutually supported one another.

Preventive principles can build on an analysis of the social environment in the case of (E1), and the operation history in the case of (E2). It could be constantly investigated whether technological features communicated externally in the wider social environment interfere with operating rules. A conflict between the image communicated and the real technological background can result in myths, like that

of fail-safety in the case of Chernobyl. Preceding events in the operating history that could lead to a loosening of discipline can also be detected and responded to accordingly. This could help prevent the spread of worst practice.

(E3 & E4), i.e. problems that made access to the ORM values cumbersome (see E3) or temporarily impossible (see E4) supported (AE), the claim that ORM values were not easy to keep up to date in order to follow the rule, and hence ignoring them could seem as a practically viable option for operators. (E3) and (E4) provide excuses for a negligent violation that does not *seem to* be rule-breaking because of its indirectness, and hence it may *seem to* be more excusable than direct violation, making it more dangerous as even agents fully committed to rule-following can negligently violate rules through a lack of knowledge of the relevant parameters.

From (E3) and (E4), it can be seen that operational circumstances play a central role in rule-following. Operational circumstances are not the only factor that can prevent operators from rule-following. It can also be sufficient if some information relevant for rule-following is hard to access, or is temporarily inaccessible. These can also raise the chances of a severe negligence as it may incline the operators to ignore information that is not suitably accessible. To prevent situations like this, it must be investigated whether operational circumstances support or cumber operations and whether access can be established for all relevant information in all possible cases.

Finally, from (E5 & E6), (IE) follows, i.e. ORM values were not important because they were not claimed to be important (see E5), and the operators did not know that they were especially important in an emergency (see E6). In order to incline towards rule-following behaviour, it is often not sufficient if a rule only ascertains what to do. In the Chernobyl case, knowing the importance of the ORM values was proved to be a prerequisite for following the ORM regulations (E5) (INSAG-7 1992, 14–15). Knowing the role of the ORM in an emergency may be unimportant in ordinary cases, but crucial insofar as the ORM regulations still be broken. This made the expectation that operators must follow the rule circular: they were not expected to know the reasons and motivations behind the rules because, *on the condition* that they do not break the rule, they do not need that knowledge, but unknowing the consequences can or could make the rule-breaking subjectively excusable.

Prevention in these cases can be grounded in a proper mediation of the designer's knowledge and operative knowledge. A revision of the operating rules and regulations, including their coherence, form and content, and their actual wording can bring unintentional underestimations of some rules (E5), or an incompleteness of the content to be transferred by the regulations to the operators in terms of the purpose(s) the rules serve (E6) to surface.

Such preventions are necessary for the following (practical) reasons. It is clear from INSAG-7 that rule-following behaviour, such as compliance or obedience, is a necessary expectation from operators (INSAG-7 1992, 30, 79). But the report also suggests that the regulation based on this expectation was insufficient. The operators did not comply with the regulation, even though INSAG-7 reports that they were "fairly typical, mature and stable group of specialists with qualifications regarded in the USSR as satisfactory. They were no better, but no worse, than the personnel at

other nuclear plants" (INSAG-7 1992, 30). Based on the analyses of the *Prognoz Psychological Research Laboratory of the USSR Ministry of Nuclear Power and Industry*, INSAG-7 concludes that "personnel at the Chernobyl plant did not have any extraordinary characteristics" and hence their personalities "were not such as to have been a direct cause of the accident" (INSAG-7 1992, 30). Since the operators' inclination not to comply with the regulation did not depend on some irregular psychological conditions, their behaviours should be rationally interpreted. This means that the widely accepted conception of rule-following as (com)pliance or obedience is to be taken as a necessary but insufficient one if we really want to understand the actual behaviour of the operators. Extending the conceptual framework by the concept of excuses can also help to anticipate as well as to prevent the rule-breaking behaviour of operators.[1]

Complexity is a further important issue we have touched upon. In a complex situation like operating a nuclear reactor, complexity occurs not only at the level of the operations but in the conditions of rule-following as well. Under complexity, compliance or obedience becomes an insufficient condition for rule-following: our rule-interpretive environment is rich, and compliance is just one of many segments of it. Understanding the rule, putting it into the context of the whole system of regulations (see esp. the importance excuses), into technological (the accessibility excuses), and the social environment (the myth of fail-safety) are also constitutive elements of how we relate ourselves to rules, as well as the consequences of our earlier rule-following behaviour (the inductive generalisation excuse). In order to understand such complexities and possible reactions of agents to unforeseen situations, rationalisations or defence mechanisms must be supposed in the background. As a further step, for preventive reasons, a possibility of such excuses must be avoided once they are recognised. Knowing possible excuses for rule violation can help prepare agents to resist inclinations towards subjective defence mechanisms that naturally occur in human thinking and behaviour, especially in sharp situations like operating a nuclear reactor.

[1] There are frameworks for extending the conception of rule-following as (com)pliance or obedience (see esp. Törneke, Luciano, and Valdivia-Salas 2008; Peláez 2013; and Kissi et. al 2017), though the application of them to the Chernobyl case is not straightforward.

References

Abramova, V. N. "What Needs to be Changed Based on Lessons Learned from Chernobyl." In *Human And Organizational Aspects Of Assuring Nuclear Safety — Exploring 30 Years Of Safety Culture*, 81-100. Vienna, Austria: International Atomic Energy Agency, 2019. Accessed December 3, 2021. https://www-pub.iaea.org/MTCD/Publications/PDF/P1810_web.pdf

Nuclear Engineering International. Dyatlov, Anatoly. "How it was: an operator's perspective."Accessed May 14, 2021. https://www.neimagazine.com/features/featurehow-it-was-an-operator-s-perspective/

Hultman, Nathan, and Jonathan Koomey. "Three Mile Island: The driver of US nuclear power's decline?" *Bulletin of the Atomic Scientists* 69, no. 3 (2013): 63–70. doi: 10.1177/0096340213485949

IAEA-TECDOC-1329. *Safety Culture in Nuclear Installations: Guidance For Use in the Enhancement of Safety Culture.* Operation Safety Section, International Atomic Energy Agency, Vienna, 2002. Accessed December 3, 2021. https://www-pub.iaea.org/MTCD/Publications/PDF/te_1329_web.pdf

INSAG-7. *The Chernobyl Accident: Updating of INSAG-1. A Report by the International Nuclear Safety Advisory Group.* Safety Series No. 75-Insag-7. International Atomic Energy Agency, Vienna, 1992. Accessed May 11, 2021. https://www-pub.iaea.org/MTCD/publications/PDF/Pub913e_web.pdf

INSAG-15. *Key Practical Issues in Strengthening Safety Culture. A Report by the International Nuclear Safety Advisory Group.* International Atomic Energy Agency, Vienna, 2002. Accessed December 3, 2021. https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1137_scr.pdf

Kissi, Ama, Sean Hughes, Gaëtan Mertens, Dermot Barnes-Holmes, Jan De Houwer, and Geert Crombez. "A Systematic Review of Pliance, Tracking, and Augmenting." *Behavior Modification* 41, no. 5 (2017): 683–707. https://doi.org/10.1177/0145445517693811

Plokhy, Serhii. *Chernobyl: History of a Tragedy*. New York: Basic Books, 2018.

Malko, Mikhail V. "The Chernobyl Reactor: Design Features and Reasons for Accident." In *Recent Research Activities about the Chernobyl NPP Accident in Belarus, Ukraine and Russia,* edited by Tetsuji Imanaka, 11–27. Japan: Kyoto University Research Reactor Institute, 2002. http://large.stanford.edu/courses/2014/ph241/alnoaimi2/docs/kr79.pdf

Medvedev, Zhores A. *The Legacy of Chernobyl*. New York: W. W. Norton & Companyk, 1990.

Niklas, Törneke, Luciano Carmen, and Sonsoles Valdivia-Salas. "Rule-Governed Behavior and Psychological Problems." *International Journal of Psychology and Psychological Therapy* 8, no. 2 (2008): 141–156. https://www.ijpsy.com/volumen8/num2/191/rule-governed-behavior-and-psychological-EN.pdf

Pelaez, Martha. "Dimensions of Rules and Their Correspondence to Rule-Governed Behavior." *European Journal of Behavior Analysis* 14, no. 2 (2013): 259–270. DOI: 10.1080/15021149.2013.11434459

Szathmáry, Zoltán, and Attila, Aszódi. *Csernobil: Tények, okok, hiedelmek*. Budapest: Typotex Kiadó: Budapest, 2005.

ZOLTÁN GELLÉR, TANJA JEVREMOV,
KARLO BALA, DUBRAVKA VALIĆ NEDELJKOVIĆ,
MIRJANA IVANOVIĆ

Non-ICT Students' Familiarity with Basic Internet Services and Tools at the Faculty of Philosophy at the University in Novi Sad

The aim of this study was to collect and analyse data about the prior knowledge that freshmen at the Faculty of Philosophy at the University of Novi Sad, Serbia, have about basic concepts in computer and information literacy. The results can be used for a better adaptation of teaching to take into account the knowledge that students have accumulated during their primary and secondary education. The study relied on an anonymous testing of respondents' knowledge. The questions encompassed two base ECDL modules: the essentials of computer and Internet use. The test was completed by more than 500 students from 13 departments at the Faculty of Philosophy, one group from the Faculty of Management and one group from the Faculty of Technical Sciences. This paper analyses the students' answers to the questions regarding their knowledge of Internet services and tools. The results reveal significant deficiencies in their knowledge in this area.

Keywords: *computer and information literacy, digital literacy, students, Internet*

Author Information

Zoltán Gellér, Faculty of Philosophy, University of Novi Sad, Novi Sad, Serbia
https://orcid.org/0000-0003-1853-4740
Tanja Jevremov, Faculty of Philosophy, University of Novi Sad, Novi Sad, Serbia
https://orcid.org/0000-0003-3780-3424
Karlo Bala, Faculty of Philosophy, University of Novi Sad, Novi Sad, Serbia
https://orcid.org/0000-0002-9267-236X
Dubravka Valić Nedeljković, University of Montenegro, Podgorica, Montenegro
https://orcid.org/0000-0002-9729-9752
Mirjana Ivanović, Faculty of Sciences, University of Novi Sad, Novi Sad, Serbia
https://orcid.org/0000-0003-1946-0384

How to cite this article:
Gellér, Zoltán, Tanja Jevremov, Karlo Bala, Dubravka Valić Nedeljković, Mirjana Ivanović. "Non-ICT Students' Familiarity with Basic Internet Services and Tools at the Faculty of Philosophy at the University in Novi Sad".
Információs Társadalom XXI, no. 4 (2021): 38–66.
https://dx.doi.org/10.22503/inftars.XXI.2021.4.3

1. Introduction

The teaching of informatics in elementary schools in Serbia was introduced only in the first decade of the third millennium as an elective subject with 36 lessons per year (1 lesson a week). The subject *Informatics and Computing* is studied from the fifth grade and envisages some acquaintance with basic concepts of operating systems, text processing and multimedia (The Official Gazette of the Republic of Serbia – Education Gazette no. 6/2007). In secondary schools, within the compulsory subject *Computing and Informatics*, these areas are further expanded and complemented with new elements, such as presentations and spreadsheets. However, this subject is not studied to the same extent in all secondary schools: while it is studied for four years in grammar schools, in vocational schools, it is often taught only in the first year (The Official Gazette of the Republic of Serbia – Education Gazette nos 6/2012, 5/2011, 4/2002, 8/1995).

Despite the fact that computer and information literacy (CIL) is one of the essential elements of functional literacy, without which survival in the modern world would become increasingly complicated, up until the end of 2017, there had been a continuous public discussion in Serbia about whether this subject should be considered compulsory or elective. It was considered that "digital natives" (Prensky 2001a) and (Presnky 2001b) do not need the subject since they have grown up in the digital environment, which means they would have been automatically acquiring this knowledge since early childhood.

Therefore, it was considered that digital natives by default would have a good grasp of basic computer literacy, even without receiving formal education in this field, but this is not quite true in practice. It has been noticed that, upon arrival at faculty, many students do not have sufficient pre-knowledge. In other words, they come with different levels of knowledge depending on their prior success in school, their preferences, and the competence of the teachers in the schools they had attended before entering the faculty.

According to the data at our disposal and to the best of our knowledge, there has been no prior research on the computer and information literacy of freshmen at the level of higher education in Serbia. At the same time, the needs for such data are indisputable, primarily because the data can be used to help make new curricula adequate to the prior knowledge, needs, and predicted outcomes of the students, as well as to help them acquire the new skills they need upon completion of related courses at the university.

This study, which was conducted by our team at the University of Novi Sad, Serbia (the Faculty of Philosophy in Novi Sad and with control groups from the Faculty of Technical Sciences and Faculty of Management), provides important information and instruction related to freshmen's levels of knowledge of computer and information literacy. This literacy is an important tool for mastering all other educational content during their studies and also plays a significant role in their digital day-to-day life, including in the context of their daily schedule/engagements. CIL along with digital literacy form the basis for introducing innovation in the learning process. This is precisely what numerous studies in the field of pedagogy and teaching methodology insist on.

Khairnar states that "Teaching with technology engages students with different kinds of stimuli involved in activity based learning. Technology makes material more interesting. It makes students and teachers more media literate" (Khairnar 2015, 869). The author argues that smart gadgets are especially important in the new approach to teaching. However, this is not possible without a solid basis of knowledge and skills in CIL and digital literacy.

Molnár and her team of assistants at the University of Szeged studied "students' attitudes and skills in solving problems using multimedia technologies and measured how students can integrate multimedia tools in the educational process and in the curriculum" (Molnár 2008, 44). The author concluded that students were typically ready for new experiences, skills, and knowledge if offered the opportunity.

In 2000, a team from Ohio University tested freshmen to determine what their real computer and information competence was. The study found that while the students themselves thought they were digitally literate, the results proved the contrary: "Only 9% of the Ohio State freshmen taking a three-part proficiency test achieved a passing score of 70% on the entire test. More of these students (30%) passed the first part on use of Internet tools; their performance was poorest (16%) on the second part, searching skills" (O'Hanlon 2002, 55).

Based on the results of researching the information and computer literacy of undergraduate and graduate LIS students, Jokić et al. concluded that "contrary to popular belief, there is no relationship between information and computer literacy, in other words, the students who possess information literacy do not necessarily possess computer literacy and vice versa" (Jokić et al. 2016, 89).

Heerwegh, De Wit and Verhoeven found that "the impact of ICT classes in secondary school is not apparent in the ICT skills of the students" (Heerwegh, De Wit and Verhoeven 2016, 36) and that the type of studies is an important variable, too: "The self-perceived proficiency in ICT skills is higher for science students who see computers as useful and necessary for scientific research" (Heerwegh, De Wit and Verhoeven 2016, 38).

Similar research was conducted in the Netherlands, but with three age groups of high school students (11–13, 14–15, and 16–17). The authors concluded that, even in countries that are significantly better developed, "the level of information and strategic Internet skills among Dutch secondary students have much room for improvement" (van Deursen and van Diepen 2013, 223). The authors also concluded that, "Unfortunately, Internet skills in general and the acquisition of information and strategic skills in particular play a minor role in Dutch classes" (van Deursen and van Diepen 2013, 224). That finding is completely in accordance with the results of the long-standing research project: "How children realise their communicative needs", involving 10 to 14-year olds, that students and teachers from the Department of Media Studies at the Faculty of Philosophy at the University of Novi Sad conducted in the territory of Vojvodina (Serbia). The results indicated that children and teenagers, despite being able to use the computer, do not use the Internet as an aid in doing homework, nor for communication with their teachers about lessons and learning, but only for entertainment (Valić Nedeljković 2011; Valić Nedeljković 2012; Valić Nedeljković, Bala and Geler 2013). They lack basic information and com-

puter knowledge and skills, which would otherwise help them understand that the Internet can be used to gain new knowledge. Also, their teachers were not prone to introducing digital innovations in their teaching.

Van Deursen and van Diepen concluded that "New educational materials should be developed that are designed for Internet use and implemented in existing courses of the school curriculum. When the development of information and strategic skills is implemented in existing courses, such as language, history, biology and geography, it is likely that they will improve" (van Deursen and van Diepen 2013, 224), since this is more appropriate to the specific traits of millennials, who represent a generation of digital natives. A new requirement for these new educational materials is high CIL and digital competency among students and teachers. In order to achieve this, it is important to establish the real level of students' knowledge beforehand, because CIL and digital literacy are what equips them to perform the tasks and activities imposed by the technical and technological progress of the third millennium they are growing up in.

In their study of the general Internet usage patterns of undergraduate students, Deniz and Geyik also argue that finding information online is useful for students, and they concluded that "spending long hours during online might be helpful for [the] young to make some contributions to their knowledge about information technologies and unlike some people's prejudices, surfing [the] Internet is not totally [a] waste of time for students but more or less a productive facility" (Deniz and Geyik 2015, 895).

Slechtova states that "students' willingness to use ICT for studying and attitudes to e-learning are not homogenous and show [a] certain relation to their field of study and computer skills. The characteristics of digital natives do not apply to everyone, which should be reflected in courses using ICT in higher education institutions" (Slechtova 2015, 1128).

In addition, according to Duţă and Martínez-Rivera, "students recognize the need and importance of ICT as a tool for collaborative learning and as we see there are great similarities between them about training methods, their application is mainly aimed at seminars on the use of multimedia equipment teaching-learning-assessment by some teachers and students, [it is] thought-provoking that there is an area that teachers are not fluent enough in Romania and therefore, the request is in line with this. It is essential to consider these views to develop proposals for improvement in the near future." (Duţă and Martínez-Rivera 2015, 1472).

Lekka and Pange state that teachers' expectations are greater than the students' knowledge: "many students are not able to keep up to date. On the other hand, teachers expect their students to have excellent technology capabilities and to use ICT tools in their everyday assignments. This expectation may turn into reality if and only if, teachers use ICT tools well-known to students. This way they will offer numerous opportunities to students for collaboration, inventiveness, and active learning" (Lekka and Pange 2015, 388).

At the end of this brief review of the available literature related to the research focus of this paper, it should be noted that, as Serdyukov says, "In education, efficiency of learning is determined mainly by the invested time and cost. Learning

is more efficient if we achieve the same results in less time and with less expense. Productivity is determined by estimating the outcomes obtained vs the invested effort in order to achieve the result. Thus, if we can achieve more with less effort, productivity increases. Hence, innovations in education should increase both [the] productivity of learning and [the] learning efficiency" (Serdyukov 2017, 8).

Today, in the third millennium, there is no efficient learning without the use of digital technologies in the educational process at all levels, especially without solid computer and information literacy as the basis for that learning. This basis requires the curricula to be designed in a modern way, which can only be created on the basis of the availability of a clear picture of the level of students' computer and information literacy in a given time and space. The research and results presented in this paper provide an answer to that requirement.

The rest of the paper is organised as follows. The second section presents the corpus and the methodology used. A detailed overview of the students' answers to the test questions and statistical analysis of the collected data are given in the third section. The last section is devoted to the discussion of the results.

2. Study Corpus and Methodology

The focus of the research of this paper is first-year students' basic computer literacy, related to their knowledge of basic Internet concepts, regarding students at the Faculty of Philosophy at the University of Novi Sad, Serbia. The testing included more than 500 first-year students from 13 out of 17 study programmes (only the programmes with a small number of students were not covered). In addition, testing was also performed with a group of students from the Faculty of Management and a group of students from the Faculty of Technical Sciences, also at the University of Novi Sad, as control groups and with the aim to gain better insights into the nature of the collected results. The numbers of freshmen from each study programme who took the test are shown in Table 1[1]. The total number of freshmen who participated in the research was 568, of whom, 522 were from the Faculty of Philosophy and 46 were students from the control groups.

The test used for knowledge evaluation comprised 22 closed-ended questions with 4 options per question. Of the 22 questions, 14 refer to the most basic computer literacy concepts and 8 to basic Internet terms. The questions were extracted from the set of questions used for compiling the final tests for the *Computer Literacy* subject at the Faculty of Philosophy. This paper provides an overview and analysis of the answers to the eight questions about the basic Internet terms. The students were tested at the beginning of lessons in agreement with the subject teachers, whose cooperation enabled the testing to proceed. The tests were distributed in print and the participants answered the questions anonymously. The students had no access to computers during the testing and were given 15–20 minutes to complete the test.

