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Empirical Studies of Russian–Ukrainian War Related Fake News, Part 3⁵

Abstract

The Russian–Ukrainian war, which broke out on 24 February 2022, resulted in several paradigm shifts in cyber warfare. One aspect of these changes is psychological operations. Russia and Ukraine have conducted extensive psychological operations campaigns to fulfil their war objectives, which have since been intense along modified objectives. This series of studies examines the impact of war-related fake news through various empirical research. In the first part of the paper, the authors examine the emergence of psychological operations and related terms in the international academic literature using network analysis methodology. In the second part of the paper, the authors use sentiment and network analysis to investigate the spread of different fake news. In the third study, the authors measure the attitudes toward the perception of the Hungarian Defence Forces from the perspective of the war in the neighbouring country.

Keywords: Russian–Ukrainian war, PSYOPS, cyberwarfare, network analysis, sentiment analysis

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Introduction

“In a volatile world, making Hungary secure and successful in the long run requires the efforts and cooperation of the nation as a whole, including the preservation of the Hungarian language and culture – both within and beyond our borders” states the National Security Strategy of Hungary. A Secure Hungary in a Volatile World in 2020.⁶ Of course, a significant part of this task falls to law enforcement agencies and the Hungarian Defence Forces (hereinafter referred to as HDF). National security relies strongly on the security of the world. As we have seen in the past years, a conflict in the Middle East could very easily spread to Europe as an immigration disaster. Hungary, as a Schengen border nation, is in a challenging position. While securing our borders and enforcing legal entry requirements to Hungary and, by extension, Europe is essential in ensuring national security, we cannot overlook the fact that our safety is intrinsically linked to the safety of others. When others are secure, crises are less likely to spill over to us, making global peace essential for our protection.

Notably, although wars have steadily declined since World War II, becoming historically unprecedentedly rare now, hybrid warfare is a significant threat to national security. Moreover, this has been accompanied by a rise in the number of conflicts below the threshold of war and the number of frozen conflicts. Table 1 presents the status quo of frozen conflicts around Europe, allowing us to note how frozen conflicts surround us.

Table 1: The status quo of “frozen conflicts” in 2024

	Azerbaijan	Moldova	Georgia	Ukraine
Type of conflict	Frozen conflict	Frozen conflict	Frozen conflict(s)	“Hot war”
Status-quo	Solved	Frozen	Frozen	Ongoing
Russian military presence	Temporary	Weakened	Stable	Attacking
EU peace-oriented involvement	None	Trade facilitation	Administrative border monitoring	Multidimensional military aid

Source: Cenuša 2024

The situation remains worrying at the global level. Between 1946 and 2011, there were 42 cases of frozen conflicts.⁷ Some of these frozen conflicts have been ongoing for such a long time (to give some examples: India–Pakistan, Egypt–Israel, North Korea – South Korea) that we can assume – without outside assistance or significant changes in government and social structure – they might be permanent.

⁶ The Government of Hungary 2020.

⁷ KLOSEK et al. 2021: 849.

One of the reasons of this rise in the number of frozen conflicts is caused by the increasing complexity of global affairs, leading to more unexpected events, both in terms of sudden weather changes triggered by global warming and the actions of some actors in international politics. For example, Russia's unexpected annexation of Crimea in 2014 and the Russian–Ukrainian war, which started as a hybrid conflict and escalated into an all-out war in 2022, will be a prolonged conflict, even if a peace agreement officially ends the war. After that, international peacekeeping forces will likely be required in Ukraine as independent observers and to prevent further conflict escalation. It is also more practical for an independent actor to coordinate the international community's assistance in the reconstruction process to maximise the efficient use of resources. In addition, in connection with the threat of hybrid warfare, we must emphasise that public support is a critical element of the defence against hybrid warfare in the current era.

Before continuing from this perspective, we must shift our attention towards cyberspace. At a time of post-truth, does it make sense to ask people's opinions? The essence of the post-truth "syndrome" is that instead of facts and logic, people make decisions based on the emotions aroused by a given topic or event, leaving a wide margin for manipulation. In cyberspace, it is increasingly filled and divided by accelerating information bubbles; how useful and possible is it to get an accurate picture of what the general public thinks?