[1] For the sake of a clearer presentation of the results, the short labels given in the first column of the table will be used further in this paper.

Label	Study programme	Number of respondents (N)	Total number of freshmen
JRN	Journalism	52	70
HIS	History	57	69
PSY	Psychology	61	80
HUN	Hungarian Language and Literature	12	16
PHI	Philosophy	38	60
SOC	Sociology	40	55
CL	Comparative Literature	14	20
SER	Serbian Language and Literature	31	50
GER	German Language and Literature	49	60
ENG	English Language and Literature	40	70
FRE	French Language and Literature	20	47
PED	Pedagogy	57	75
SL	Serbian Literature	51	71
FTN	Faculty of Technical Sciences	29	
FAM	Faculty of Management	17	
FF	Faculty of Philosophy	522	
TOTAL		568	

Table 1. Study programmes that participated in the testing and the numbers of respondents

2.1. Data analysis

The scores of the students from the Faculty of Philosophy (FF) were evaluated and compared with the scores of the students in the control groups from the Faculty of Technical Sciences (FTN) and Faculty of Management (FAM). The students' answers were analysed both with regard to the total score on the test and for the individual questions. The overall scores of the students from the FF for all the study programmes and for each study programme individually were also analysed.

The answers given by the students from the FF and from the control groups from the FTN and FAM to each question are graphically presented below. The statistical significance for the correlation between different faculties, individual study programmes within the FF, and the number of correct answers was tested by Pearson's $\chi 2$ test. The level of association is expressed by Cramer's V coefficient. Distributions of correct answers for the FTN, FAM, and the individual study programmes in the FF were also analysed. Measures of central tendency and variability were calculated. In order to gain insights into the students' success, their pass rates on the European Computer Driving Licence (ECDL) test and in faculty exams were also analysed.

Differences in the scores of the students from the FF in relation to the control groups were tested by using the Kruskal–Wallis test and z-tests for contrasting the differences between the average ranges with a Bonferroni adjustment. These non-parametric tests based on the sums of ranges were chosen due to the observed non-homogeneous distribution of the results of the tested groups.

The last step of the analysis was the calculation of the phi coefficients of correlation between the questions in order to test the relation between the test questions with regard to the number of correct answers.

3. Results

As a first level presentation of the test results, an overview and graphical representation of the students' answers to the individual test questions are given in the form of charts, as shown below. In these charts, the percentage of students who did not answer the given question is marked by an X. The complete test can be found in Appendix A. The short labels, which are later used in the tables to mark the questions, can be found in brackets after the question numbers. A short explanation of the used terms and offered answers is provided before each question. For better orientation, the correct answers in the list of possible answers are marked in bold. Based on the statistical analysis of the first-year students' answers, the second level describes the general picture of their familiarity with the covered basic Internet concepts.

3.1. Overview of the students' answers

Question 1 (INET). The goal of the first question was to test whether students know what the Internet represents, i.e. whether and to what degree they identify it with its best-known, most-visible, and most-frequently used service – the system of mutually connected hypertextual documents known by the abbreviation the "*web*". The following options were possible for the answer to the question: The Internet is … (the correct answer is 2. global computer network):

1. World Wide Web
2. global computer network
3. social network
4. type of server

As can be seen in Chart B in Figure 1, while the majority of students (55.6%) gave the correct answer, a significant percentage (44.4%) of the first-year students at the FF gave wrong answers; for instance, 39.1% (204 out of the 522 respondents) identified the Internet with the web (Chart A). Looking at Chart D, it is clear that the FF students' answers were similar to those of the students from the FAM, while the results for the group of students from the FTN were significantly better, whereby almost 80% of the students answered the question correctly (Chart C). The results also indicated that the students could differentiate between the concepts of social networks and the Internet.

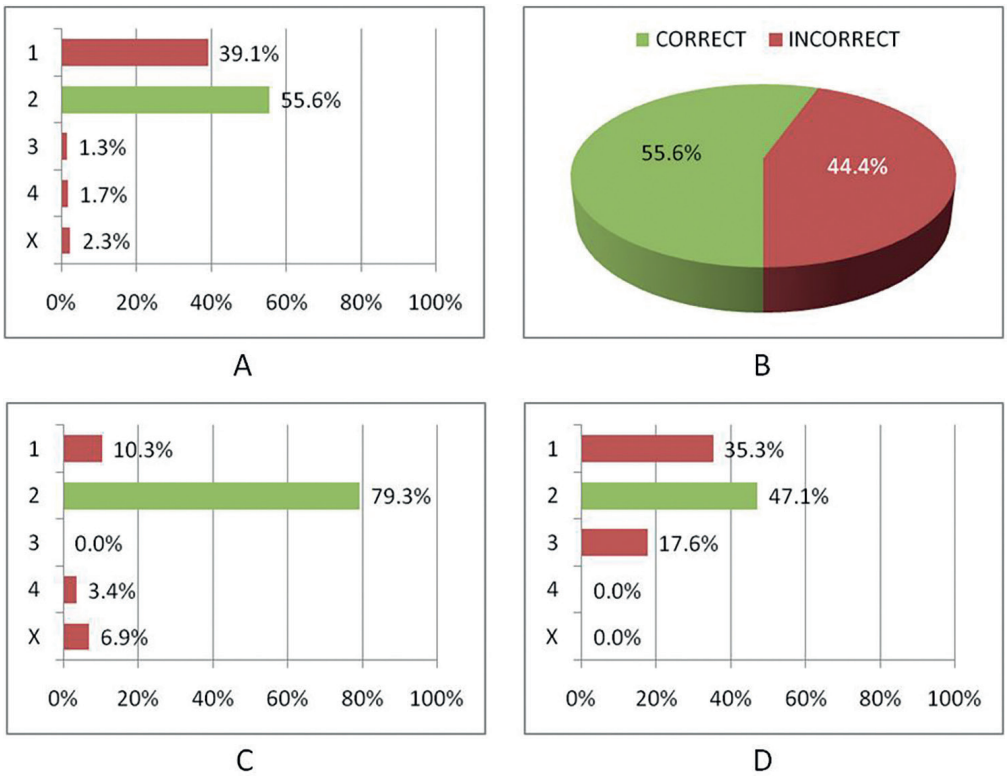

Figure 1. Percentage representation of answers to the first question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

Question 2 (IP). Data transfer on the Internet relies on a set of protocols known as TCP/IP. TCP (*Transmission Control Protocol*) ensures reliable data exchange between computers in the form of small data packages called datagrams. The role of the IP (*Internet Protocol*) is to address the networked devices and to direct data. The second test question checked whether students could recognise the abbreviation IP (correct answer, 3. Internet Protocol) among the following alternatives:

1. Internet Store (Ser. *Internet Prodavnica*)
2. Internet Provider
3. Internet Protocol
4. Internet Presentation

Chart B in Figure 2 clearly indicates that almost 2/3 (64.9%, or 339 of 522) of the tested students from the FF wrongly identified the acronym IP. Almost 60% of respondents thought that the abbreviation IP refers to the provider of Internet services, i.e. Internet Provider – answer 2 (see Chart A). As was the case in the first question, the situation with the group of students from the FAM was again similar (Chart D). The percentage of correct answers in the FTN group was again close

to 80%, amounting to 76% (Chart C). Interestingly, very few students in any of the groups chose the other two answers (Internet Store and Internet Presentation).

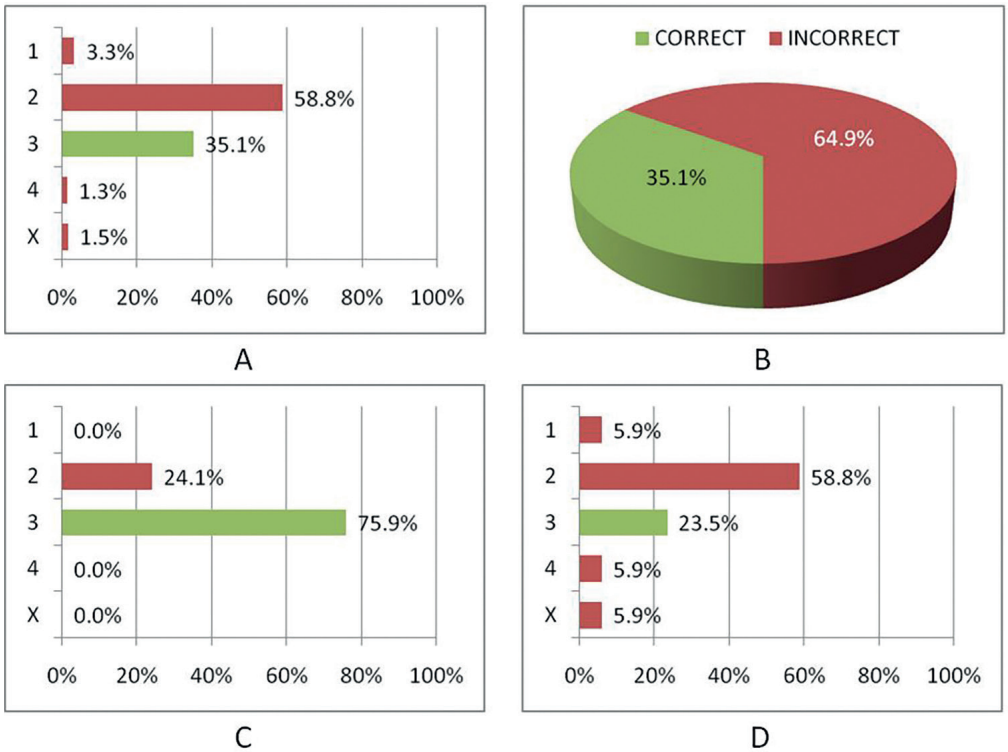

Figure 2. Percentage representation of answers to the second question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

Question 3 (LAN). Regarding their size (covered area), computer networks can be divided into two main categories: a local network (LAN – *Local Area Network*), which covers a relatively small area, such as a classroom, office, or building; or a wide regional network (WAN – *Wide Area Network*), which covers a wider area, such as a town, region, or country. The third question on the test aimed to check students' familiarity with these terms and abbreviations, which are integral parts of a globally connected world. Their task was to identify what type of network a LAN is among the following categories (the correct answer is 2. covers a relatively small area (e.g. office, classroom, building)):

1. covers a wider area (e.g. town, region)
2. covers a relatively small area (e.g. office, classroom, building)
3. connects distant servers
4. is a global computer network

Comparing Figures 3 and 1, it can be noticed that the results for the first and third questions were quite similar. In both cases, almost half the students from the FF

chose a wrong answer (see Chart B). The most frequent wrong answer was 1. covers a wider area (e.g. town, region) (18.6%), closely followed by the third answer, 3. connects distant servers (15.5%), which actually represents a non-existent, imaginary category of computer networks. A number of respondents (8.8%) chose the fourth answer, 4. is a global computer network, which is actually the definition of the Internet. While the percentages of wrong answers from the FAM group (Chart D) did not significantly differ from these results, impressively, nearly 90% of the students from the FTN circled the correct answer (see Chart C).

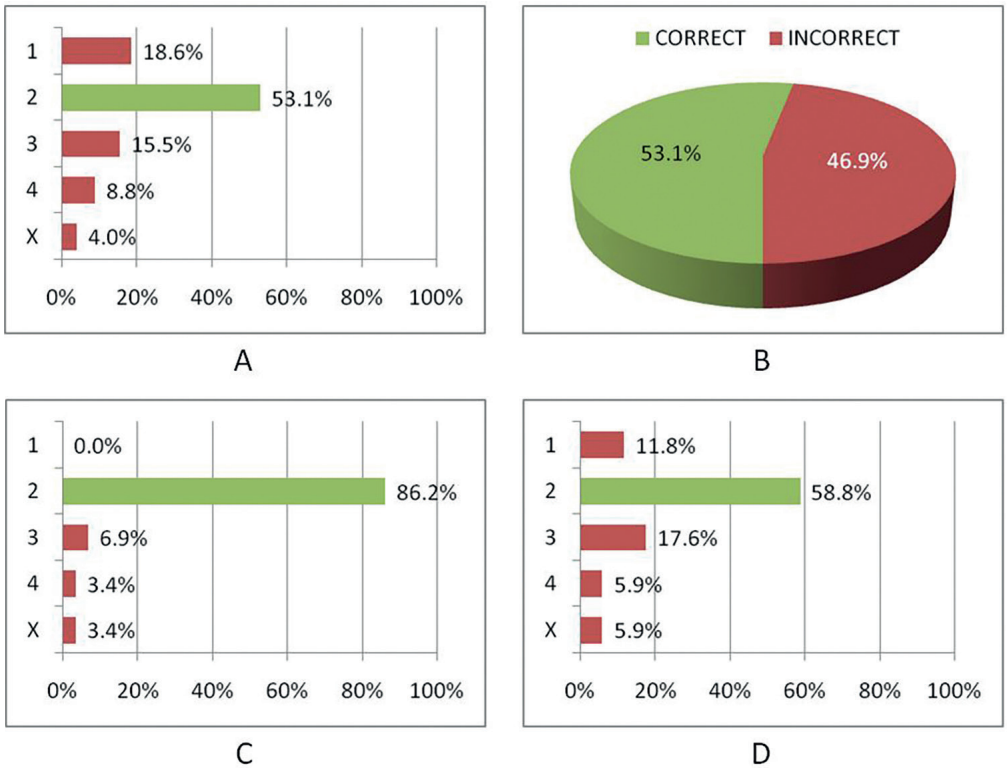

Figure 3. Percentage representation of answers to the third question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

Question 4 (URL). The URL (*Uniform Resource Locator*) address is one of the key Internet concepts and represents a unique address for resources, such as web pages, documents, programs, pictures, videos, and other data forms. For example, the web page containing the exam schedules at the FF can be accessed through the URL address: http://www.ff.uns.ac.rs/sr-lat/studenti/rasporedi/raspored-ispita/osnovne-studije. In the fourth question, the students were asked what URL represents and were offered the following answers (the correct answer is 4. unique address of Internet resources):

1. transfer protocol for web pages
2. numerical label that uniquely identifies every computer in a network

3. domain name
4. unique address of Internet resources

Here, the first three answers can be integral parts of a URL address. Looking at the provided example of a URL address, the protocol for transferring web pages is http (*HyperText Transfer Protocol*). The domain name is www.ff.uns.ac.rs and it represents an understandable letter substitute for a numerical label that uniquely identifies the computer on which the exam schedules are located. This numerical label is called the IP address and is used in internal communication in a computer network.

Based on Chart B in Figure 4, it can be seen that most (60%) of the tested students from the FF were familiar with the concept of a URL address. Though charts A, C, and D indicate that some respondents confused this term with the protocol for transferring web pages, as well as less often with the domain name. The category of IP address was the rarest choice on the test, which probably indicated that the students do not deal with IP addresses directly. Interestingly, the percentage of correct answers in the FTN group was not significantly higher than the results for the students from the FF.

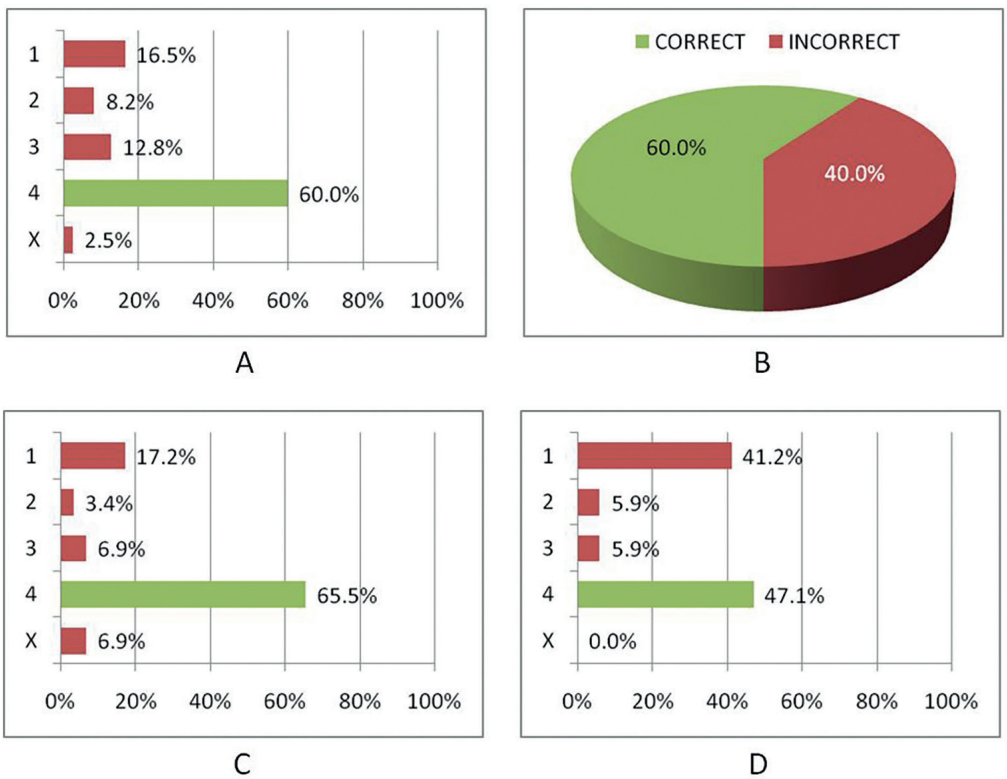

Figure 4. Percentage representation of answers to the fourth question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

Question 5 (ORG). A domain name is the part of a URL address that represents the name of a website that somebody wants to visit. For example, in the case of the URL address http://www.ff.uns.ac.rs/sr-lat/studenti/rasporedi/raspored-ispita/osnovne-studije, which contains the exams schedules at the FF, the domain name is www.ff.uns.ac.rs. The part of a domain name after the last dot is called the top-level domain (in this case .rs) and indicates the kind of domain and type of website. Apart from top-level national domains such as .rs, which also indicate countries, there are several international domains that are important to know for getting by in the Internet world. The fifth test question checked whether students could recognise these international domains. From the following options, the respondents were asked to choose the top-level domain that indicates the websites of non-profit organisations (the correct answer is 3. ORG):

1. COM
2. NET
3. ORG
4. XLSX

The percentage of wrong answers by the students from the FF was nearly 60% (Chart B in Figure 5), which shows that most of them were not familiar with the meanings of these labels.

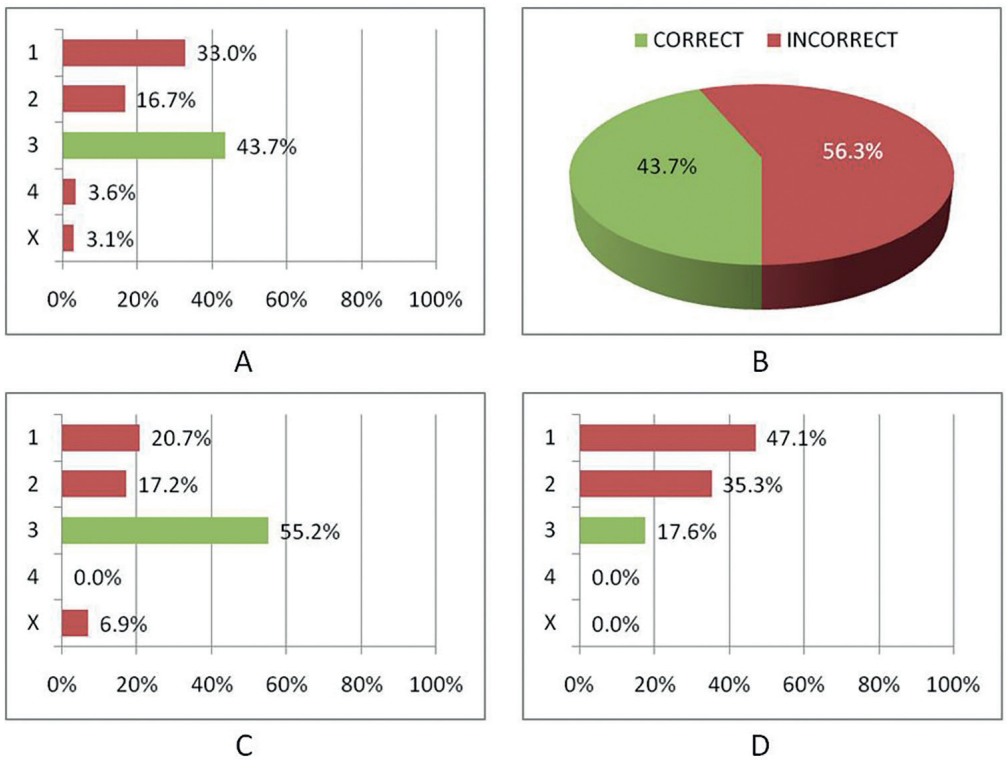

Figure 5. Percentage representation of answers to the fifth question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

Special attention should be paid to the fact that the most common among the wrong answers was the first option, 1. COM, i.e. the domain used by commercial organisations (see Charts A, C, and D in Figure 5). The question arises, to what extent is this the consequence of the fact that popular and seemingly free Internet services, such as the search engine *Google* or the social network *Facebook*, which have grown into unavoidable components of everyday Internet experience, can be found with addresses in the COM domain?