Ordinary citizens are likely to inform themselves about the HDF's activities mainly on the internet, so the perception of the HDF and peacekeeping operations can be very diverse due to the different credibility of websites. Depending on the information bubble in which they "stay" in cyberspace, they may be more supportive, more averse to the topic, or not concerned about it at all, thus adopting a neutral attitude.

Our research aims to establish and support with empirical data the current level of public support and trust in the HDF and its capabilities to defend Hungary. Additionally, it examines public opinion on our NATO membership and the potential expansion of NATO.

The last public survey regarding public trust in the HDF was collected during the 2016 Microcensus of the Hungarian Central Statistical Office, which has taken place in October of 2016. The census took place in 2,148 municipalities across the country at approximately 440,000 addresses, sampling around 10% of the Hungarian households.⁸ In 2018 Attila Rácz published his article about the results; at that time the HDF enjoyed a medium level of public trust, on the scale of 0 (totally untrusted) to 10 (fully trusted), the average trust level was 5.44.⁹

We believe that the 2015 migration crisis, the Covid–19 epidemic period, and the war fought in Ukraine will significantly increase the HDF's prestige among the population in general. The Zrínyi Defence and Force Development Programme started in 2017, the aim of which is the general modernisation of the whole HDF, bringing it to the standard of a modern 21st century army, and the related equipment purchases

⁸ Central Statistical Office of Hungary 2016.

⁹ Rácz 2018: 4–9.

will contribute to this cause, as well. In addition, the HDF's more active use of social media will also support this trend.

Disinformation has always been part of war; this is also true for the Russian–Ukrainian war. There have been some disinformation campaigns regarding Hungary as well, the most memorable is perhaps the rumour that Putin offered Transcarpathia for Orbán's support. This alleged offer was never confirmed by reliable sources and was denied by Putin himself in the Tucker Carlson interview.¹⁰

There has been no major HDF-related disinformation campaign in this war, the Russian narrative targets the political leaders of Hungary and the unity of the alliances standing against them (in their narrative), the EU and NATO. If we browse the EUvsDisinfo Project, no HDF related news exist. We think that one sign to look for in the future is whether there will be a disinformation campaign attempting one of the following: discrediting the HDF, increasing the tension between the political and military leadership, or undermine the social recognition of soldiers.

In the everyday news, the HDF is mainly mentioned in three contexts: new military hardware arrived because of the ongoing Zrínyi Defence and Force Development Programme; HDF has rebuild a capability long lost or added a new modern one; HDF is successful in a peacekeeping mission. We wanted to gauge the level of engagement among the Hungarian population. We collected all active HDF missions and used SentiOne to measure online engagement and sentiments.

Based on a comprehensive review of the existing literature, we identified and formulated the key hypotheses guiding our research:

H1: The awareness level of the HDF-related news is a deciding factor in the population when it comes to sentiments regarding: a) the HDF's capabilities to defend Hungary on its own; b) defending together with allied forces; c) the support of Hungary's NATO membership and; d) the support on the expansion of NATO.

H2: The Hungarian people's public preference for crisis management type varies by demographic factors such as age, gender, or education level.

H3: The socioeconomic background has an impact on the individuals' views regarding the question if NATO membership or the expansion of NATO lies in the interest of Hungary.

Methods

Our research is structured in two parts. First, we conducted sentiment analysis using the SentiOne social media listening platform. We analysed the online content concerning the HDF's missionary engagement based on keywords. A message, tweet, etc., can be classified into three categories based on sentiment value: positive, neutral and hostile.

In the second part of our study series, we explained in detail the methodology used by the SentiOne platform, so we will not repeat it here but briefly summarise it. SentiOne (sentione.com) is a content-based web analytics platform that covers and

¹⁰ CARLSON 2024.

recognises 70 languages all across the globe. It crawls and analyses content presented and perceived in social media and other online channels. The SentiOne monitoring tool currently monitors over 20,000,000,000 mentions and gathers data from 8 different types of sources, namely portals, blogs, Twitter, Facebook, Instagram, video, forums and review sites. The mentions are divided into statements and articles, automatically classified as positive, neutral, or negative using SentiOne's unique, proprietary algorithm. The interactive platform is built upon user-provided keywords and key phrases to look for the specific mentions that, either in themselves or within their context, contain those pre-given phrases that interest the user. The system gathers data in almost real time yet has a memory that can go back up to 3 years. For quantitative research, data is structured by different focus points and research parameters and is visualised interactively. This technology also supports qualitative research, enabling in-depth analysis and categorisation of all the indexed web content.