The domain NET, which primarily labels the locations of commercial organisations that deal with computer networking (i.e. Internet service providers), was also noticeably present among the wrong answers: 17% of students linked this domain with non-profit organisations.

While Chart D in Figure 5 indicates that the domain ORG was largely an unknown category among the students in the FAM group, Chart C shows that the situation with the respondents in the FTN group was better, but even in that group almost half the students (44.8%) gave a wrong answer.

Also, the results clearly show that the students could correctly recognise that the fourth category (4. XLSX) did not belong to the Internet world, which was correct as XLSX does not represent a domain, but rather is a file extension of Excel workbooks.

Question 6 (HTML). HTML (*HyperText Markup Language*) is the language for the markup of hypertext (web pages) and a basic tool for creating web content. HTML is used for the markup of different parts of web pages, such as paragraphs, titles, pictures, and links. Web pages are kept on computers in files with the extension (type) .html. The sixth question on the test tested the students' knowledge of what the name of the language used for creating web pages is and the following options were offered (the correct answer is 2. HyperText Markup Language):

1. World Wide Web
2. HyperText Markup Language
3. HTTP
4. Hypertext

The first answer, 1. World Wide Web, is the full name of the Internet's best-known service, i.e. the Web. The third answer, 3. HTTP, is the acronym of the protocol for transferring hypertext (web pages) through the Internet (*HyperText Transfer Protocol*) and the fourth, 4. Hypertext, is hypertext in English. In a general sense, hypertext means a document that contains connections (links) to parts of the document itself and/or to other documents – in the Internet world, these are web pages themselves.

The sixth question was the most technologically oriented part of the test, which is reflected in the results shown in Figure 6. The percentage of wrong answers among the students from FF was the highest in the case of this question, reaching 70% (Chart B). Nearly half the respondents (44.6%) marked HTTP (protocol for transferring web pages) as the language for making web pages. This response predominated in the FAM group as well (Chart D) and it was markedly present in the FTN group, although most students in that group (slightly over 60%) answered the question correctly. The similarity between the acronyms HTML and HTTP probably contributed to this result.

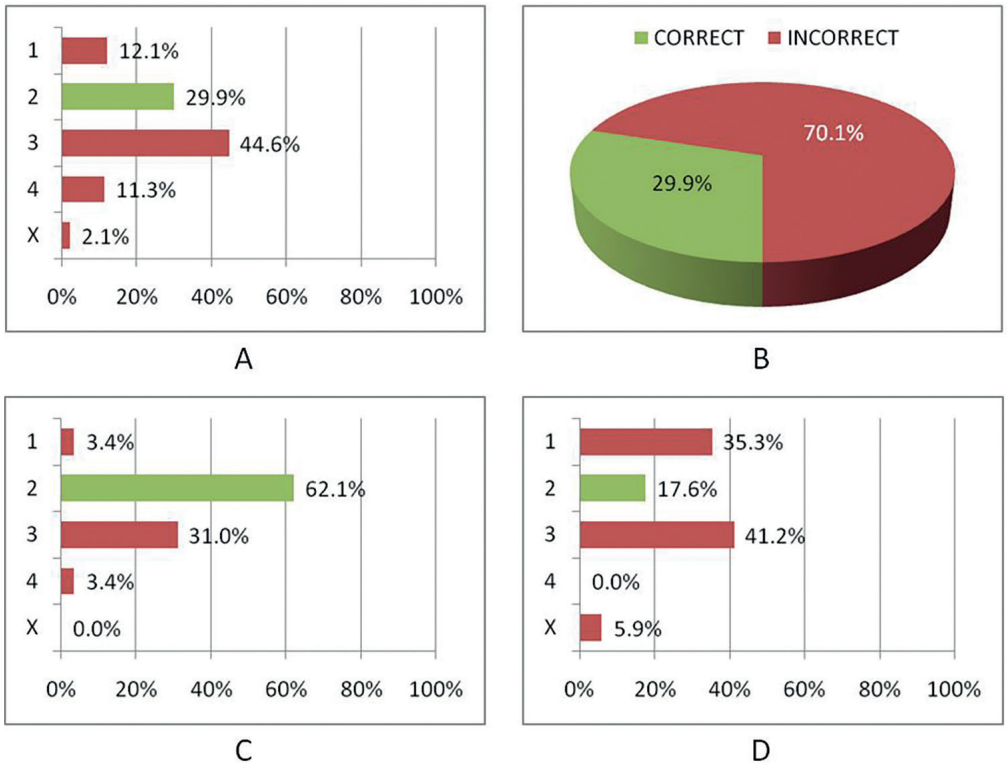

Figure 6. Percentage representation of answers to the sixth question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

Question 7 (IE). Web pages created with HTML language are opened by entering their URL addresses in programs called *web browsers*, which are created for that specific purpose. There are many different web browsers available, the most popular being *Google Chrome*, *Safari*, *Firefox*, *Opera*, and *Internet Explorer*, with the latter being part of the Windows operating system. The options offered in the penultimate question included three programs and one web service (*Google Mail*), the task being to choose which is a web browser (the correct answer is 3. Internet Explorer):

1. Google Mail
2. Windows Explorer
3. Internet Explorer
4. Microsoft FrontPage

Based on the results presented in Figure 7, it is evident that this task did not cause any difficulties for most the participants. Around 85% of students from the FF correctly identified Internet Explorer as the program for visiting websites, and the other answers were only marginally present (Chart A). Similar results were noticed in the FAM and FTN groups (Charts D and C, respectively).

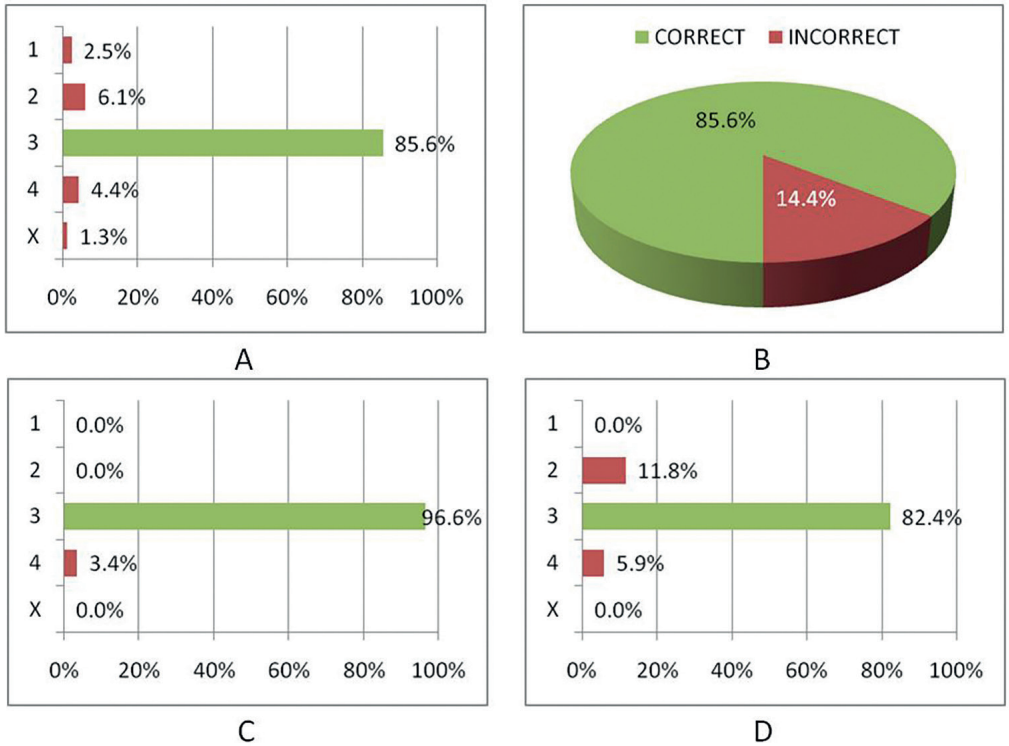

Figure 7. Percentage representation of answers to the seventh question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

Question 8 (MAIL). Since electronic mail is an unavoidable part of formal Internet communication, the last question was posed with the aim of discovering whether the students were familiar with popular email clients, in this case specifically *Thunderbird*. Apart from the *Thunderbird* program, possible answers included the web browser *Chrome*, the previously popular instant messaging client *Google Talk* (support for which had already ended at the time of the research), and a social network, i.e. the microblogging service *Twitter* (the correct answer is 1. Thunderbird):

1. Thunderbird
2. Chrome
3. Google Talk
4. Twitter

This structure of possible answers was determined with the awareness that the respondents all belong to a generation that is predominantly oriented towards the use of online services, social networking sites, and instant messages.

Noticeably, there was a high percentage (65.7%) of wrong answers (Chart B in Figure 8), which indicated that the first-year students in the FF most probably rely on online services, such as *Google Mail*, for communication by electronic mail and that they are not familiar with specialised programs. Interestingly, a large num-

ber (almost 42%) chose *Google Talk*, a specialised program for instant messaging (Chart A) – maybe while thinking of *Google Mail*? The online-orientation of respondents may also account for the fact that a noticeable percentage (nearly 17%) chose the *Chrome* web browser (which can be used for accessing online email services). Similar results were noticed in the groups of students from the FTN (Chart C) and FAM (Chart D).

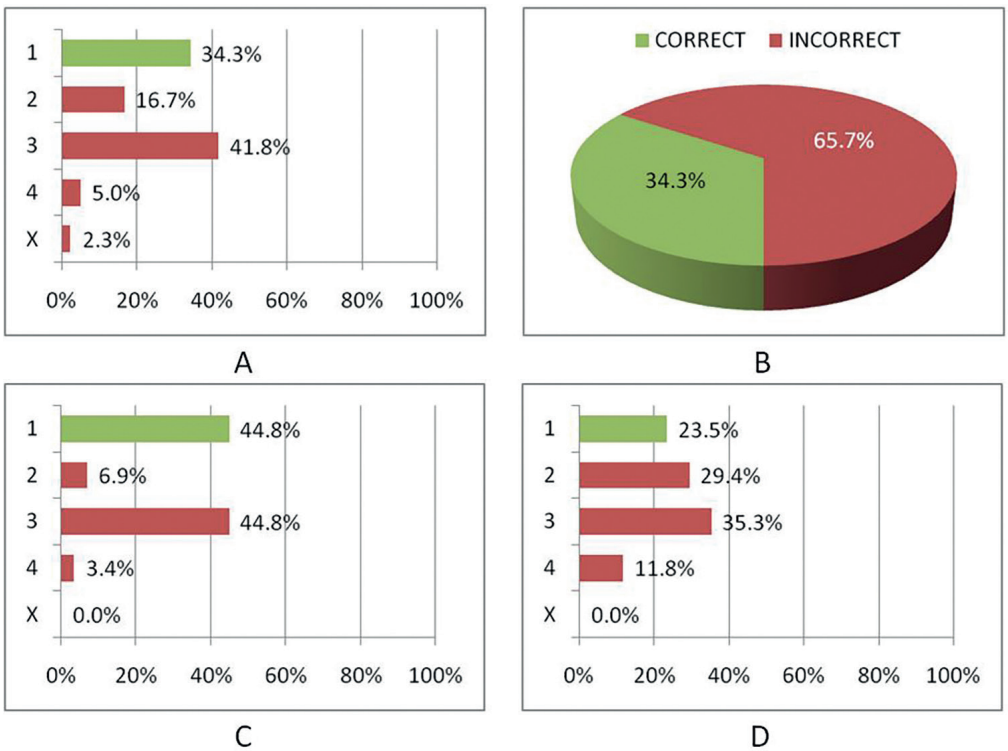

Figure 8. Percentage representation of answers to the eighth question by the students from the FF (A), a group of students from the FTN (C), and a group of students from the FAM (D); ratio of incorrect to correct answers by the students from the FF (B).

3.2. Percentages of correct answers

The percentages of correct answers per question (columns) and study programmes are shown in Table 2. The best results for each question are marked by the symbol • and the worst with the symbol ○. For example, for the first question (INET), the best result was achieved by the FTN group (79.3%) and the worst by the FRE group (40%). The column TEST shows the aggregate results for all the test questions. The best results per study programme are marked in bold and the worst are underlined. For example, the students in Journalism (JRN) achieved the best result in the question IE (94.2%) and the worst in the question MAIL (23.1%). Row FF shows the aggregate

results for the students from the Faculty of Philosophy, and the row ALL shows the aggregate results of all the students who participated in the testing.

As for the students from the Faculty of Philosophy, based on row FF in Table 2, it is evident that among all the basic Internet concepts, the one they were most familiar with was the concept of the web browser (85.6% of correct answers) and their least familiar was the concept of the HTML language for the creation of web pages (29.9% of correct answers). Looking at the set of all the answers given for the eight test questions by the students from the FF, the ratio of correct to incorrect answers was approximately 50%.

	INET	IP	LAN	URL	ORG	HTML	IE	MAIL	TEST
JRN	69.2	34.6	50.0	61.5	48.1	30.8	**94.2**	23.1	51.4
HIS	52.6	38.6	56.1	35.1	35.1	40.4	**82.5**	17.5 ○	44.7
PSY	60.7	44.3	65.6	78.7	52.5	31.1	**91.8**	45.9	58.8
HUN	58.3	33.3	41.7	8.3 ○	16.7 ○	8.3 ○	**100.0** ●	25.0	36.5 ○
PHI	55.3	42.1	47.4	50.0	47.4	42.1	**86.8**	42.1	51.6
SOC	50.0	17.5 ○	47.5	80.0	45.0	30.0	**82.5**	32.5	48.1
CL	64.3	57.1	78.6	50.0	64.3	21.4	**85.7**	21.4	55.4
SER	77.4	19.4	45.2	58.1	41.9	35.5	**87.1**	32.3	49.6
GER	44.9	30.6	51.0	55.1	36.7	24.5	**89.8**	38.8	46.4
ENG	47.5	67.5	57.5	67.5	70.0 ●	37.5	**95.0**	72.5 ●	64.4
FRE	40.0 ○	20.0	60.0	**100.0** ●	55.0	40.0	90.0	35.0	55.0
PED	57.9	26.3	33.3 ○	49.1	17.5	22.8	**73.7**	22.8	37.9
SL	47.1	27.5	64.7	66.7	47.1	13.7	**70.6** ○	31.4	46.1
FTN	79.3 ●	75.9 ●	86.2 ●	65.5	55.2	62.1 ●	**96.6**	44.8	70.7 ●
FAM	47.1	23.5	58.8	47.1	17.6	17.6	**82.4**	23.5	39.7
FF	55.6	35.1	53.1	60.0	43.7	29.9	**85.6**	34.3	49.6
ALL	56.5	36.8	54.9	59.9	43.5	31.2	**86.1**	34.5	50.4
MIN	40.0	17.5	33.3	8.3	16.7	8.3	70.6	17.5	36.5
MAX	79.3	75.9	86.2	100.0	70.0	62.1	100.0	72.5	70.7

Note: ● denotes the best and ○ the worst result for each question (column). The best result of each study group (row) is marekd in bold and the worst one is underlined.

Table 2. Percentage of correct answers for each group

In order to observe the answering trend more easily, this data is visually presented using charts in Figure 9. As can be seen in Chart B in this figure, the average success rate of students from the FF was between that of the FTN and FAM students. Chart A in Figure 9 and the numerical results in Table 2 show differences in the variability of the results for the various study groups with regard to the questions. For some questions, the study programmes have quite homogenous results; e.g. a high percentage of students in all the programmes answered correctly the question about web browsers (IE), while all scored below average (<50%) for the question about HTML, except for the FTN group, and all scored below average (<50%) for the question about electronic mail (MAIL), except for the English Language and Literature (ENG) group. The highest variability between groups was regarding the percentage of correct answers to the question about URL, which was answered correctly by all the students in FRE, but less than 10% of students in HUN.

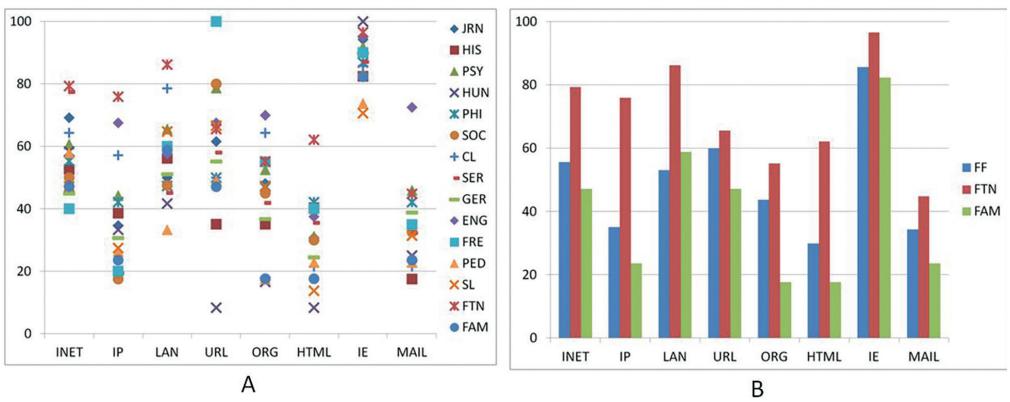

Figure 9. Graphical representation of the percentage of correct answers by students from the study programmes of the FF (A) and from different faculties (B)

3.3. Statistical significance of the differences in the answers among the groups

Table 3 shows the results of the $\chi 2$ testing which was used to test differences in the correctness of the answers among the study programmes at the Faculty of Philosophy (A) and the differences in the correctness of the answers among the faculties (B). Column V contains the obtained Cramer's V coefficients. At the significance level of $\alpha = 0.05$, this analysis indicated that the relation between the number of correct answers and study programmes in the FF was not statistically significant, only in the cases of the INET and HTML questions. Looking at the relation between the number of correct answers and the faculties, it can be concluded that there was no statistically significant difference in the cases of the URL, IE, and MAIL questions, while a mild statistically significant difference was detected in the case of the ORG question.

	A			B		
	df=12, N=522			df=2, N=568		
	χ^2	p	V	χ^2	p	V
INET	18.634	0.098	0.189	6.946	0.031	0.111
IP	39.324	0.000	0.274	20.996	0.000	0.192
LAN	22.767	0.030	0.209	12.296	0.002	0.147
URL	64.391	0.000	0.351	1.548	0.461	0.052
ORG	39.614	0.000	0.275	6.238	0.044	0.105
HTML	19.838	0.070	0.195	14.758	0.001	0.161
IE	27.761	0.006	0.231	2.940	0.230	0.072
MAIL	46.166	0.000	0.297	2.284	0.319	0.063

Table 3. Results of the $\chi 2$ tests and Cramer's V coefficients of the relationships between answer correctness and the study programmes at the FF (A) and among the faculties (B)

3.4. Distributions of answers

	N	Mean	SD	Median	Q25	Q75	Min	Max
JRN	52	4.12	1.69	4	3	5	0	8
HIS	57	3.58	1.81	3	2	5	1	8
PSY	61	4.70	1.43	5	4	6	2	8
HUN	12	2.92	1.16	3	2.25	3.75	1	5
PHI	38	4.13	1.68	4	3	5	0	8
SOC	40	3.85	1.56	4	3	5	0	7
CL	14	4.43	1.16	4.5	3	5.25	3	6
SER	31	3.97	1.45	4	3	5	2	7
GER	49	3.71	1.55	4	2.5	4	1	7
ENG	40	5.15	1.93	5	4	7	2	8
FRE	20	4.40	1.43	4	4	4	2	8
PED	57	3.04	1.66	3	2	4	0	7
SL	51	3.69	1.49	4	3	5	0	6
FTN	29	5.66	1.74	6	5	7	2	8
FAM	17	3.18	0.95	3	2	4	2	5

Table 4. Measures of the central tendency and variability of the correct answers of the study programmes

Table 4 shows the values obtained for the indicators of the central tendency and variability of the total number of correct answers for the students in the FTN and FAM groups and in the individual study programmes at the FF.