Our second method was publishing a questionnaire survey. It was based on the one compiled in Fang and Sun's 2019 article *Gauging Chinese Public Support for China's Role in Peacekeeping*¹¹ translated into Hungarian and removing Chinese specificities. We also changed some questions and added new ones to reflect the Hungarian social and geographical circumstances. The response to the questions was based on a 5-point Likert scale, which is a psychometric scale commonly used in research to measure attitudes, perceptions, or subjective evaluations. It is a structured ordinal scale designed to capture a respondent's attitude or opinion by providing a range of fixed-choice responses. The scale generally includes five points, with levels of agreement ranging from 'completely disagree' (1) to 'completely agree' (5), often including a neutral midpoint ('Neither Agree nor Disagree'). This scale quantifies subjective data, facilitating statistical comparison and analysis. The questionnaire also included the respondents' socioeconomic and demographic data. The data obtained from the questionnaire were processed by statistical analysis using the Python libraries *scipy.stats*¹² and *scikit-posthocs*.¹³ For data handling we used the *pandas* library.¹⁴

The data collection period was from 11 March 2023 to 11 April 2023. We received 116 responses to our questionnaire; one record was removed during the cleaning up process. The remaining sample of 115 was analysed. It is important to acknowledge that our dataset is not representative of the entire Hungarian population, particularly with respect to age distribution and educational attainment, which we consider the most critical factors. Consequently, the results obtained from our analysis should not be generalised to the broader population, as a substantially larger, more diverse sample would be required for such extrapolation. Therefore, the findings presented are applicable solely to the respondents of this specific questionnaire and should be interpreted with caution in this context.

¹¹ FANG–SUN 2019.

¹² Part of the broader SciPy library, *scipy.stats* is a module focused on providing a wide array of statistical functions, tests and probability distributions.

¹³ A specialised library designed for performing post-hoc tests after non-parametric statistical tests like Kruskal–Wallis. It fills a gap left by *scipy.stats*, which does not offer built-in post-hoc test functionality.

¹⁴ *Pandas* is a highly popular open-source data analysis and manipulation library for Python. It provides flexible and powerful data structures for efficient management of structured data, such as time series, tables and matrices.

Another limitation of this study is that the responses were collected through self-reported questionnaires, which may introduce a form of bias known as response bias. This bias occurs when respondents do not provide entirely accurate answers due to factors such as social desirability, recall issues, or the desire to conform to perceived norms. As a result, the validity of the findings may be affected by the inherent inaccuracies in self-reported data.¹⁵

The Kruskal–Wallis H test is a rank-based non-parametric test that can determine whether there are statistically significant differences between two or more groups of an independent variable for a continuous or ordinal dependent variable. It is considered a non-parametric alternative to one-way ANOVA and is an extension of the Mann–Whitney U test that allows comparisons between more than two independent groups. For example, it can be used to understand whether attitudes about a workplace problem – where attitudes are measured on an ordinal scale – differ by job position. The Kruskal–Wallis H test is an omnibus test statistic that cannot tell which specific groups of its independent variable are statistically significantly different; it can only tell whether at least two groups are different.¹⁶

Dunn's test is a post-hoc test used after a Kruskal–Wallis H test to determine which specific groups differ from each other. It performs pairwise comparisons and calculates a Z test statistic to show statistically significant differences between groups. To control the family-wise error rate (which increases with multiple comparisons), adjustments like Bonferroni or Sidak can be applied to the p values. We used the Bonferroni correction and calculated the results using Python's scikit-posthocs¹⁷ library.¹⁸

The chi-square test is a non-parametric statistical method employed to evaluate the presence of a statistically significant association between categorical variables. It assesses whether the observed frequency distribution deviates from the expected distribution under the assumption of independence. This test is widely utilised in hypothesis testing to examine the independence of two categorical variables or to determine the goodness of fit between empirical data and a theoretical model.¹⁹

Mann–Whitney U test, as a non-parametric test, is designed to analyse data without assuming a specific distribution. It is particularly useful when: sample sizes are small, data is ordinal, can analyse ranked variables. Another of its advantages is that it does not require data to follow a normal distribution.²⁰

¹⁵ FURNHAM 1986: 1–2.

¹⁶ KRUSKAL–WALLIS 1952.