The results show that the scores of all the analysed groups of students from the FF were worse than the FTN students, to a lesser or greater extent. The only groups whose average score was somewhat lower than the FAM students' scores were the students in HUN and PED. Apart from this, the results showed relatively great differences between the study programmes at the FF in relation to the average achievement. Of the eight possible answers, which is the number of questions in the test, the average number of correct answers varied between 2.92 (for the groups HUN and PED) and 5.15 for the group ENG. Relatively great individual differences between students' answers were also evident; whereby, while some of them answered all the questions correctly, some did not give any correct answers to any question. Furthermore, there were differences in the variability of the achieved results between the analysed groups. It could be noticed that the results for the students from certain programmes with a small number of respondents were the most similar. Those are the groups in which most students did quite poorly (HUN and FAM) or had average scores (CL and FRE). The groups ENG and HIS, which were characterised by a greater variability of results in comparison to the other groups, had larger numbers of tested students and somewhat asymmetric distributions, which indicated that the variability was increased partly due to the smaller number of high results. This asymmetry of certain distributions can be seen in Figure 10, where the boxplots (box and whisker plots) show the medians, interquartile ranges, and lowest and highest observations.

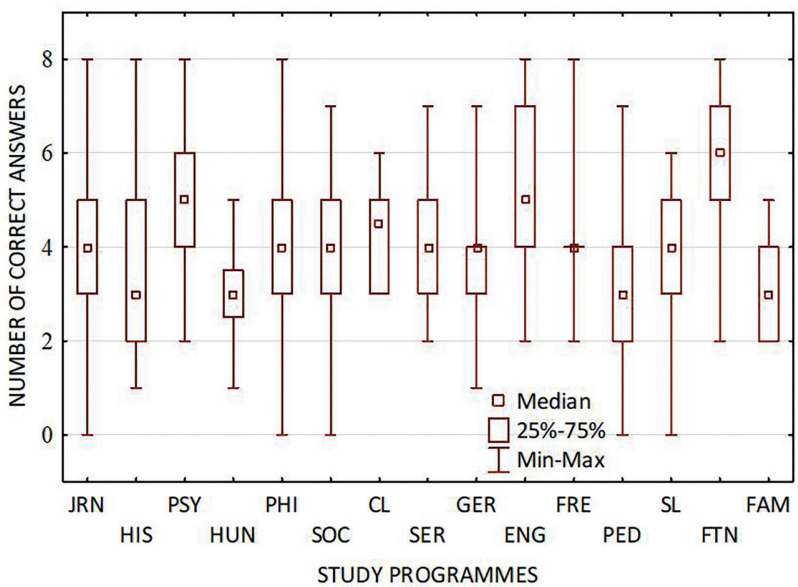

Figure 10. Boxplots (box & whisker plots) of the central values and variability in the scores of the student groups considering the total number of correct answers

The described differences in the number of correct answers between students in the different study programmes (FTN, FAM, and individual groups in the FF) were corroborated by the Kruskal–Wallis test, whose value was $H(14, N = 568) = 84.728$, $p < 0.001$. The z-test showed that these differences were a consequence of the better results achieved by the FTN students in comparison to a large number of the other analysed groups (SOC, GER, SL, HIS, FAM, PED, HUN); better results achieved by the ENG and PSY students in comparison to the HIS, FAM and PED students; and better results achieved by the students of ENG compared to the HUN students (Table 7 in Appendix B).

3.5. Student's results in relation to the ECDL standard and the requirements for passing the exam

Two additional analyses were done in order to estimate the degree of the students' familiarity with the basic Internet concepts: we tested how many of them would meet the condition for passing the test from the corresponding ECDL base module (M2–Online Essentials) and how many students would fail the exam (answer correctly to less than 51% of the questions).

The pass mark for the ECDL test is 75%, which corresponds to 6 correct answers (of 8 questions) in this test. Based on the chart shown in Figure 11, it can be seen that less than 20% of the students would meet this condition in most of the groups, and in the case of two groups (FAM and HUN) nobody would pass the test. The numbers of students who satisfy this requirement are shown in Table 5 (ECDL row) together with the total number of students in the groups (N row). It can be seen from this table that only every fifth first-year student (100 of 522) would meet the ECDL 75% pass mark, i.e. only around 19%.

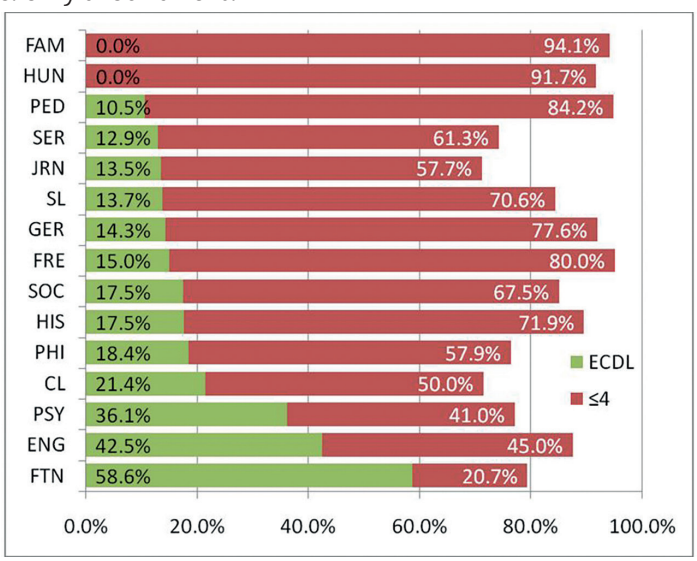

Figure 11. Percentage of students who meet the condition defined by the ECDL standard (ECDL) and those who answered correctly to less than 51% of the questions (≤4)

On the other hand, when it comes to the minimum requirements for passing the exam, Figure 11 shows that the percentage of first-year students from the Faculty of Philosophy who would not pass the exam ranged from 45% in the ENG group (18 out of 40 students) to about 92% in the HUN group (11 out of 12 students). The numbers of those students for each group are given in the bottom row of Table 5 marked with ≤4. These data show that nearly 65% (338 out of 522) of the first-year students from the FF who were tested would not pass the exam (according to the faculties' criteria).

	JRN	HIS	PSY	HUN	PHI	SOC	CL	SER	GER	ENG	FRE	PED	SL	FTN	FAM	FF	ALL
N	52	57	61	12	38	40	14	31	49	40	20	57	51	29	17	522	568
ECDL	7	10	22	0	7	7	3	4	7	17	3	6	7	17	0	100	117
≤4	30	41	25	11	22	27	7	19	38	18	16	48	36	6	16	338	360

Table 5. Total number of students who participated in the research (N), number of students who answered correctly more than 5 questions (ECDL), and number of students who answered correctly fewer than 5 questions (≤4)

3.6. Correlations between the questions

Based on the correlation coefficients between test questions calculated on the whole sample (Table 6), it can be seen that the correlations between questions were very low (compared to the maximum value of 1). This indicates that, although the test measured knowledge of the same field, the students answered the questions quite inconsistently – a correct answer to one question does not mean that a student will give correct answers to the other questions as well. The question about the Internet (INET) was the least related to the others, i.e. the correctness of answer to this question was not related to the correctness of the answers to any other question. The question about URL was related only to the question about the domain (ORG) with a correlation of only 0.124. The highest correlation was between the questions about MAIL and domain (ORG), but this was also quite low (0.230).

For the sample of students from the FF, who made up majority of the sample, the relations between the questions were approximately the same as in the total sample (Table 8 in Appendix B). On the other hand, the relations were somewhat different in the subsamples of FTN and FAM (Tables 9 and 10 in Appendix B), primarily because fewer numbers of correlation coefficients met the significance criterion, which was probably because they were calculated on a smaller sample. For the sample of FTN students, the question about the Internet (INET) showed a significant relation with the questions about IP and HTML. However, for the FAM sample, significant correlations were rare among the questions and they had negative signs (a correct answer to one question is related to a wrong answer for another). Although significant, these relations were possibly a consequence of some random result variations due to the small number of respondents.

	INET	IP	LAN	URL	ORG	HTML	IE	MAIL
INET		0.073	0.062	0.028	-0.033	0.061	0.037	-0.036
IP			**0.178**	0.022	**0.178**	**0.125**	**0.096**	**0.137**
LAN				0.045	**0.159**	**0.136**	**0.178**	**0.151**
URL					**0.124**	0.078	0.045	0.066
ORG						**0.138**	**0.147**	**0.230**
HTML							**0.084**	**0.103**
IE								**0.099**
MAIL								

Note: Bold values are significant at the level 0.05

Table 6. Correlation coefficients (phi) between individual questions for the total sample of respondents

4. Discussion

The research presented in this paper was carried out with the aim of assessing the pre-knowledge of non-ICT first-year students at the Faculty of Philosophy at the University of Novi Sad about the key concepts in computer literacy. Contrary to the general assumption that the knowledge of digital natives is adequate and up to date, the author's experience in teaching suggested that they are generally not sufficiently familiar even with the basic concepts. The freshmen's knowledge was consequently evaluated in the present study relying on a test consisting of 22 close-ended questions with 4 options per question. The questions were selected from the set of questions on which the *Computer Literacy* exam is based. The student's answers to 8 questions related to the Internet were analysed in this paper.

In accordance with previous research (Heerwegh, De Wit and C. Verhoeven 2016; O'Hanlon 2002; van Deursen and van Diepen 2013) and with the authors' own in-classroom experience, the results confirmed the relatively poor familiarity of first-year students with basic Internet concepts at the beginning of their studies: the percentage of correct and incorrect answers of the FF freshmen was about 50%. The percentage of correct answers at the level of individual study groups of the FF ranged between 36.5% (HUN) and 64.4% (ENG), and the average number of correct answers varied between 2.92 (HUN) and 5.15 (ENG). The highest homogeneity of accurate answers was detected in the case of the question about web browsers (IE), and the lowest one in the case of the question about URL.

Regarding the number of correct answers, when observing all the analysed study groups (including the two control groups FTN and FAM), statistically significant differences were detected between a number of them. These differences may be explained by:

- The type of study programme – students who enrolled on technical studies (FTN) showed richer knowledge; here, they had probably been more interested in the field of information/computer science before their studies compared to the FF and FAM students.
- For the FF, the ENG and PSY students had the best results, because those are the study groups with the strictest selection on the entrance exam due to the large number of candidates. Apart from high results in the entrance exam, the students in those groups probably had a high grade-average in high school.

The analysis of the freshmen's results in relation to the ECDL standard (the percentage of students who met the condition defined by the ECDL standard was between 0% (HUN) and 42.5% (ENG)) and the fulfilment of the requirements for passing the exam (the percentage of students who would fail the exam was between 91.7% (HUN) and 45% (ENG)) further highlights the need to improve their computer literacy.

The results of this research suggest that the familiarity of the first-year students at the Faculty of Philosophy at the University of Novi Sad with the basic concepts of Internet is unsystematic, incomplete, and rather uneven. This is probably partly due to the unequal coverage of computer literacy in secondary education and to the differences in students' preferences. These findings emphasise the need for long-term monitoring of the freshmen's pre-knowledge and the necessity for systematising their knowledge at the beginning of their studies through appropriate basic subjects in computer literacy. In order to gain insights into the general state of computer literacy among students, it would be preferable to expand the research to other higher educational institutions, and in addition to assessing their familiarity with the basic concepts, their practical skills should also be tested.

References

Deniz, Müjgan Hacıoğlu, and Seda Karakaş Geyik. "An Empirical Research on General Internet Usage Patterns of Undergraduate Students." *Procedia - Social and Behavioral Sciences* 195 (July 2015): 895–904. https://doi.org/10.1016/j.sbspro.2015.06.369

Duţă, Nicoleta, and Oscar Martínez-Rivera. "Between Theory and Practice: The Importance of ICT in Higher Education as a Tool for Collaborative Learning." *Procedia - Social and Behavioral Sciences* 180 (May 2015): 1466–73. https://doi.org/10.1016/j.sbspro.2015.02.294

Heerwegh, Dirk, Kurt De Wit, and Jef C. Verhoeven. "Exploring the Self-Reported ICT Skill Levels of Undergraduate Science Students." *Journal of Information Technology Education: Research* 15 (2016): 19–47. https://doi.org/10.28945/2334

Jokić, Andrea, Dragana Koljenik, Sanjica Tanacković Faletar, and Boris Badurina. "Vještine Informacijske i Informatičke Pismenosti Studenata Informacijskih Znanosti u Osijeku: Pilot-Istraživanje." *Vjesnik Bibliotekara Hrvatske* 59, No. 3–4 (2016): 63–92. https://hrcak.srce.hr/187610

Khairnar, C. M. "Advance Pedagogy: Innovative Methods of Teaching and Learning." *International Journal of Information and Education Technology* 5, No. 11 (2015): 869–72. https://doi.org/10.7763/IJIET.2015.V5.629

Lekka, Aspa, and Jenny Pange. "What ICT Tools Do Undergraduate Students Use?" In *2015 International Conference on Interactive Mobile Communication Technologies and Learning (IMCL)*, 386–88. IEEE, 2015. https://doi.org/10.1109/IMCTL.2015.7359625

Molnár, Gyöngyvér. "The Use of Innovative Tools in Teacher Education: A Case Study." In *Proceedings of the Fifth International Conference on Informatics, Educational Technology and New Media in Education*, 44–49. Sombor: Faculty of Education, 2008. http://www.staff.u-szeged.hu/~gymolnar/sombor_2.pdf

O'Hanlon, Nancy. "Net Knowledge: Performance of New College Students on an Internet Skills Proficiency Test." *The Internet and Higher Education* 5, No. 1 (2002): 55–66. https://doi.org/10.1016/S1096-7516(02)00066-0

Prensky, Marc. "Digital Natives, Digital Immigrants Part 1." *On the Horizon* 9, No. 5 (2001a): 1–6. https://doi.org/10.1108/10748120110424816

Prensky, Marc. "Digital Natives, Digital Immigrants Part 2: Do They Really Think Differently?" *On the Horizon* 9, No. 6 (2001b): 1–6 https://doi.org/10.1108/10748120110424843

Serdyukov, Peter. "Innovation in Education: What Works, What Doesn't, and What to Do about It?" *Journal of Research in Innovative Teaching & Learning* 10, No. 1 (2017): 4–33. https://doi.org/10.1108/JRIT-10-2016-0007

Slechtova, Pavla. "Attitudes of Undergraduate Students to the Use of ICT in Education." *Procedia - Social and Behavioral Sciences* 171 (January, 2015): 1128–34. https://doi.org/10.1016/j.sbspro.2015.01.218

Valić Nedeljković, Dubravka. "Deca, Mediji i „trošenje Budžeta" Slobodnog Vremena." *Medijski Dijalozi* IV, No. 10 (2011): 339–54.

Valić Nedeljković, Dubravka. "Deca i Zadovoljavanje Informativnih Potreba." *Medijski Dijalozi* V, No. 11 (2012): 325–36.

Valić Nedeljković, Dubravka, Karlo Bala, and Zoltan Geler. "Deca u Virtuelnom Svetu Kompjuterskih Igara." In *Digitalne Medijske Tehnologije i Društveno-Obrazovne Promene, Knjiga 3*, edited by Dubravka Valić Nedeljković, and Dejan Pralica, 241–54. Novi Sad: Filozofski fakultet, 2013.

Van Deursen, A.J.A.M., and S. van Diepen. "Information and Strategic Internet Skills of Secondary Students: A Performance Test." *Computers & Education* 63 (April 2013): 218–26. https://doi.org/10.1016/j.compedu.2012.12.007

Appendix A. Test questions

1. The Internet is
    1. World Wide Web
    2. global computer network
    3. social network
    4. type of server

2. IP stands for
    1. Internet Store (Ser. *Internet Prodavnica*)
    2. Internet Provider
    3. Internet Protocol
    4. Internet Presentation

3. LAN is a computer network which
    1. covers a wider area (e.g. town, region)
    2. covers a relatively small area (e.g. office, classroom, building)
    3. connects distant servers
    4. is a global computer network

4. URL is
    1. transfer protocol for web pages
    2. numerical label that uniquely identifies every computer in a network
    3. domain name
    4. unique address of Internet resources

5. Choose the top-level domain which is used for websites of non-profit organisations
    1. COM
    2. NET
    3. ORG
    4. XLSX

6. The language used to make Web pages is called
    1. World Wide Web
    2. HyperText Markup Language
    3. HTTP
    4. Hypertext

7. Choose the program which is a Web browser
    1. Google Mail
    2. Windows Explorer
    3. Internet Explorer
    4. Microsoft FrontPage

8. Choose the program used for sending and receiving electronic mail
    1. Thunderbird
    2. Chrome
    3. Google Talk
    4. Twitter

Appendix B. The results of additional statistical tests

	FTN	ENG	PSY	CL	FRE	PHI	JRN	SER	SOC	GER	SL	HIS	FAM	PED	HUN
FTN						0.175	0.091	0.054	**0.009**	**0.001**	**0.001**	**0.000**	**0.001**	**0.000**	**0.001**
ENG									0.413	0.052	0.087	**0.009**	**0.021**	**0.000**	**0.026**
PSY									0.987	0.115	0.197	**0.017**	**0.050**	**0.000**	0.058
CL														0.543	
FRE														0.367	
PHI														0.261	
JRN														0.094	
SER															
SOC															
GER															
SL															
HIS															
FAM															
PED															
HUN															

Note: Only p values lower than 1 are shown, bold values are significant at level 0.05

Table 7. Significance of z-tests of contrasting between mean ranges of results of the analysed study programmes expressed in p levels

	INET	IP	LAN	URL	ORG	HTML	IE	MAIL
INET		0.035	0.032	0.032	-0.036	0.020	0.051	-0.052
IP			**0.160**	0.035	**0.162**	0.082	**0.095**	**0.129**
LAN				0.054	**0.163**	**0.119**	**0.184**	**0.146**
URL					**0.113**	0.081	0.033	0.063
ORG						**0.142**	**0.140**	**0.226**
HTML							**0.088**	**0.101**
IE								**0.112**
MAIL								

Note: Bold values are significant at level 0.05

Table 8. Correlation coefficients (phi) between individual questions on the sample of students from FF

	INET	IP	LAN	URL	ORG	HTML	IE	MAIL
INET		**0.508**	0.289	-0.012	0.053	**0.478**	-0.097	0.118
IP			**0.475**	-0.070	0.302	**0.555**	-0.107	0.346
LAN				-0.290	0.243	0.099	-0.076	0.159
URL					**0.367**	-0.119	0.260	0.070
ORG						0.010	0.210	0.255
HTML							-0.148	-0.010
IE								-0.210
MAIL								

Note: Bold values are significant at level 0.05

Table 9. Correlation coefficients (phi) between individual questions on the sample of FTN students

	INET	IP	LAN	URL	ORG	HTML	IE	MAIL
INET		0.033	0.310	-0.181	-0.436	0.182	**-0.491**	0.033
IP			-0.381	**-0.523**	0.107	-0.257	-0.107	-0.308
LAN				0.070	-0.240	0.074	-0.074	0.182
URL					-0.127	0.182	0.127	0.033
ORG						-0.214	0.214	0.107
HTML							-0.190	0.107
IE								-0.107
MAIL								

Note: Bold values are significant at level 0.05

Table 10. Correlation coefficients (phi) between individual questions on the sample of FAM students

Challenges in Tackling COVID-19: Use of the Mass Media versus Interpersonal Channels in Pakistan

This study aimed to investigate the influence of mass media and interpersonal communication channels in the adoption of preventive measures against the Covid-19 pandemic (coronavirus). The study hypothesises that higher exposure to media content increases interpersonal communication and increased interpersonal communication is positively associated with the adoption of preventive behaviour. To test this hypothesis, this study used a quantitative research technique employing a survey method. The results, when assessed through Pearson correlation, elaborated that there was a stronger association between media exposure and increased interpersonal communication and the adoption level of Covid prevention measures. The result of the thematic analysis revealed that interpersonal communication was an important contributor towards changing behaviour. Hence, the two-step flow of communication showed strong support for accepting the role of interpersonal communication alongside the mass media. This study findings provide insights to communicators and planners for devising different communication strategies for combating the pandemic.

Keywords: Covid-19, Interpersonal Communication, Media Effect, Health Communication, Prevention, Pakistan.

Author Information

Babar Hussain Shah, Assistant Professor in Department of Mass Communication at AIOU Islamabad Pakistan
https://orcid.org/0000-0002-1845-468X

Zaheer Khan, PhD, Scholar in Department of Mass Communication at AIOU Islamabad Pakistan
https://orcid.org/0000-0002-1692-3833

Saqib Riaz, Chairman/Associate Professor in Department of Mass Communication at AIOU Islamabad Pakistan
https://orcid.org/0000-0002-6059-7019

How to cite this article:

Shah, Babar Hussain, Zaheer Khan, Saqib Riaz. “Challenges in Tackling COVID-19: Use of the Mass Media versus Interpersonal Channels in Pakistan”.
Információs Társadalom XXI, no. 4 (2021): 67–85.
https://dx.doi.org/10.22503/inftars.XXI.2021.4.4

1. Introduction

We are now living in the age of Corona, where the COVID-19 pandemic has changed the world completely, and perhaps permanently in some regards. Each area of life as we know it has been heavily affected by the changes that have occurred around us. There is no nation on earth that has not been affected by the coronavirus and almost every field of life has been adversely impacted by the pandemic all over the world. The coronavirus has been the most common cause of viral disease during the last two years (2020 and 2021) and its direct target has been (and still is) human health. The very existence of human life depends on healthy and active people. A healthy life means life without diseases. In the past, diseases and epidemics have resulted in a great loss of human beings. Humanity has struggled throughout history to find solutions to the various health issues that inflict mankind and tried its best to prevent the spread of epidemics that are hugely hazardous to life. For the sake of saving humanity, the world nations, regardless of their differences, have extended their cooperation in an attempt to control the disease. Sharing timely communication about the risk to life and wisdom to control the massive destruction that the pandemic has caused has proven to be an effective method in humanity's fight against the virus during the disastrous years of the pandemic (2020 and 2021).

Effective communication has played a pivotal role so far in helping us through the hardest times of our lives during this pandemic, and it remains a blessing to helping us cope as we continue to battle Covid-19. This includes both interpersonal communication and communication through mass media. Effective communication is helpful for promoting adopting preventive measures and for overcoming fallacies about the pandemic and its repercussions. This paper is an attempt to explore and investigate the role of mass media and interpersonal channels in facing the challenges that have arisen during this time of pandemic.

Only a few years ago, life seemed to be sailing its journey very smoothly, when suddenly shocking news arrived that a deadly viral outbreak had occurred in Wuhan China. Initially, it was assumed that this virus, which was later identified as Covid-19 or the coronavirus, would only be confined to a certain geographical region near the outbreak. But in fact the virus rapidly spread across the globe and the World Health Organisation (WHO) was forced to declare it a pandemic. Due to this virus,2,378,863 deaths across the globe had been reported up to 12 February 2021, and that number has continued to rise since (Worldmeter 2020).

The main symptoms of this virus include cough fever, sore throat, and difficulty in breathing. The WHO quickly recommended preventive measures, like covering the mouth during coughing, repeated hand wash, maintaining distance from other people (with the new term "social distancing" rapidly gaining popularity), and proper isolation for people with suspected infection (WHO 2021). Information about the prevention measures against Covid-19 was mostly disseminated through the mass media and it was understood that people would adopt these precautionary measures to keep themselves and others safe from this deadly virus.

Many countries around the world imposed strict lockdowns and people were advised to stay at home and to apply all the precautionary measures for their safety and

for the safety of others. To implement these methods effectively, a change in public opinion was required and communication channels were supposed to disseminate information persuasively. Consequently, during this time of high crisis, the media were required to play their part in educating the public about their health and handling of the pandemic. Consequently, one aim of the present study was to unfold the importance of the communication channels in combating the Covid-19 pandemic.

1.2. Role of the media during the pandemic outbreak

There is much evidence that the mass media can have a great impact on changing the behaviour of the public, and so it was hoped that this impact would ultimately reduce the number of newly infected cases (Yan et al. 2016). Studies into the outbreak of severe acute respiratory syndrome (SARS) indicated the importance of providing accurate and fast communication to the public about health risks so that the public can benefit from the advice from experts. It was also proved that the extensive press coverage of the SARS epidemic contributed to public-health bodies taking proper action against this respiratory syndrome (Rezza et al. 2014). Another study into the specific role of the media during crisis periods also elaborated that the impact of the media reduces the number of cases (Zhou 2019).

It has been found that all types and forms of mainstream traditional media, including television, newspapers, radio, booklets, and billboards, have been used for the dissemination of preventive messages related to health during the pandemic, with the presumption that the media has the potential to influence public opinion (Brinn et al. 2010). Furthermore, the media can discourage people from risky behaviours and persuade people to adopt precautionary measures to mitigate the severity of the disease (Young 2008).

The use of mass media for the promotion of clinical practices is one of the best tools to discourage them from adopting unapproved methods (Grilli et al. 2002). In modern societies, media organisations are primarily considered as responsible for the dissemination of health information (Schwitzer et al. 2005). It is also evident that the media is the most inexpensive source to sensitise people regarding health issues, especially those who are not easy to access through traditional approaches (Bauman et al. 2006). From the above narrative, the role of the media has been considered as very important during the current pandemic. In the past, diseases remained in specific geographical boundaries, but with the advent of globalisation, mankind has become more vulnerable to diseases such as Covid-19, which has spread globally and under such circumstances that the role of media has gained tremendous significance during the pandemic crisis.

1.3. Role of interpersonal communication

Interpersonal communication involves communication between small groups of people in close physical proximity of the communication taking place. The litera-

ture indicates that interpersonal conversations often begin when a population is exposed to mass media. According to Schulz (2010) interpersonal communication is initiated when individuals are exposed to media and media communication is discussed among the individuals. Interpersonal communication gains more importance when it involves issues about human lives, more specifically when the situation involves humans on the brink of risk from different contagions. Under such circumstances, mass media trickles information down to the masses, who then discuss it through their interpersonal communication platforms (Kam and Lee 2012).

However, it is not always the case that routine discussions in the media about health-related issues lead to further interpersonal communication (Brosius and Weimann 1996). However, studies have been designed to create awareness and encourage communication to create interpersonal conversations through exposure to mass media and they found that this exposure leads to further interpersonal conversation (Kam and Lee 2012). Public communication campaigns opine the importance of the media, yet supported by interpersonal communication. The success of any communication depends upon the extent to which the target audience has received the message and understood it.

The connection between interpersonal communication and mass media campaigns was probed in Southwell and Yzer's study, 'The Roles of Interpersonal Communication in Mass Media Campaigns'. This study found that the roles of interpersonal communication could be split into three general categories: media campaign outcomes, mediator of the media campaign effects, and moderator of the campaign effects (Southwell and Yzer 2007).

The literature on mass media and interpersonal communication further disclosed that there is a possible interplay between mass and interpersonal communication, especially in the context of health beliefs (Morton and Duck 2001). Mass media campaigns adds persuasion to interpersonal communication and that indirectly leads to behavioural change (Southwell and Yzer 2007). Consequently, the interaction starts with friends, family, and colleagues, and it may also regulate one's own perceived level of concern and decisions regarding the adoption of preventive measures. This advocates the important role of interpersonal communication following media exposure and its effects in influencing behaviour, and this process is known as the two-step flow of information (Jeong et al. 2015).

The process of interpersonal communication only starts when the message during the period of crisis is effectively designed, and it requires careful and good preparedness. In such shocking periods of crisis, the communicator needs to understand the information requirements of the audience. When the communicator knows the needs of the intended target audience, he/she can deliver the message more effectively and there is more chance that the target audience would act upon the message as desired by the communicator (Lundgren and McMakin 2018).

The above narration explains that exposure to the media could initiate interpersonal communication, but it is also found that this would only work when the message has been carefully designed and with knowing the targeted audience's needs. Therefore, the current study examined how exposure to the media and interperson-

al conversation has influenced the targeted population in taking measures for the prevention of Covid-19.

1.4. Adoption of preventive measures

The role of mass media and interpersonal communication channels has been inevitable in the creation of adaptive measures against different diseases. The primary goal of all health preventive messages is to keep the public away from all sorts of hazards that may damage their health. Both media and interpersonal channels are further expected to effect changes in the behaviour of the public to accept and adopt the recommended measures to keep themselves healthy and active to defend against diseases. Campaigns by mass media specially designed for behavioural and social change have shown great results because they are supported both by the media and by interpersonal communication (Ramalingaswami 2013). The success of interventions for stopping smoking in adults is evidence of the effectiveness of the mass media for supporting health campaigns (Bala, Strzeszynski and Cahill 2008).

It has been observed that when the risk from a disease is high, people may opt to act upon advice more promptly (Onofrio 2007). So, the mass media and interpersonal communication are central to slowing down the course of an epidemic (Mukandavire and Garira 2007). The media have the potential to change the knowledge, attitude, and behaviour of large groups of the population in diverse communities (Redman et al. 1990).

The above indicates that the media and interpersonal communication can be effective during the period of an epidemic. This study aimed to investigate the linkage between exposure to mass media and interpersonal communication, and their outcome as adoptive measures against the Covid-19 pandemic.

Furthermore, there is a plethora of communication theories that explain the importance of health risk communication. Among the most known are the diffusion of innovation, Awareness-Interest-Evaluation-Trial-Adoption (AIETA), and hierarchy effects models. However, this research study primarily focuses on the two-step-flow of communication model as it is intended as a tool to explore the association between exposure to mass media and interpersonal communication. The diffusion of innovation theory can also add value, but due to the time constraints in this study, we only focused on the two-step flow of communication.

2. Statement of the Problem

The role of media, both in times of war and peace, carries worthwhile importance. Likewise, interpersonal channels of communication also have their own worth. Considering the importance of the media and the interpersonal mode of communication, the present study aimed to gain insights into how both media exposure and

interpersonal communication align for the adoption of preventive measures against the Covid-19 pandemic.

2.1. Objectives of the study

- To find out the association between media exposure and the adoption of preventive measures against COVID-19.
- To investigate the linkage between media exposure and interpersonal communication.
- To explore the relationship between interpersonal communication and the adoption of COVID-19 preventive measures.

2.2. Hypotheses

The literature indicates that there is a great linkage between media exposure and the adoption of preventive measures against diseases (Zhou 2019). One previous study found that there is an association between the thinning standard of beauty portrayed in the media and the increase in eating disturbances seen in women (Levine, NivaPiran and Irving 2017). Another study titled 'Health effects of mass-media interventions' concluded that media campaigns can effect positive changes and can be more effective in preventing negative changes occurring in health-related behaviours (Deane 2018). Therefore, in the light of evidence presented in the above literature on the role of the media in the outbreak of the pandemic, we hypothesise that:

H1. The higher the exposure to media content about Covid-19, the greater the adoption of preventive measures.

Discussions on the role of interpersonal communication, as seen in the earlier section, and further literature on the subject indicate that there is an interplay between media usage and interpersonal communication. Specifically, a study about healthy lifestyle behaviours was conducted and concluded that there was a great association between getting health-related information and interpersonal health communication (Narissra, Carter and Arias 2016). Consequently, we hypothesise that:

H2.The higher the exposure to Covid-19 information, the greater the intensity of interpersonal health communication.

Interpersonal communication is considered effective in the adoption of preventive measures process and there is a linkage between interpersonal communication and behavioural change. A study titles 'Interpersonal communication in healthcare' concluded that the more interpersonal communication about a health issue, the higher the willingness of patients to adopt measures and the increased interest of

the patients (Gheorghe et al. 2018). Given the discussion on the adoption of preventive measure and the above study findings, we hypothesise that:

H3.It is likely that increased interpersonal communication about Covid-19 will promote a greater adaptability of preventive measures against Covid-19.

2.3. Theoretical framework

In the two-step flow theory of the media, the information is disseminated in steps, including through channels such as opinion leaders, who are well placed to influence the public. In one study, Katz (1957) highlights the importance and role of opinion leaders in disseminating information from the mass media to the masses. It was further emphasised in that study that opinion leaders can influence the opinion of the masses through interpersonal communication more than mass media communication can.

The two-step flow theory represents an important baseline for this study, as it is used in the current study to analyse how people have been exposed to the media and thus the role of interpersonal communication is ascertained in light of this theory. Hopefully, it would also tell us whether people who have been exposed to both media have been given the same message or have added in their own suggestions.

3. Methodology

The research methodology is a procedure that is adopted for completion of the research. To understand the role of mass media and interpersonal communication channels in the adoption of Covid-19 preventive measures, the researcher chose the survey method. The participants in this research study were the public of Pakistan. An online questionnaire was uploaded for users to fill out, with 300 people invited to participate in the stipulated period, but only 202 questionnaires were received back.

3.1. Consideration of the time frame

This study was conducted at the peak time of the outbreak of Covid-19. It was decided that asking about the role of mass media after some time would be useless, hence 20 days was selected for the collection of responses.

3.2. Sampling method

A convenient sampling method was used in the collection of the data. The study was conducted during the time of the epidemic, during which time the Government as well health organisations requested all the residents to remain isolated as much as possible and hence the convenient sampling method was adopted. Face-to-face in-

terviews or data collection through a by-hand distribution of the questionnaire was almost impossible given the permanent lockdown when it was almost impossible to access respondents in person, so social media was chosen as the platform to access them more easily. To ensure the questionnaire responses were representativeness of the whole country, the questionnaire was forwarded to different respondents in all provinces of Pakistan.

3.3. Instrument development

The instrument was developed to determine the validity of our hypotheses, which were generated in light of the findings from the literature review. The instrument was a researcher-made-literature-consulted questionnaire. The questions about the role of mass communication and interpersonal communication channels were prepared by the researcher, with the questions about the preventive measures framed in light of the WHO recommendations for the protection from Covid-19. The reliability of the questionnaire was confirmed with a Cronbach's alpha index of 0.790.

3.4. Method of collection of the data

Face-to-face interviews or data collection through by-hand distribution of the questionnaire was almost impossible as there was a permanent lockdown going on. Furthermore, there was another risk in spreading the virus through distribution of the paper-based questionnaire, so we created it through Google forms and sent a link to all the participants through social networking sites (Facebook, WhatsApp, and Twitter). The online questionnaire was available to fill in for 300 participants in the stipulated period, and 202 questionnaires were completed and received back.

3.5. Data analysis

The responses received back through Google forms were transferred to a computer for analysis. The frequency and percentage of the answers in the gathered data were calculated with the help of the Statistical Package of Social Sciences (SPSS) software. The answers to the open-ended question were manually analysed after receiving the responses. Codes were then generated to extract the data, which were then converted into themes. The dominant themes were about diet, religious practices, and the avoidance of 5G technology.

3.6. Measures

In Part-1 of the questionnaire, the respondents were asked about their media exposure to Covid-19. This segment contained questions about the media messages

about the virus, source of information, and frequency of receiving information about Covid-19.

Part-2 comprised questions seeking information about the role of interpersonal communication in discussing Covid-19. This portion also contained questions asking respondents about the extent to which they talked about Covid-19 with their family, friends, and with their social circle.

In Part-3 of the questionnaire, the respondents were asked to inform whether increased interpersonal communication about Covid-19 had made them adopt preventive measures. This was also the part of the questionnaire that asked about how much prevention they had adopted and what type of prevention they had applied so far. This segment was based on the WHO-recommended preventive measures and the main objective was to explore the respondents actions to get a true picture on how they are considering this important information and whether they have acted upon it.

Furthermore, the respondents were asked, through an open-ended question, about which additional preventive measures they have suggested to their families, friends, and social circle for protection against the coronavirus.

4. Results and Discussion

Results for H.1: The higher the exposure to media content about Covid-19, the greater the adoption of preventive measures.

Description	Item	No of responses	Percentage
Exposure to media messages about the coronavirus	Not at all	9	4.45 %
	To some extent	32	15.85 %
	To moderate extent	52	25.74 %
	To a great extent	83	41.08 %
	To a greater extent	26	12.87 %
	Total	202	100 %

Table 1. Extent of exposure to media messages

Table 1 indicates the exposure to the media messages about the coronavirus. The people were asked to respond on a 1–5 scale ranging from “Not at all” to “To a greater extent”. The majority indicated that they were indeed exposed to media messages about the coronavirus; 41.1% responded that they were exposed to a great extent, 25.7% to a moderate extent, 15.8% to some extent, and 12.9% to a greater extent, while 4.5% responded that they were not at all exposed to information through the media about the coronavirus.

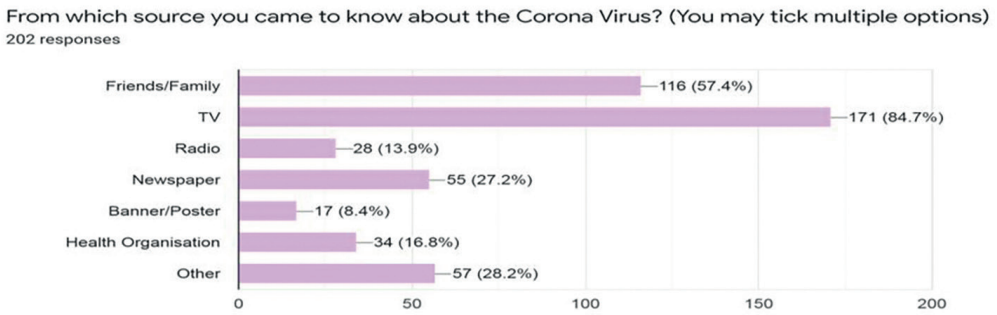

Figure 1. Sources of information for learning about the coronavirus

Figure 1 highlights the responses when asked about the source of information through which they came to know about the coronavirus. The highest response of 84.7% said they were informed about the virus through television, while the figure for the friends/family circle was 57.4%, radio 13.9%, newspapers 27.2%, banner/posters 8.4%, health organisation 16.8%, and 28.2% other.

Description	Items	No	Percentage
Exposure to messages about Covid-19	One time/day	10	4.95
	Two time/day	15	7.42
	More than three times/day	153	75.76
	Seldom	21	10.39
	None	3	1.48
	Total	202	100

Table 2. Daily exposure to messages about Covid-19

Table 2 shows how much people are exposed to the messages about Covid-19 on a daily basis. The highest percentage of 75.76 was for respondents exposed to messages about Covid-19 more than three times a day, while 4.95% were exposed one time/day, and 7.42% two times/day respectively. In addition to these figures, 10.39% said they were seldom exposed to such information and 1.48% were not exposed to such messages at all.

Figure 2 indicates that when the respondents were asked to what extent the media helped them in the adoption of preventive measures against the coronavirus, 48.5% informed that the media had helped them to a great extent, 20.8 % to a moderate extent, and 13.9% to a greater extent, while only 1.9% said that the media had not helped them in the adoption of preventive measures against the coronavirus.

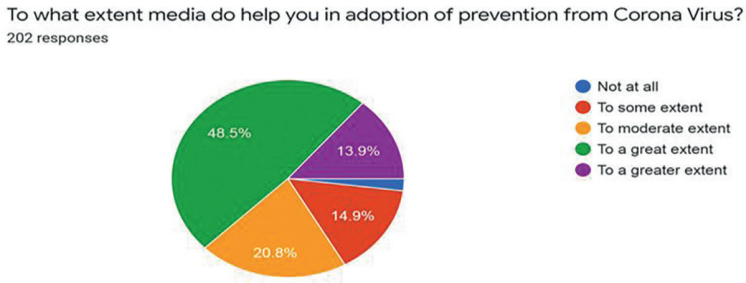

Figure 2. Media help in promoting the adoption of preventive measures against the coronavirus

		Exposure	Prevention
Exposure	Pearson Correlation	1	.492**
	Sig. (2-tailed)		.000
	N	202	202
Prevention	Pearson Correlation	.492**	1
	Sig. (2-tailed)	.000	
	N	202	202

***. Correlation is significant at the 0.01 level (2-tailed).*

Table 3. Test of the correlation in Hypothesis 1 about the exposure to media content about Covid-19 and the adoption of preventive measures

The results in Table 3 for Pearson's correlation coefficient indicate that a correlation existed in the above relationship and is significant, hence our hypothesis that the higher the exposure to media content about Covid-19, the greater the adoption of preventive measures holds true and is supported by the obtained results.