¹⁷ The scikit-posthocs library is a Python package designed for performing multiple post-hoc tests after non-parametric statistical tests like the Kruskal–Wallis test. It supports various tests such as Dunn's test, Conover's test, and the Nemenyi test. Additionally, it offers several methods for correcting p values for multiple comparisons, such as the Bonferroni correction.

¹⁸ DUNN 1964.

¹⁹ The University of Utah s. a.

²⁰ MANN–WHITNEY 1947.

Results

Using the SentiOne social media monitoring platform, we examined the posts on each social media platform about missions with Hungarian participation, using the shortened or full English names of the missions as keywords. Since SentiOne can estimate the language of a given piece of content with 99% accuracy, we used this data instead of the much less reliable country/position, which SentiOne can only estimate without this information. The sentiment value was calculated using an appropriate Excel function for Hungarian content. The results are summarised in Table 2. A topic's sentiment can be harmful, neutral, or positive. A lack of sentiment gives an empty result, as shown in Table 2.

Table 2: Sentiment values of Hungarian peacekeeping missions

Mission	Negative	Neutral	Positive	Empty	Summary
EUFOR-Althea	3	5	0	65	73
EUMM	17	41	4	49	111
EUNAV-FOR-IRINI	0	7	1	5	13
EUTM-MALI	11	42	3	49	105
KFOR	2,501	9,720	1,527	2,602	16,350
MINURSO	1	8	0	15	24
International Coalition (Iraq)	0	0	0	0	0
NMI	0	1	0	5	6
UNFYCIP	0	1	0	5	6
UNIFIL	38	201	18	223	480
Overall	2,571	10,026	1,553	3,018	17,168

Source: compiled by the authors based on SentiOne

Perhaps unsurprisingly, the KFOR mission, as the most significant (and probably the best-known) peacekeeping mission, has the most hits. Altogether, the various missions show slightly negative perceptions where there is enough data available to make it worthwhile to look at. Only one entry with at least 100 records is worth examining, and there are only 4.

Overall, the Hungarian social media sentiment toward Hungarian peacekeeping missions was neutral. Around 58.3% of the sentiment showed neutral feelings towards missions; this means people or other sources talked about the missions in a factual, empirical way. However, if we compare the negative and positive sentiments, the negatives exceeded the positive views.