*Results for H2: The higher the exposure to Covid-19 information, the greater the intensity of interpersonal health communicatio*n

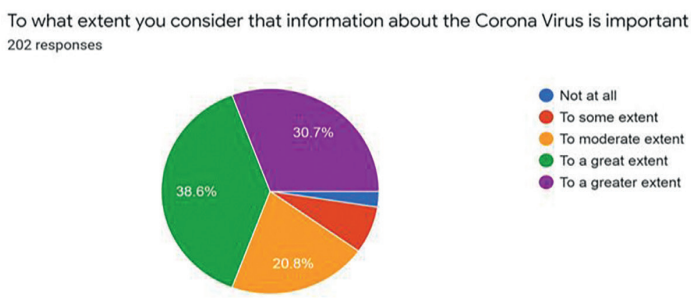

Figure 3. Perception about the importance of interpersonal communication to discuss information about the coronavirus

Figure 3 shows that the majority of respondents considered that it was important to discuss information about the coronavirus in interpersonal communication: 38.6% to a great extent, 30.7% to a greater extent, 20.8% to a moderate extent, and 7.42 to some extent, while 2.47 thought that there was no need to discuss information about the coronavirus.

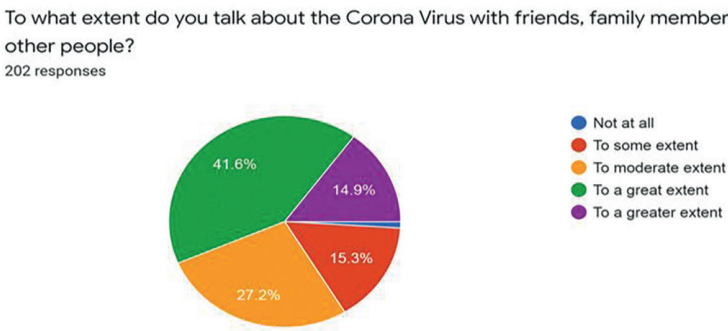

Figure 4. Interpersonal communication about the coronavirus

Figure 4 shows how much people talked about the coronavirus with friends, family members, colleagues, and other people: 41.6 % to a great extent, 27.2 % to a moderate extent, 14.9 % to a greater extent, and 15.3% to some extent, while 0.99% responded they did not talk about it at all.

		Exposure	**Interpersonal communication**
Exposure	Pearson Correlation	1	.478**
	Sig. (2-tailed)		.000
	N	202	202
Interpersonal communication	Pearson Correlation	.478**	1
	Sig. (2-tailed)	.000	
	N	202	202

***. Correlation is significant at the 0.01 level (2-tailed).*

Table 4. Test of the correlation in Hypothesis 2 about the exposure to Covid-19 information and the intensity of interpersonal health communication

The results in Table 4 show that a correlation existed in the above relationship as is significant, hence our hypothesis that higher exposure to Covid-19 information leads to a higher intensity of interpersonal health communication holds and is supported by the results.

Results for H3: It is likely that increased interpersonal communication about Covid-19 will promote a greater adaptability of preventive measures against Covid-19

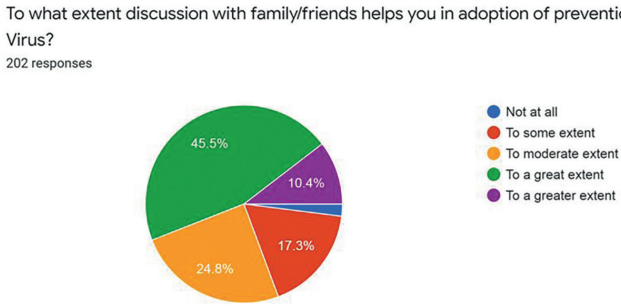

Figure 5. Interpersonal communication helps people in the adoption of preventive measures against the coronavirus

Figure 5 presents the figures for the role of interpersonal communication in the adoption of preventive measures against the coronavirus: 45.5 % stated this helped to a great extent, 24.8 % to a moderate extent, 10.4 % to a greater extent, and 17.3% to some extent, while 1.98% responded it did not help at all.

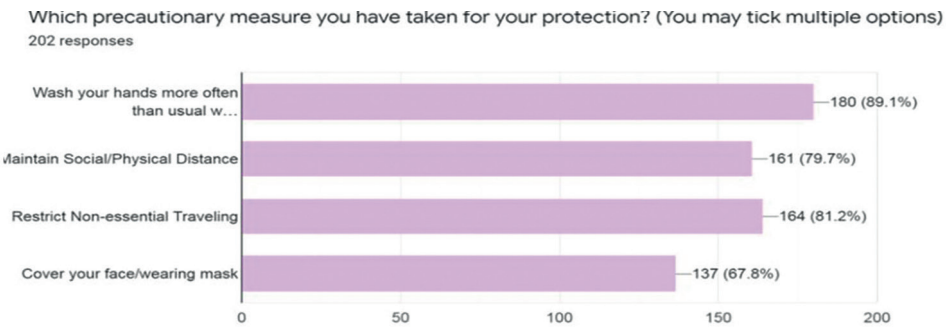

Figure 6. Precautionary measures taken as protection against the coronavirus

Figure 6 shows how people have protected themselves from the coronavirus. This was a multiple choice question, and the responses showed that: 89.1% wash their hands more often than usual, 79.7% maintained the social/physical distance, 81.2% restricted non-essential travelling, and 67.8% covered their face/wore a mask as a precautionary measure.

Table 5 shows that a correlation existed in the above relationship and is significant, hence our hypothesis that increased interpersonal communication is positively associated with the adoption of preventive measures holds and is supported by the results.

		Interpersonal Communication	Prevention
Interpersonal communication	Pearson Correlation	1	.431**
	Sig. (2-tailed)		.000
	N	202	202
Prevention	Pearson Correlation	.431**	1
	Sig. (2-tailed)	.000	
	N	202	202

***. Correlation is significant at the 0.01 level (2-tailed).*

Table 5. Test of the correlation in Hypothesis 3 between interpersonal communication and the adoption of preventive measures against the coronavirus

4.1. Additional preventive measures suggested by respondents

In addition to the above, a question was asked about which additional measures they suggested to family, friends, relatives, and others which, as per their knowledge, they considered was the best remedy against the coronavirus so that their social circle could save themselves. The respondents were able to give the choice in an open-ended question. The responses to this question were manually analysed after the first 10 responses. Codes were generated to extract the data, and these codes were then cast into themes. A summary of these themes is given below.

4.1.1. Use of special drinks as a remedy

While the vast majority of people suggested that washing the hands, using a mask, maintaining physical distance, and avoiding unnecessary travel were the best preventive measure, they also recommended some other measures to their social circle, like using lukewarm water for drinking, as they considered this would relieve congestion, and gargling with salt . Some respondents also expressed that warm water is also the best remedy for controlling the spread of flu.

In conjunction with the above suggestion of drinking hot water, some others stressed the use of lemon in hot water for drinking. As per the old traditional remedies, many responded that Kalonji (Black seed, Black Cumin) and natural honey with black tea are good natural remedies and should be used regularly. Another suggestion was making green tea with ginger and using turmeric with milk, as both are effective methods that have long been used to control the flu and other viruses.

4.1.2. Diet improvement

Most of the respondents urged boosting the immunity system, such as by eating a lot of fresh fruits and vegetables for strong immunity, or using vitamins and food sup-

plements, especially for elderly people. Some respondents also recommended using a clove of garlic, as this would energise the body against the viruses and it should be used regularly. It was also recommended that junk food should be avoided as much as possible.

4.1.3. Religious practices

Another theme that was highly suggested by these people to their social circles was that they should regularly make Wudu (ablution) with a short interval, pray to God, and ask forgiveness. Many people also recommended learning religious practices, with some further suggesting that serving mankind is the only way to come out from this calamity.

4.1.4. Avoidance of technology

Some curative and critical opinions were also received stating that 5G Technology is the biggest cause in spreading the coronavirus, and therefore urging that 5G Technologies should be stopped to halt its spreading of the virus. “Feed your mind and body from authentic information as there is a bombardment of misinformation”, one respondent recommended to his social circle. Another respondent thought that enough information had reached everyone, so he advocated stopping further discussion of the issue, as more discussion would only further harm the mental health of the masses.

5. Conclusion

This study investigated the role of the mass media and interpersonal communication on the adoption of preventive measures against the coronavirus. Initially, the study participants were asked whether they had been exposed to messages about the coronavirus or not. Most of the respondents informed that they had been exposed to messages about the coronavirus. They were further asked about which sources they had received information about the virus. The highest response cited television as the main source where they got the maximum information. Respondents were further asked how much information they received daily, and here the majority replied that they received information about the coronavirus more than three times a day.

This was followed up by a question asking to what extent the media helped them in the adoption of preventive measures against the coronavirus. The role of interpersonal communication was also assessed among the respondents through multiple questions, like how much they think that information about the coronavirus should be discussed and to what extent they have talked about such information with their families, friends, relatives, and others. In response to these questions, a higher number of respondents thought that information about the coronavirus should be discussed and that they had shared such information.

All the data received from the respondents were statistically analysed with SPSS using Pearson's correlation coefficient, and the results showed that relations existed between media exposure and increased interpersonal communication about the virus and between interpersonal communication and the adoption of preventive measures against the coronavirus.

Interpersonal communication was further investigated through an open-ended question asking what additional measures they have suggested as a precautionary step for protection against the coronavirus. From the initial stage responses, codes were generated to extract the data, and these codes were then organised into themes. One highly recommended suggestion was about imbibing special drinks, such as lukewarm water, lemon water, turmeric with milk, making green tea with ginger, and the regular use of Kalonji (Black seed, Black Cumin) or natural honey with black tea, which were all considered good remedial steps to control the virus.

Another major theme was about diet improvement, as most of the respondents urged measures to boost the immunity system, such as eating a lot of fresh fruits and vegetables, and using vitamins and food supplements, especially for elderly people. Some respondents recommended using a clove of garlic, stating this would energise the body against the viruses and that it should be used regularly. Another suggestion was that junk food should be avoided as much as possible.

Through the open-ended question, another theme that appeared in the recommendations of the respondents was suggestions about religious practices, including that adopting religious practices is the only way and solution by which people can save themselves from the coronavirus.

Some people criticised 5G Technologies, stating that 5G was causing great harm and was contributing to the spreading of the coronavirus. A few respondents also suggested that the excessive coverage of the issue was harming the mental health of the masses and should be stopped.

Through the results of the study, we can conclude that during a period of crisis, like the current Covid-19 pandemic, the media and interpersonal communication both are effective tools for spreading information. People receive information through the media, and this is discussed in interpersonal communication among their circle. The present study's findings revealed that the more interpersonal conversations take place about the virus, the greater the adoption of preventive measures against the virus. Like in the two-step flow of information theory, it was also found in this study that the role of interpersonal communication was important in times of calamities, as those who are recipients of information, e.g. from the media, then tend to pass this information along to their circle of friends, family members, relatives, and others along with conveying their own opinion on the subject.

The true opinions of these opinion leaders was analysed through coding, and it was found that all the suggestions have some deep-roots in the traditional thoughts and practices of the people of Pakistan. Whether these unconventional methods of treatment will work as prevention against coronavirus is not certain. but it is recommended that the health communicators should consider these historical treatments when designing the communication strategy for effective messaging to the Pakistan population.

5.1. Limitations

This study has several limitations to note.

1. This study was confined to respondents from Pakistan only.
2. Another limitation is that the respondents were those who have internet facility, whereas it would be better if the researcher could approach other people too who do not have internet/cell connection with the net. It has already been explained that during the pandemic face-to-face interaction was almost impossible, so the questionnaire was forwarded to respondents through social media.

5.2. Policy recommendations

- It is desired that all the media should work holistically in this COVID-19 emergency for the betterment of humanity.
- A joint mechanism should be devised by all stakeholders so as maximise the valid information that can be shared.
- Health communicators should create the messages to the public carefully by keeping in mind the effects of interpersonal communication when designing messages.
- A debate in the media is necessary about the old traditional methods of healing, so that public misconceptions can be minimised.
- Opinion leaders should avoid making suggestions to adopt practices that are not scientifically proven, as these can be harmful.

References

Bala, Malgorzata M., Lukasz Strzeszynski, and Kate Cahill. "Mass media interventions for smoking cessation in adults." *Cochrane Database of Systematic Reviews* (2008). doi: 10.1002/14651858.cd004704.pub2

Bauman, Adrian, Ben J. Smith, Edward W. Maibach, and Bill Reger-Nash. "Evaluation of mass media campaigns for physical activity." *Evaluation and Program Planning* 29, no. 3 (2006): 312–322. doi: 10.1016/j.evalprogplan.2005.12.004

Brinn, Malcolm P., Kristin V. Carson, Adrian J. Esterman, Anne B. Chang, and Brian J. Smith. "Mass media interventions for preventing smoking in young people." *Cochrane Database of Systematic Reviews* (2010). doi: 10.1002/14651858.cd001006.pub2

Brosius, Hans-Bernd, and Gabriel Weimann. “Who Sets the Agenda.” *Communication Research* 23, no. 5 (1996): 561–580.
doi: 10.1177/009365096023005002

Worldometers. “COVID-19 Coronavirus Pandemic.” Accessed December 28, 2021.
https://www.worldometers.info/coronavirus/

Deane, James. “Health effects of mass-media interventions.” *The Lancet Global Health* 6, no. 9 (2018): e960.
doi: 10.1016/s2214-109x(18)30279-1

D’Onofrio, A., P. Manfredi, and P. Manfredi. “Bifurcation Thresholds in an SIR Model with Information-Dependent Vaccination.” *Mathematical Modelling of Natural Phenomena* 2, no. 1 (2007): 26–43.
doi: 10.1051/mmnp:2008009

Gheorghe, Iuliana R., Victor L. Purcarea, and Consuela M. Gheorghe. “Consumer eWOM Communication: The Missing Link between Relational Capital and Sustainable Bioeconomy Ii Health Care Services.” *Amfiteatru Economic* 20, no. 49 (2018): 684.
doi: 10.24818/ea/2018/49/684

Grilli, Roberto, Craig Ramsay, and Silvia Minozzi. “Mass media interventions: effects on health services utilisation.” *Cochrane Database of Systematic Reviews* (2002).
doi: 10.1002/14651858.cd000389

Jeong, Michelle, Andy S. Tan, Emily Brennan, Laura Gibson, and Robert C. Hornik. “Talking About Quitting: Interpersonal Communication as a Mediator of Campaign Effects on Smokers’ Quit Behaviors.” *Journal of Health Communication* 20, no. 10 (2015): 1196–1205.
doi: 10.1080/10810730.2015.1018620

Kam, Jennifer A., and Chul-joo Lee. “Examining the Effects of Mass Media Campaign Exposure and Interpersonal Discussions on Youth’s Drug Use: The Mediating Role of Visiting Pro-Drug Websites.” *Health Communication* 28, no. 5 (2012): 473–485.
doi: 10.1080/10410236.2012.699873

Katz, Elihu. “The Two-Step Flow of Communication: An Up-To-Date Report on an Hypothesis.” *Public Opinion Quarterly* vol. 21, no. (1957) : 61.
doi: 10.1086/266687

Levine, Michael P., NivaPiran, and Lori M. Irving. “Disordered Eating Behavior, Adolescence.” In *Encyclopedia of Primary Prevention and Health Promotion*, edited by Thomas P. Gullotta, and Martin Bloom, 422–428. New York: Springer Science+Business Media, 2014.

Lundgren, Regina E., and Andrea H. McMakin. *Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks*. Hoboken: John Wiley & Sons, 2018.

Morton, Thomas A., and Julie M. Duck. “Communication and Health Beliefs.” *Communication Research* 28, no. 5 (2001): 602–626.
doi: 10.1177/009365001028005002

Mukandavire, Z., and W. Garira. “Effects of public health educational campaigns and the role of sex workers on the spread of HIV/AIDS among heterosexuals.” *Theoretical Population Biology* 72, no. 3 (2007): 346-365.
doi: 10.1016/j.tpb.2007.07.002

Punyanunt-Carter, Narissra M., and V. S. Arias. “The interplay between interpersonal communication and instructional communication.” *Communication Education* 66, no. 1 (2016): 118–120.
doi: 10.1080/03634523.2016.1221512

Ramalingaswami, V. "Moving of Declaration for Adoption." *World Health & Population* 3, no. 1 (2013).
doi: 10.12927/whp..17552

Redman, Selina, Elizabeth A. Spencer, and Robert W. Sanson-Fisher. "The role of mass media in changing health-related behaviour: a critical appraisal of two models." *Health Promotion International* 5, no. 1 (1990): 85–101.
doi: 10.1093/heapro/5.1.85

Rezza, Giovanni, Raffaella Marino, Francesca Farchi, Mirella Taranto, and Instituto Superiore di Sanità. "SARS Epidemic in the Press." *Emerging Infectious Diseases* 10, no. 2 (2004): 381–382.
doi: 10.3201/eid1002.030743

Schulz, Peter. *Communication Theory: General approaches to communication and the processing of communication on the intra-individual level.* London, UK: Sage Publications Ltd, 2010.

Schwitzer, Gary, Ganapati Mudur, David Henry, Amanda Wilson, Merrill Goozner, Maria Simbra, Melissa Sweet, and Katherine A. Baverstock. "What Are the Roles and Responsibilities of the Media in Disseminating Health Information?" *PLoS Medicine* 2, no. 7 (2005): e215.
doi: 10.1371/journal.pmed.0020215

Southwell, B.G., and Marco C. Yzer. "The Roles of Interpersonal Communication in Mass Media Campaigns." *Annals of the International Communication Association* 31, no. 1 (2007): 420-462.
doi: 10.1080/23808985.2007.11679072

World Health Organization. "Country & Technical Guidance - Coronavirus disease (COVID-19)." Accessed December 28, 2021.
https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance

Yan, Qinling, Sanyi Tang, Sandra Gabriele, and Jianhong Wu. "Media coverage and hospital notifications: Correlation analysis and optimal media impact duration to manage a pandemic." *Journal of Theoretical Biology* 390 (2016): 1–13.
doi: 10.1016/j.jtbi.2015.11.002

Young, Meredith E., Geoffrey R. Norman, and Karin R. Humphreys. "Medicine in the Popular Press: The Influence of the Media on Perceptions of Disease." *PLoS ONE* 3, no. 10 (2008): e3552.
doi: 10.1371/journal.pone.0003552

Zhou, Weike, Yanni Xiao, and Jane M. Heffernan. "Optimal media reporting intensity on mitigating spread of an emerging infectious disease." *PLOS ONE* 14, no. 3 (2019): e0213898.
doi: 10.1371/journal.pone.0213898

The phenomena of epidemic crime, deepfakes, fake news, and the role of forensic linguistics

The present study analyses the phenomena of deepfakes and fake news, together with their linguistic fingerprints, to understand how these may influence the public, including in their decision making. Nowadays, linguistic fingerprints are present mostly in digital forms; therefore, forensic linguistics was also recently introduced as a subject and involves the analysis of linguistic fingerprints. The present study provides an insight into the contribution of linguist and forensic linguist experts in the work of investigative authorities. Linguistic fingerprints can convey messages and provide evidence to support an investigation, such concerning the following questions: Who could the perpetrator be? Who could have written the message? The linguist expert can also help develop a profile of perpetrators, including their likely age, sex, ethnicity, or help prove the validity of news versus fake news as well as other attributes of sources. These aspects are all covered in the present study.

Keywords: *deepfake, fake news, epidemic crime, linguistics, linguistic fingerprint*

Author Information

Ürmösné Gabriella Simon, University of Public Service
https://ORCID: 0000-0001-9284-9578
Endre Nyitrai, University of Public Service
https://ORCID: 0000-0001-5060-5516

How to cite this article:

Ürmösné, Gabriella Simon, Endre Nyitrai. “The phenomena of epidemic crime, deepfakes, fake news, and the role of forensic linguistics”.
Információs Társadalom XXI, no. 4 (2021): 86–101.
https://dx.doi.org/10.22503/inftars.XXI.2021.4.5

1. Introduction

On an average day, after we wake up, and at some point start to surf the internet, we will likely come across diverse news channels that deliver the news with different slants. How we receive the news can alter our perception of the news and ultimately even our decisions. Moreover, many people may share the news, among friends or on social media, as they naturally trust the authenticity of the news and believe the content in the news stories is true.

Nowadays, digital informational channels and social media more and more frequently represent people's primary news source, which is reflected by statistics showing the increasing usage of the internet. According to measurements by the Deutscher Commercial Internet Exchange of Frankfurt, the record peak of internet data traffic worldwide occurred in spring 2020 at 9.1 terabit per sec.; interestingly, this occurred during the pandemic (Johannes 2020, 2).

However, increasingly the authenticity of the news on the internet is called into question with the emergence of the phenomenon of fake news. The conveyance of fake news can be seen as a very cheap and eminently effective method of influencing society. While the misleading content that makes up the fake news mostly appears in written forms, due to the rapid development of technology, fake pictures and audiovisual content are also being increasingly created and spread, and these are the most powerful formats for influencing individuals (Klein and Tóth 2020). A brand new type of crime, termed epidemic crime, has emerged in recent months, and is related to the SARS-coV pandemic. Promising effective disinfection and cures against the virus, swindlers, ring bells, and fraudsters have popped up selling better health solutions on the internet, while cons have also sprung up, such as trading non-existent masks. The situation has become so widespread that epidemic crime has entered the public consciousness as a relatively new type of crime, where crooks and swindlers, try to obtain people's money in relation to the corona virus. The police try to call the public's attention to the fraudsters, while the fraudster's seek to grab the opportunity to profit from the chaotic and crisis situation caused by the pandemic. They may even do so by pretending to be hospital staff, and by referring to an infected family member who requires money for medical treatment. Coronavirus-related scams have become widespread, such as the ruse where a person receives an email supposedly from a national or world organisation, together with false but seemingly credible statements, in order to trick the person into revealing their passwords and codes needed for purchasing items, or tricking them into opening an infected file that secretly installs phishing software.

These criminals utilise fear and anxiety, emotions that the coronavirus have raised to new levels not only in ourselves, but especially in those who take care of their loved ones.

Peddlers are not legally entitled to trade in disinfectants, masks, medicines, and hand sanitisers at all, and many authorities draw attention to the jeopardy of buying from unverified websites or even inputting personal particulars and data related to bank accounts due to the risk of phishing or theft. Expensive remedies and miracle cures for the coronavirus have propagated on the internet with vast sums of money generated for fraudsters.

2. Deepfakes and Fake News

Fake news is the most widespread on online platforms. It is typically less recognisable in electronic media, and for this reason, it is here it is the most destructive, since, the "receiver", i.e. the reader, does not have the capability of supervising the reality of the read and seen material. Behind the fake news, diverse motivations can exist, which may be economic, political, or might serve private interests. Considering manipulative devices, deepfakes and fake news materials are highlighted as particular concerns due to the damage they can cause. Deepfake can involve cases like a picture being made of the person in question, or their voice, which is then adjusted in a video or picture with the contribution of artificial intelligence, often depicting them in a compromising position to shame or blackmail them (Nyitrai and Rucska 2020, 1–8).

2.1. The concept of fake news

Fake news, or disinformation, has become more and more popular in recent years (Fehér and Király 2017, 39). Under the umbrella term of fake news, we generally mean false and sham news. (Topszótár 2020) Fake news can be considered a weapon for raging information warfare, either against the governance of internal procedures or for the disruption of international or foreign connections.

2.2. The concept of deep fake

In the deepfakes, deep-learning can be said to meet fake news (Biztosításinfo 2021). The term deepfake is derived from the postings of a Reddit user from 2017, and the concept was created to reflect the juxtaposition of deep-learning and faking. Deep-learning suggests that videos of this kind are created using artificial intelligence by providing information to an algorithm that works with a machine-learning method. (Deepfake 2020).

Fake news, deepfake news, and fake videos can bias political elections as well even the future itself, since, they can alter political view points and the decisions of the electorates, and as a consequence, they can be used to manipulate situations, both internal and related to foreign policies as well.

With the help of deepfake technology, a person's face, voice, and even movement can be reproduced, such as by the following methods:

- the substitution of faces
- the reanimation of faces
- removing diverse details
- creating fictitious faces. (Deepfake 2021)

Reuters has called attention to the following aspects to help recognise this appalling phenomenon:

- the picture and voice may not be in perfect synchrony
- the movement of the speaker's mouth is unnatural

– there may be unusual pixel patterns at the edge of people or objects
– the speakers' face is unnaturally motionless
– the subject never blinks, or blinks unnaturally
– the eyes of the speaker are blunt. (Deepfake 2021)

The essence of deepfake videos is their ability to convey any content on behalf of anyone, and the ability to transfer anyone into any audiovisual situation through the illegal use of their image or voice. (Kamuvideok 2021)

Currently around 96 % (Arccserélés 2020) of the content involving replacing faces is pornography based, i.e. revenge porn, usually created by algorithms used for manipulating recordings. The principal objective of revenge porn is humiliation, and to hurt someone or possible blackmail some, by placing them in an awkward situation in public (Sorbán 2020, 84).

As far as the phenomenon of deepfakes is concerned, there is no direct criminal law sanction behind it in many countries, yet, even in those places, it may still indirectly represent a perpetration, such as menacing with public danger or scaremongering.

The spreading of fake news and scaremongering, and indeed menacing with public danger, has undoubtedly increased during the corona virus in many countries, including in our country (Hungary), with thousands of news items appearing in the electronic media with the aim to mislead people, and subsequently, to abet the crime of scare mongering among the public and the perpetration of other crimes as well, especially theft and fraud.

If we analyse Hungarian statistics regarding crime rates, in respect of the registered crimes, there have been 212 cases of menacing with public danger since 2018 (until 03/02/2021), whereas scare mongering happened only on 4 occasions during the observed period (Figure 1). (ENyÜBS 2020)

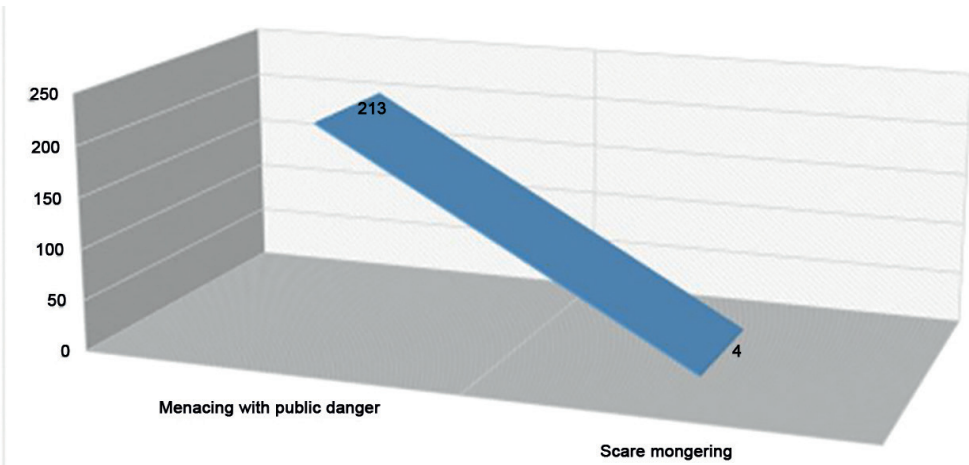

Figure 1. The number of registered crimes (Source: Bsr 2021)

The statistical data can also be analysed in respect of age group and sex of the offenders. Of the 213 cases of menacing with public danger, 193 involved male offend-

ers, as opposed to 19 females. Interestingly, scare mongering was solely perpetrated by male offenders in the observed period (Figure 2).

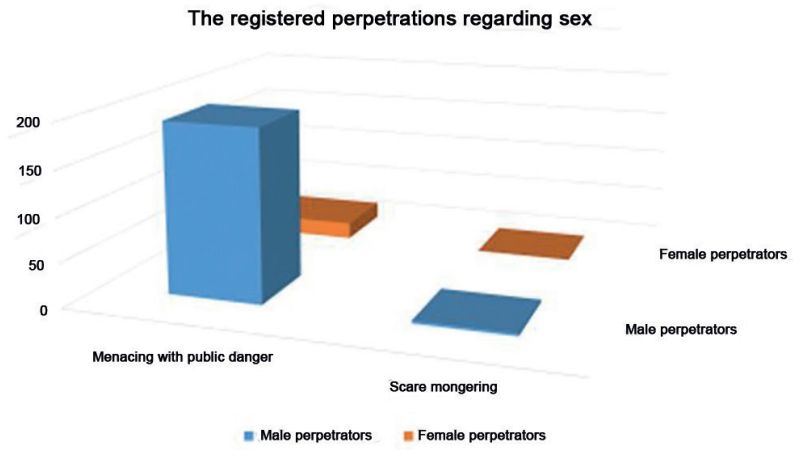

Figure 2. The registered perpetrations regarding sex (Source: Bsr 2021)

Crimes committed under the label of menacing with public danger (as a characteristic of the commission of the crime) include false allegations, rumours, and pretence (Figure 3).

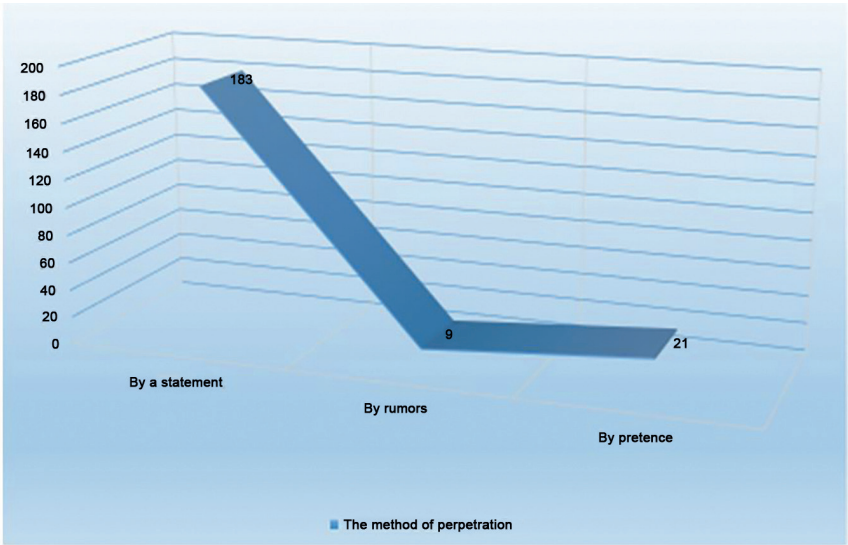

Figure 3. The method of perpetration (Source: Bsr 2021)

While scare mongering also includes making false allegations or spreading rumours that are known to be a false allegation (ENyÜBS 2020) (Figure 4).

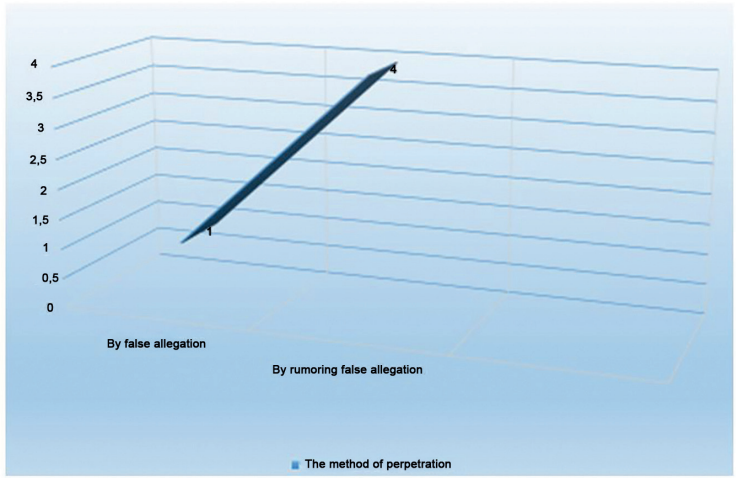

Figure 4. The method of perpetration (Source: Bsr 2021)

We can analyse the perpetrators of the crimes by age group, as illustrated in the figure below (Figure 5).

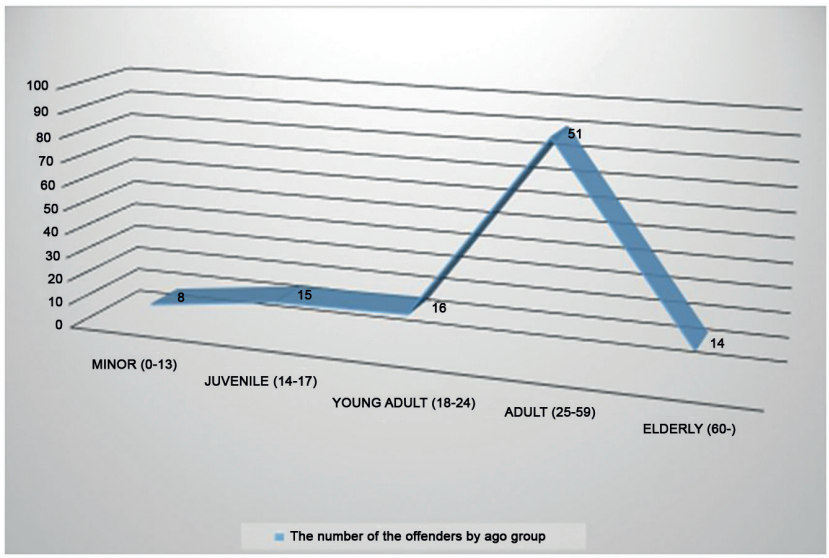

*Figure 5.*The number of the offenders by age group (Sourrce: Bsr 2021)

In the wake of the Covid Sars 19 pandemic, several “click bait” editors of websites, creating fake news have been caught by the Hungarian police, who initiated a

major investigation in connection with suspicions of menacing with public danger by unknown perpetrators, after concerns that several news items had been issued incorrectly on websites with fake news designed to alarm the public, reporting false stories like: “More people have been infected by the corona virus in Hungary, than in other countries”, and “Many people collapsed and died at the railway stations of the city, due to the infection of the virus”. The investigators established that the same members of a network, derived from dozens of fake platforms, shared articles based on currently popular topics but with incorrect statements. They used topics with content designed to disturb the public order, and moreover, they highlighted the articles by using “click bait” headlines, in order to gain more and more users and shares – sometimes more than 100,000 users, as was revealed by the investigation. The intention of the editors of the webpages was to spread the fake news to more widespread circles, so that they could benefit by a greater number of clicks, and hence they could generate more income from the advertisements. (Fake news 2020)

As the number of websites increased due to the COVID-19 pandemic, the number of fake news simultaneously rose as well. Fake news about ‘healing’ methods and ‘effective precautionary’ measures also spread. Experienced cybercriminals also transferred disinformation with fake news, with the ultimate objective always being to gain more profit. The following table 1. graphically shows how fake news can endanger civilians’ lives, especially during the pandemic. It also shows how the information chain, regarding fake products, services, and healing methods, could be broken by straining out fake news, and by avoiding sharing the links to fake news. (Europol 2020)

Table 1. Fake News
(Source: Europol 2020)

These phenomena carry criminal risks as well; therefore, the authorities responsible for the investigations should elaborate a relatively new methodological guidance for the Police.

Fake news can either be paper based, or digital, but nowadays the latter is more typical. Persons, with unknown identity, leave linguistic fingerprints with their documents, i.e. incriminating text, which may reveal the language usage of the perpetrator. With the contribution of forensic linguistics, the circle of the suspects can be narrowed, which provides facilities for following the versions, and embarking on criminal procedures. Therefore, in the following part, we discuss the significance of linguistic fingerprints and forensic linguistics.

3. Linguistic Fingerprints and their Contribution to Investigations

Is it possible to tell whether a text was written by a female or a male, or how old he/she could be, or what his/her occupation might be? Over recent decades, more and more researchers have sought the answers to the above questions, primarily because of the application of criminalistics in connection with anonymous letters, blogs, cites, chats, leaflets, and hate speech used in crimes[1]. In the era of the computer and the internet, any author can easily hide behind the walls of anonymity (Hugyecz 2011). On social media, umpteen written documents and electronic data are created daily. No wonder that the authorities utilise the indispensable toolkit of online databases, comprising social media, like Facebook, and other sites for combating crime (Nyitrai 2018, 108–121). The screening and research work elaborated in databases is called "screen investigation", and the digital data derived from it can bear fruit concerning the effectiveness of investigations (Nyitrai 2015a, 1–24). The pieces of information derived and analysed from files contribute to the mapping of the perpetrator or the circles of the perpetrators (Nyitrai 2014, 217–224). The task of the forensic linguistics is the analysis of the linguistic evidence of crimes. The most important questions that the authority seeks answers to are usually the following: Who committed the crime, or who wrote the text?[2] Forensic linguistics is the most applied field in studies of the language of legal processes, and usually covers two tasks: the analysis of linguistic evidence, and the detection of the perpetrators of linguistic crimes, such as threatening, bribery, abetting, requesting sexual services, blackmailing, verbal harassment, and hate speech. The basic task of the forensic linguistic is analysis of the linguistic evidence (Ürmösné 2019, 65). As regards suicide notes, the fact that these texts are not created in a traditional language environment, but are created before death should be taken into consideration. In such cases, the assertion of foul play or whether the style in the suicide note is identical to previous writings by the deceased is crucial. The objective during the textual analysis of suicide notes is the revelation of any peculiarities in the content, structure, and

[1] Linguistic profiling may also play a substantial role during border inspection, and the identification of the nationality of persons illegally crossing the border. (Varga and Borszéki 2014, 286; Borszéki 2016, 190.)

[2] Basic principles, as revealed by linguistic profiling, reflect similarities with the geographical profiles in many cases. Perpetrators have certain characteristic features that can barely be concealed, such as linguistic peculiarities, and the persistence of the location of the perpetrator. For more, see Mátyás 2020.

style, and as a consequence, the analysis can disclose: whom does the suicide note target (addressing), what content elements is it composed of, and how long is it. It is also vital to understand what the standard of the rhetoric and orthography is. This so-called specific profiling may assist the reconnaissance in some cases, whereby the profiler seeks to answer the question about "what kind of", i.e. what kind of the offender can this be (Nyitrai 2015b, 141–147).

The advances in modern technology have opened brand new spaces for perpetrators: anonymous letters may be conveyed via email or SMS, the victim, might be known on social media, or in a chat room, moreover, the perpetrator can blog, or create a website (Hugyecz 2011). The objective with regards to the suspect, in all cases, comprises the reconnaissance of the perpetrator of the crime, or proving the innocence or amassing evidence of their guilt. Our linguistic fingerprints can also convey messages and provide evidence in respect of the questions: who could be the perpetrator, who could have written the letter, whose voice could be heard on the tape recording. In other words word, the linguist expert also profiles the age, sex, ethnicity, and other attributes of the perpetrator (Szegedi 2013, 17).

Only a few people know what role linguists might play when an investigation gets stuck at a certain point, and when the investigative authority requires an assessment of authorship, voice recognition, text analysis, the disclosure of linguistic evidence, text comparison, or the profiling of the offender. In other words, the tracing of the delinquent and finding evidence of the suspect's innocence or guilt are the principal objectives of the collaboration between the authority and the linguist experts.

Forensic linguist experts also encounter obstacles in most cases and few are straightforward. It is rather difficult, for instance, to analyse tweets in Twitter, where only a fixed number of characters can be typed. The source of any mistake may derive from the interference of languages and language varieties concerning the delinquent's written and oral competences. In most cases, the writer's mother tongue affects their use of foreign languages, and the primary, dominant language variety affects other language varieties, yet, a so-called backflash interference also exists (Szegedi 2013, 57). The quality and the quantity of any mistakes depend on the language socialisation and the literacy of the author, and as a consequence, we might obtain useful pieces of information concerning the above-mentioned factors (Fobbe 2011, 143–176). When determining the perpetrator's age, the fact that the sociocultural environment can influence language use may cause problems. The language use of village dwellers, for instance, is more archaic, and as a consequence, the author may seem older than in reality (Szegedi 2012, 64). Notwithstanding the fact that in the digital age the author of a text can seemingly preserve their anonymity (Hugyecz 2011), linguists may also assist the work of the authority, even in cases where the offender does not put pen to paper, and instead sits down in front of a computer.