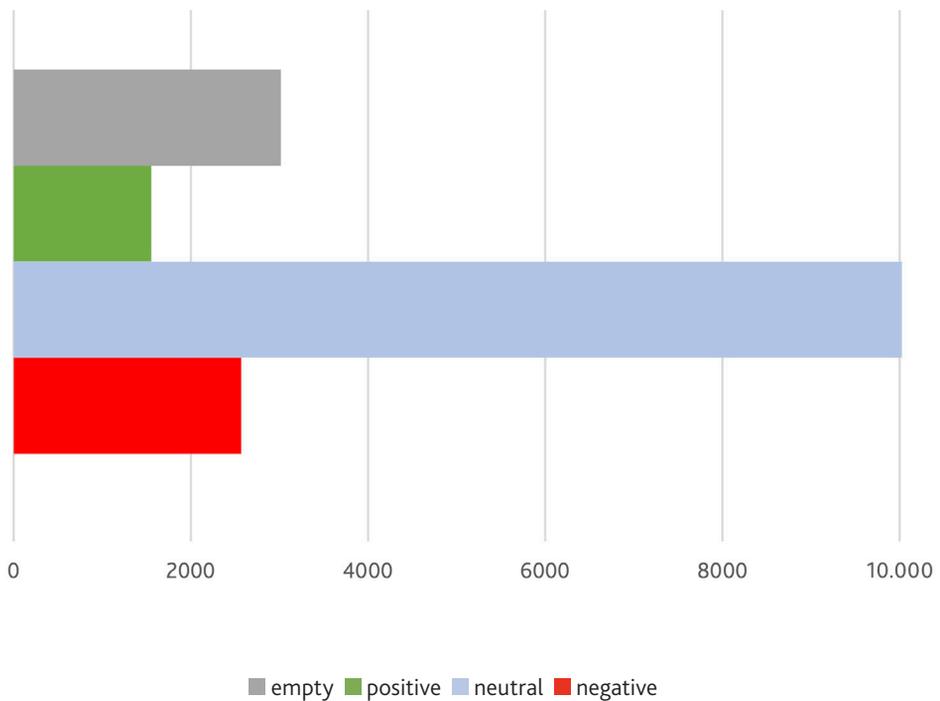


Figure 1: The share of sentiment values of Hungarian peacekeeping missions

Source: compiled by the authors based on SentiOne

As seen in Figure 1, neutral sentiment overwhelmingly dominates, with minimal positive feedback and a noticeable negative sentiment. As mentioned earlier, we suspect that a high amount of neutral sentiment can be noted toward factual reporting, where users share stories in a non-emotional reporting manner. SentiOne is capable to browse three years of data, so if we take into account this long timespan and the lack of engagement, we can see that there is room for improvement from the HDF's side to get closer to the Hungarian population.

H1: The awareness level of the HDF-related news is a deciding factor in the population when it comes to sentiments regarding: a) the HDF's capabilities to defend Hungary on its own; b) defending together with allied forces; c) the support of Hungary's NATO membership and; d) the support on the expansion of NATO.

If we visualise answers on the grouping variable "awareness level", the results can be seen in Figure 2.

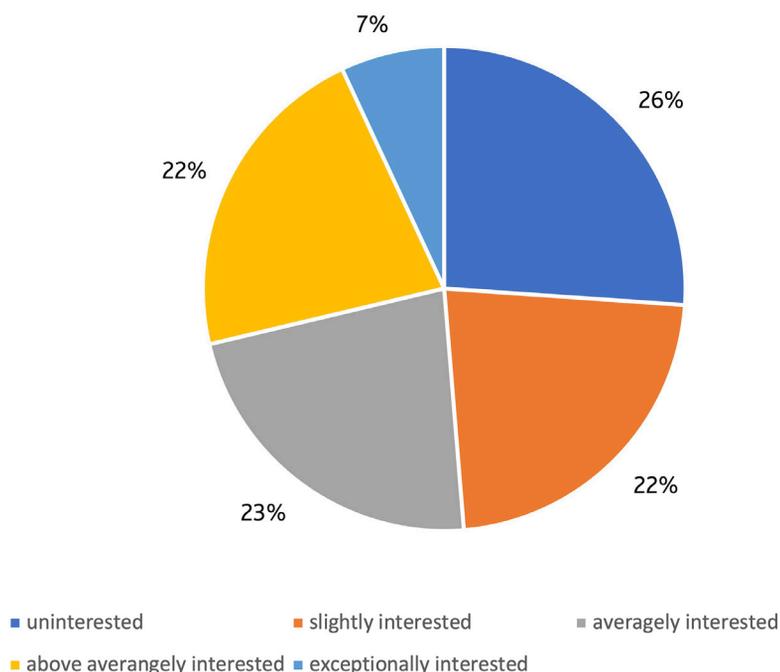


Figure 2: Distribution of answers regarding awareness level

Source: compiled by the authors based on the abovementioned questionnaire

Table 3: The Kruskal–Wallis H test results on HDF self-defence capabilities and NATO attitude

Variable	H statistic	P value
v28_self	2.583	0.6298
v29_ally	18.3475	0.0011
v30_NATO_mem	15.2985	0.0041
v31_NATO_ext	8.4666	0.0759

Source: compiled by the authors

Statistically significant differences were found in v29_ally and v30_NATO_mem, suggesting that awareness levels influence opinions on these topics.

Dunn's test was conducted as a post-hoc analysis following the Kruskal–Wallis H test, which showed a statistically significant difference for v29_ally. The Bonferroni correction was applied as control for multiple comparisons.

Table 4: Dunn's test with Bonferroni correction

	1	2	3	4	5
1	1.0	1.0	0.1607	0.0003	0.7796
2	1.0	1.0	1.0	0.0645	1.0
3	0.1607	1.0	1.0	0.75	1.0
4	0.0003	0.0645	0.75	1.0	1.0
5	0.7796	1.0	1.0	1.0	1.0

Source: compiled by the authors

Group 1, as those participants, who are uninterested in HDF news and Group 4, who show above average interest in this kind of news have significantly different views on whether the HDF can defend Hungary with the assistance of allies. No other groups exhibit strong statistical differences.

A Dunn's post-hoc test with Bonferroni correction was conducted after the Kruskal–Wallis H test, which found that awareness level significantly influences opinions on NATO membership. The results can be found in Table 4.