3.1. Case studies involving a study of linguistic fingerprints

Robert Leonard and James Fitzgerald are distinguished linguistic experts, whose most famous case was the *Coleman* case. Chris Coleman, was a father of two, who mentioned to his friends first, in 2009, that he usually receives threatening letters

from an unknown person. The target of the threats was himself, and these became more and more aggressive over time, and even included threats against other family members, all made by an unknown person. Therefore, Coleman asked his neighbour, who worked as a policemen, to set up a camera in the vicinity of the house, so that he might see if any suspicious or unusual event took place in the neighbourhood. Allegedly, the husband called his wife, during his training in a gym, but she did not answer the phone. Coleman was "frightened" that something had happened to her; therefore, he asked his policeman neighbour to look around the house, who subsequently found the strangled wife of Coleman, and the kids. The following graffiti was written on the wall: "U have paid!". The police suspected Coleman first, but they did not have any direct evidence against him. After two linguist experts became involved in the investigation, they assessed that the writing style of Coleman and the murderer were similar. The usage of "U" is basically used in short messages, and SMS, but it less typical in emails. However, both the murderer and Coleman used "U" in emails; furthermore, Coleman usually omitted the apostrophe in contractions, such as "doesnt'" and "cant'", just as the delinquent did, which arose more suspicion. After revealing more evidence from a linguistic point of view against him, a case was built up against Coleman, who was eventually sentenced to triple life.

In another case, the police were investigating the murder of Jenny Nicholle, when a forensic linguist was also recruited to assist the work of the authority by analysing a number of messages related to the case. The investigations put suspicion on David Hodgons as the murderer. The linguistic expert analysed the style of both Jenny's previous SMS messages, and SMS messages that had supposedly been sent by Jenny but which the police suspected had been sent by the murdered after Jenny had went missing. During the forensic linguist expert's analysis, it was disclosed, that the latter messages differed from her usual style. Jenny, for instance, used 'my" and "myself" correctly in her messages, whereas in her last messages, she wrote "me" and "meself" instead of the previous correct ones, which mostly characterise a Yorkshire dialect. Helped by this evidence, David Hodgons was convicted by the court, but Jenny's corpse was never found. (Crimes 2008)

In 2008, in England, Christopher Birks's house was gutted by fire, and his wife died in the fire. Birks bravely asserted to the authorities how heroically he had saved his kids from the flames, while Amanda tragically died in the fire. When investigating the cause of the fire, the body of his wife was found lying in an unnatural position on the ground. It was also suspected, that the house fire was not by chance, therefore, an investigation was launched with the suspicion of arson to cover a homicide, and the husband became the main focus of suspicion. Not only did the position of the corpse was suspicion, but also the injuries showed, that Amanda had been dead well before the fire. On the day of her death, the wife sent several messages on her cell phone to her relatives, who became suspicious about the messages, since the messages contained many abbreviations, which was not characteristic of her usual messages. As Amanda's cell phone was burnt during the fire, the authorities had to gather the SMS messages, old and more recent, from the addressees as well. During the investigation, the forensic linguist Dr Tim Grant was asked to study the messages between Amanda and her husband. The professor examined 200–200 messages between the

couple. The expert compared the last messages of Amanda, to the previous ones, and noticed that after 12:38 on the day if the fire and her death, a great turning point happened, in which such abbreviations emerged, which had not been typical for the wife, i.e. instead of "just", someone used "jst", and instead of "don't", "dnt" was used. Appalling abbreviations like "dnt now", "2getha", "2think", and "4get" were also revealed. On the first day of his trial, Birk was faced with the evidence against him, according to which, he changed his confession, and pleaded guilty. (Grant 2013)

As we can learn from the above cases, everyone has a unique style, namely, an idiolect. Its roots are derived from the diversities of the individual competences, the various socialisation procedures, the social network of the individual, and the differentiation within certain social groups, which could all be analysed at every linguistic level (Fliegauf and Ránki 2007, 139). Peculiarity of phrasing does not just mean that certain "phrasing reveals the author" (Nagy 1980, 62) yet, it does indicates that all of our utterances and manifestations are the results of our linguistic toolkit, and their combinations (Bruner 2005, 27). This linguistic diversity is not only imbued in languages and language varieties, but it is presented in language use as well (Nagy 1980, 62). This selection is restricted to such an extent that a person creating a text can only choose from the familiar language forms acquired by them, and this restriction is associated with their age, sex, educational attainment, profession, and social class. It is an axiom that our language use adapts the speech situation (Hámori 2006, 157–187). Our utterances are diverse in formal and in informal situations: The choice of the text types depends on the quality of the channel, and the relationship of the participants, which are reflected by the speech accommodation theory in linguistics.

The improvement in linguistic techniques has been driven somewhat by the fact that most incriminating texts are not handwritten. Some decades ago, the usage of typewriter was common, whereas nowadays printers are used, or texts are transferred via email. In such cases, the competence of the graphologist is not enough, and as a consequence, only linguist experts can answer the emerging questions. Forensic linguistics has improved to a great extent throughout years, and it is definitely going to develop further to address the needs of the forthcoming technology landscape.

3.2. How can linguists assist revealing fake news?

The question can crop up: What can be done to indicate if the news that we glimpse is fake or not? Exaggerating, sensational titles; eye-catching, tabloid-style text; the correct or incorrect use of terms; fake URLs imitating real websites; expressive pictures often featuring celebrities; and the use of all caps, excessive punctuation, and spelling mistakes can all arouse suspicion (Veszelszki 2017). Persuasive strategies, references to apparently credible sources (lawyer friend, large company), pseudo-scientific evidence, offering money (XY pays you one dollar for each forwarded message), threatening with bad luck, an irresistible headline, an egregious picture, and a mysterious lead can all suggest fake news too (Veszelszki 2011). From a textological

point of view, the headline should deictically point at the text and metonymically represent it (Tolcsvai Nagy 2001, 327). The headlines try to shock, horrify, or scare the readers outright to trick them into clicking on the article. The use of T-form words, bold and capital letters and spelling mistakes may also cause ambiguity or misunderstanding. The overuse of punctuation marks and the use of all caps, and all the above-mentioned idiolects can also be suspicious.

The main characteristics of pseudoscience that can also be traced in fake news are the following:

- Anachronistic thinking (the formulation of such statements that have already been disproved by science)
- Searching for mysteries and secrets, like UFO-s, Yetis, spontaneous combustion
- Referring to myths (the older a tale is, the more persuasiveness it has)
- Negligent and selective treatment concerning the evidence (the article may refer to the evidence supporting its case and statements, but ignore the counterarguments)
- Irrefutable hypotheses
- Virtual similarities (the article uses parts of proved and accepted theories, but reinterprets and replaces them in a new context)
- Instead of explaining a phenomenon by facts, it uses scenarios (the facts are solely interpretations, as it reflects)
- Immunity against criticism (Casti 1990; Pigliucci 2010; see itemised: Veszelszki 2017; Veszelszki and Falyuna 2019).

Argumentative mistakes are frequent in pseudoscience texts as their content is unfounded and inconsistent. These texts refuse and ignore criticism and debate, and moreover, they use personalised dispute management strategies in themes like the flatness of the Earth, vaccine hesitancy, and parasites. In 1998, a British researcher published an article in which he proved that the MMR vaccine (measles, mumps and German measles) had direct causal link with autism. He accomplished his research with dubious methodology, with a limited number of samples, and excluding a control group. As a consequence, not only in Great Britain, but worldwide, the cases of mumps and measles began to increase significantly as people avoided the vaccine. Moreover, celebrity anti-vaxxers who were considered to be influencers also backed the movement, and the activities of Twitter trolls also strengthened the impact of the anti-vaccination movement (Broniatowski et al. 2018). The “mimicry of science” was created partially by reference to an experimental methodology together with the use of technical language and terminologies suited to medical science, and which could hardly be received by the laymen consumers. However, the statistical data were totally unverifiable, and above all, illustrious researchers were used to “convey” and “represent” the arguments.

4. Suggestions, Summary, and Future Perspectives

One of the negative results of the technical advancement of mass communication is the presence of the phenomena of deepfake and fake news, which can influence po-

litical decisions, or create negative publicity for the average civilian, as well as any organisation. These phenomena can cause several inconveniences, with irreversible and irredeemable harms recognised subsequently. Text analysis can be required for the identification of those who spread fake news, and as far as the published fake news is concerned, comparison and the detection of linguistic evidence are indispensable. Fake news can be easily filtered, according to Ágnes Veszelszky, who recommends the following ways to strain out potential fake news (Veszelszki 2017, 28):

- Look closely at the URL.
- Is the source reliable?
- Be sceptical of headlines. (Too itemised sensationalist headlines must be handled critically).
- Watch for unusual formatting.
- Check the photos. (If the images are not clearly authentic, such as in the case of missing persons, Google Image Search service can be useful).
- Check the author.
- Check the date.
- Check the evidence.
- Look at other reports.
- Overcome your prejudice.
- Check the linguistic quality and stylistic characteristics of the text.
- Is it not a joke? (Joke sites can be misleading).
- Some stories are intentionally false.
- Ask the experts.

We totally agree with the revelations and suggestions of Ágnes Veszelszki, since these options can contribute to greater clarity. The other solution is the use of so-called fact-check pages, which collect the currently spreading fake news and pseudoscientific views, and refute them with exact sources and evidence (Veszelszki and Falyuna 2019). Epistemic vigilance as an attribute may also help make a distinction between reliable and unreliable pieces of information, i.e. credible accounts vs gossip, false vs trustworthy sources. It is also indispensable to educate the media consumers and the media users (Veszelszki 2021, 93-105.)

As far as future perspectives and research are concerned, we tend to analyse more fake news cases, which we can suppose mushroomed during the 4th wave of the pandemic and the forthcoming Hungarian election. Such fake news may cause irredeemable harm, such as threatening, scare mongering, and causing psychological distress. Fake news regarding the outcome of the election may also cause political turmoil. People can be naive and easily misled, and they are naturally inclined to believe every news item they bump into; moreover they may share them with thousands of people via social media without investigating the validity and the reliability of the sources. For this reason, we decided to shed light and draw the attention to the jeopardies of fake news and the role of both forensic linguists and applied linguists, who can both contribute to the detection of fake news and the investigation of criminal cases.

References

Arccserelés. "Arccserélős tartalmak." Accessed January 04, 2020. https://corvinusonline.blog.hu/2020/05/15/_az_arccserelos_tartalmak_96_szazaleka_porno_hogyan_szurjuk_ki_a_manipulalt_videokat

Biztosításinfo. "Hét dolog, ami nagyot változtat jövőre az életünkön." Accessed January 1, 2021. https://www.biztositasinfo.hu/magazin/het-dolog-ami-nagyot-valtoztat-jovore-az-eletunkon/20181210-1700

Borszéki, Judit. Az angol szaknyelvi kompetenciák szerepe a határrendészeti szervek nemzetközi együttműködése megvalósításában, fejlesztésük lehetőségei (Doktori (PhD) értekezés). Budapest: Nemzeti Közszolgálati Egyetem Hadtudományi Doktori Iskola, 2016.

Broniatowski, David A., Amelia M. Jamison, Si Hua Qi, Lulwah Al Kulaib, Tao Chen, Adrian Benton, Sandra C. Quinn, and Mark Dredze. "Weaponized Health Communication: Twitter Bots and Russian Trolls Amplify the Vaccine Debate." *Am J Public Health* vol. 108, no. 10 (2018): 1378–1384. https://doi.org/10.2105/AJPH.2018.304567

Bruner, Jerome. *Valóságos elmék, lehetséges világok.* Budapest: Új Mandátum Könyvkiadó, 2005.

Bsr. "Bűnügyi Statisztika Rendszer." Accessed February 03, 2021. https://bsr.bm.hu/Document

Casti, J. L. *Verlust der Wahrheit: Streitfragen der Naturwissenschaften.* Munich: Droemer/Knaur, 1990.

Crimes. "Scines News." Accessed January 26, 2021. https://www.sciencedaily.com/releases/2008/09/080908073841.htm

Deepfake. "Ami ellen semmit nem tudsz tenni: deepfake-jelenségek a kampányokban." Accessed August 26, 2020. http://www.atv.hu/belfold/20200113-ami-ellen-semmit-nem-tudsz-tenni-deepfake-jelensegek-a-kampanyokban

Deepfake. "Mi az deepfake." Accessed January 04, 2021. https://www.urbanlegends.hu/2019/12/reuters-hogyan-ismerjuk-fel-a-deepfake-videokat/

ENyÜBS. "The number of crimes registered in criminal procedures, as regards the location of perpetration, based on the annual data of the second semester of 2018, and between 2019-2020, reflected by the ENyÜBS." Accessed February 03, 2021. https://enyubs.bm.hu 2021.02.03.

Europol. "Internet Organised crime threat assesment (IOCTA) 2020." Accessed February 03, 2021. https://www.europol.europa.eu/activities-services/main-reports/internet-organised-crime-threat-assessment-iocta-2020

Fake news. "Kattintásvadász címekkel operáló álhírgyáros weboldalak szerkesztőit számoltatták el a rendőrök." Accessed January 04, 2020. http://www.police.hu/hu/hirek-es-informaciok/legfrissebb-hireink/bunugyek/fake-news

Fehér, Katalin, and Olívia, Király. "Álhíresülés- a hamis hírek dinamikája a médiában." *Századég* 2. szám (2017): 39.

Fliegauf, Gergely, and Sára, Ránki. *Fogva tartott gondolatok.* Budapest: L'Harmattan. 2007.

Fobbe, Eilika. *Forensische Linguistik.* Tübingen: Narr Verlag, 2011.

Grant, Tim. “Method, consistency, and distinctiveness in the analysis of sms text messages.” Accessed January 26, 2021. https://publications.aston.ac.uk/id/eprint/40092/1/2013_Grant_TXT_4N6_Journal_of_Law_and_policy.pdf

Hámori, Ágnes. “A társalgási műfajokról.” In: *Szöveg* és *típus: szövegtipológiai tanulmányok,* edited by Gábor, Tolcsvai Nagy. Budapest: Tinta Könyvkiadó, 2006.

E-nyelv magazin. Hugyecz, Enikő Henriett. “Ki a szerző? – Avagy hogyan profiloznak a laikusok?” Accessed January 28, 2021. http://e-nyelvmagazin.hu/2011/08/31/ki-a-szerzo-%e2%80%93-avagy-hogyan-profiloznak-a-laikusok/, 2021.01.28

Kamuvideo. “Életek, amiket tönkretesz a deepfake.” Accessed January 04, 2021. https://divany.hu/vilagom/2019/09/22/deepfake/

Klein, Tamás, and András, Tóth. *Technológia jog - Robotjog – Cyberjog*. 2020. https://uj.jogtar.hu/#lbj109id159834593998182b2

Mátyás, Szabolcs. *Az elemző-értékelő munka gyakorlati aspektusai.* Budapest: Nemzeti Közszolgálati Egyetem Közigazgatási Továbbképzési Intézet, 2020.

Nagy, Ferenc. *Kriminalisztikai szövegnyelvészet*. Budapest: Akadémiai Kiadó, 1980.

Nyitrai, Endre. “Civilnyilvántartások a nyomozásban.” In: *Tanulmányok a “Biztonsági kockázatok - rendészeti válaszok” című tudományos konferenciáról. Pécsi Határőr Tudományos Közlemények XV.*, 217–224. Pécs: Magyar Hadtudományi Társaság, 2014. http://pecshor.hu/periodika/XV/nyitrai.pdf

Nyitrai, Endre. “Raster Investigation.” *Casopis Nauoa Ser Pravo*. Natsionalnyi Universytet Ostrozka Akademiya no. 11 (2015a) 1–24. https://lj.oa.edu.ua/articles/2015/n1/15eenrri.pdf

Nyitrai, Endre. “Bűnelemzés a nyomozásban.” In *Modernkori veszélyek rendészeti aspektusai, Pécsi Határőr Tudományos Közlemények XVI.,* 141-147. Pécs: Magyar Hadtudományi Társaság, 2015b. http://pecshor.hu/periodika/XVI/nyitrai.pdf

Nyitrai, Endre. “Az interoperabilitási e-nyomozás alapjai.” *Belügyi Szemle* no. 10 (2018):108–121. https://doi.org/10.38146/BSZ.2018.10.7

Nyitrai, Endre and András, Rucska. “Spread of ‘Fake News’ in the Present Days.” *Casopis Nauoa- Seria Pravo* no. 22 (2020): 1–8. https://lj.oa.edu.ua/articles/2020/n2/20enntpd.pdf

Pigliucci, Massimo. *Nonsense on Stilts. How to Tell Science from Bunk*. Chicago: University of Chicago Press, 2010.

Sorbán, Kinga. “A bosszúpornó és deepfake pornográfia büntetőjogi fenyegetettségének szükségességéről.” *Belügyi Szemle* no. 10 (2020): 84. https://doi.org/10.38146/BSZ.2020.10.4

Szegedi, Zoltán. “A kriminalisztikai nyelvészet lehetőségei elektronikus zsarolólevelek esetében.” In *Tanulmányok: Nyelvtudományi Doktori Iskola “Nyelv* és *társadalom” (Az I. doktorandusz-konferencia előadásai*, 2012. május 17-18.), 139-145. Budapest: Komáromi nyomda, 2013. https://dtk.tankonyvtar.hu/xmlui/bitstream/handle/123456789/5848/tanulmanyok_05.pdf?sequence=1&isAllowed=y

Szegedi, Zoltán. "A nyelvhasználat tudatos torzításának figyelembevétele nyelvi profilalkotás során." In *Félúton 8*, edited by Fanni, Drávucz, Helga Anna, Haindrich, Krisztina, Horváth, and Fanni, Karácsony, 63-71. Budapest: ELTE BTK Nyelvtudományi Doktori Iskola, 2013. https://edit.elte.hu/xmlui/handle/10831/20728?show=full

Tolcsvai Nagy, Gábor. *A magyar nyelv szövegtana.* Budapest: Nemzeti Tankönyv Kiadó, 2001.

Topszótár. "Fake News." Accessed August 25, 2020. https://topszotar.hu/angolmagyar/fake+news

Ürmösné Simon, Gabriella. "Miben segítik a nyelvi ujjnyomok a nyomozást?" *Magyar rendészet* 1. szám (2019): 65. https://doi.org/10.32577/mr.2019.1.4

Varga, János, and Judit, Borszéki. "Intelligens határok." *Hadtudományi Szemle* 7. szám (2014): 278–288. http://epa.oszk.hu/02400/02463/00022/pdf/EPA02463_hadtudomanyi_szemle_2014_01_278-288.pdf

Veszelszki, Ágnes. "Lájkolom! A Facebook-folklórról." In *Klárisok: Tanulmánykötet Korompay Klára tiszteletére*, edited by Gábor, Csiszár and Anikó, Darvas, 379–390. Budapest: ELTE, Magyar Nyelvtörténeti, Szociolingvisztikai, Dialektológiai Tanszék, 2011.

Veszelszki, Ágnes. "Linguistic and Non-Linguistic Elements in Detecting (Hungarian) Fake News." *Acta Universitas Sapientiae* Communicatio 4 (2017): 7–35. https://doi.org/10.1515/auscom-2017-0001

Veszelszki, Ágnes and Nóra, Falyuna. "Az áltudományosság leleplezése érveléstechnikai-nyelvészeti eszközökkel." *Médiakutató: Médiaelméleti folyóirat* no. 20 (2019): 39-51. https://www.mediakutato.hu/cikk/2019_03_osz/03_az_altudomanyossag_leleplezese.pdf

Veszelszki, Ágnes. "deepFAKEnews: Az információmanipuláció új módszerei." In: *Digit*ális *kommunikáció* és *tudatosság*, edited by László, Balázs. Budapest: Hungarovox Kiadó, 2021.

Wiggen, Johannes. "The Impact of COVID-19 on cyber crime and state-sponsored cyber activities." *Konrad Adenauer Stiftung* no. 391 (2020): 2.