Table 5: Dunn's test with Bonferroni correction

	1	2	3	4	5
1	1.0	0.1461	0.0128	0.0407	0.0359
2	0.1461	1.0	1.0	1.0	1.0
3	0.0128	1.0	1.0	1.0	1.0
4	0.0407	1.0	1.0	1.0	1.0
5	0.0359	1.0	1.0	1.0	1.0

Source: compiled by the authors

Group 1, who are uninterested in HDF news differs significantly from Groups 3, 4 and 5, who are averagely or above interested in HDF news, meaning that awareness level strongly impacts NATO membership views for these groups. Groups 3, 4 and 5 also do not show significant differences among themselves, indicating similar opinions in these groups.

As this hypothesis was only partially true, we rejected it.

H2: The Hungarian people's public preference for crisis management type varies by demographic factors such as age, gender, or education level.

We have chosen to investigate the connection between demographic factors and crisis management type because we believe that at the end of the Russian–Ukrainian war there will be great need for volunteer nations to send crisis response teams to Ukraine. We wanted to see if the Hungarian people are showing any kind of preference regarding the methods, in order to better understand what kind of factors may play

in this preference. We asked this question in a neutral way, so the results do not get influenced (so much) by the ongoing war.

From the 5 categories 3 involved sending personnel, military support and medical contingent (which in the Hungarian tradition means military medical troops), but there was the civilian expert option as a more neutral choice.

The financial support category referred to assisting in the form of monetary donation, grants or low-interest loans. The military support category encompasses support provided for peace operations through military means, including the deployment of armed forces, provision of defence equipment and tactical assistance. This support aims to enhance stability, ensure security, and reinforce peacekeeping efforts through structured military involvement. The civilian expert category means sending civilian experts as consultants, to restore basic governmental or infrastructural networks and capabilities. The humanitarian aid category provides essential aid to alleviate immediate suffering and support basic needs, such as food, water, shelter and emergency relief supplies. This assistance addresses urgent crises, protects vulnerable populations and fosters community resilience. The medical contingent category focuses on delivering medical support, including deploying healthcare professionals, medical supplies and facilities. This assistance aims to ensure essential health services, manage medical emergencies, and contribute to the well-being and recovery of communities in crisis.

In the questionnaire the test takers had to input their priorities on crisis management, and rank the five options from 1 to 5, where 1 was the kind of support they would prefer the most, and 5 the least preferred. Every option needed to be given a rank.

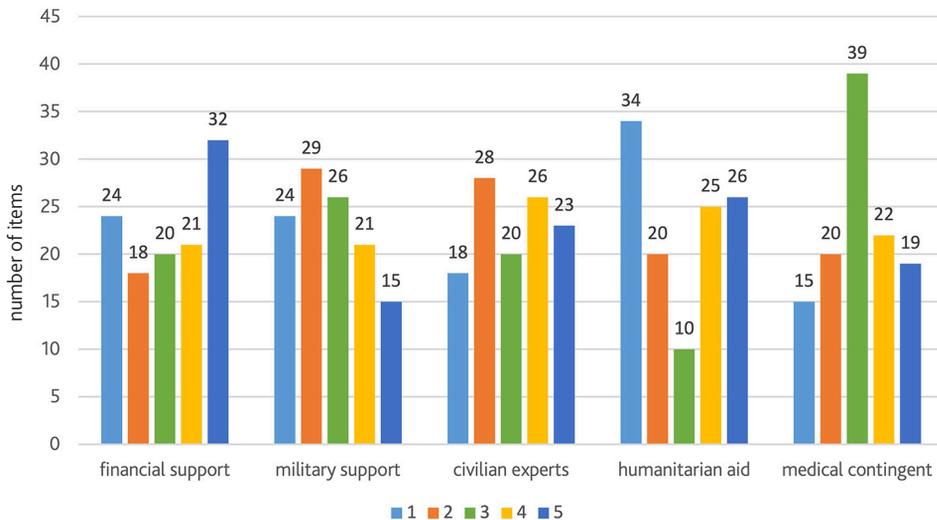


Figure 3: Prioritisation of different types of crisis management

Source: compiled by the authors based on the abovementioned questionnaire

We tested our hypothesis using the chi-square test for different crisis management types and the demographic variables gender, age and highest education.

Table 6: Chi-square test results

Variable 1	Variable 2	Chi-square	Degree of freedom	P value
v18_fin_sup	gender	3.1099	4	0.5396
v18_fin_sup	v1_age	26.1933	24	0.3434
v18_fin_sup	v3_degree	15.1355	24	0.9167
v19_mil_sup	gender	10.1937	4	0.0373
v19_mil_sup	v1_age	20.675	24	0.6578
v19_mil_sup	v3_degree	28.6828	24	0.2323
v20_civ_sup	gender	3.8767	4	0.423
v20_civ_sup	v1_age	18.6153	24	0.7722
v20_civ_sup	v3_degree	24.8124	24	0.416
v21_hum_aid	gender	2.0838	4	0.7203
v21_hum_aid	v1_age	25.2373	24	0.393
v21_hum_aid	v3_degree	27.8248	24	0.2675
v22_med_sup	gender	18.6218	4	0.0009
v22_med_sup	v1_age	40.2863	24	0.0199
v22_med_sup	v3_degree	36.4695	24	0.0494

Source: compiled by the authors

The results show that military support (v19_mil_sup) is statistically influenced by gender; there is a difference of preferences regarding military aid among the genders. Medical contingent as support type (v22_med_sup) is significantly affected by the following variables: gender, age and education; these factors seem to play a role in how people prioritise medical assistance.

Preferences for financial aid, civilian expert assistance and humanitarian aid are not significantly influenced by gender, age, or education among our responders. People's opinion on these forms of crisis management appears to be independent of their demographic background.

As in our survey gender was a binary choice (and mandatory as well), we used the Mann–Whitney U test to compare the differences between the genders regarding military support (v19_mil_sup) and medical contingent (v22_med_sup). For military support, the Mann–Whitney U result was 1,409, with a p value of 0.1801, so statistically seen, the difference between the genders is insignificant. Medical support had the Mann–Whitney U score of 2,058.5 and a p value of 0.0164, which is a statistically significant difference.

For the rest of the variables, which had a significant difference in the chi-square test, we did a Kruskal–Wallis H test with the following results to see if there is a group difference.

Table 7: Kruskal–Wallis H test

Variable 1	Variable 2	Kruskal–Wallis H	P value
v21_hum_aid	v3_degree	14.9987	0.0203
v22_med_sup	v1_age	6.4767	0.372
v22_med_sup	v3_degree	13.0179	0.0428

Source: compiled by the authors

This shows that the support for medical contingent does not show any significant difference between the age groups. For the other two support types, we did a Dunn's post-hoc test with Bonferroni correction, with the following results.

Table 8: Dunn's test with Bonferroni correction

	1	2	3	4	5	6	7
1	1.0	1.0	1.0	0.8918	1.0	1.0	1.0
2	1.0	1.0	1.0	1.0	0.4975	1.0	1.0
3	1.0	1.0	1.0	1.0	0.1631	1.0	0.6484
4	0.8918	1.0	1.0	1.0	0.1559	1.0	0.1844
5	1.0	0.4975	0.1631	0.1559	1.0	1.0	1.0
6	1.0	1.0	1.0	1.0	1.0	1.0	1.0
7	1.0	1.0	0.6484	0.1844	1.0	1.0	1.0

Source: compiled by the authors

Table 9: Dunn's test with Bonferroni correction

	1	2	3	4	5	6	7
1	1.0	0.4377	1.0	0.8552	1.0	1.0	1.0
2	0.4377	1.0	1.0	1.0	1.0	0.3261	1.0
3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4	0.8552	1.0	1.0	1.0	1.0	0.3128	1.0
5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6	1.0	0.3262	1.0	0.3128	1.0	1.0	1.0
7	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Source: compiled by the authors

Seeing the results, they show that there is no significant difference among any of the groups.

As a final conclusion we rejected H2, because only for the medical contingent was there a difference of genders for support. For any other crisis management types using the demographic variables age, gender and highest education level we did not find any preference.

H3: The socioeconomic background has an impact on the individuals' views regarding the question if NATO membership or the expansion of NATO lies in the interest of Hungary.

Using the variables v30_NATO_membership_support, v31_NATO_extension_support, v3_highest_degree and v11_financial_situation we did a chi-square analysis.

Table 10: Chi-square analysis results

Variable 1	Variable 2	Chi-square	Degree of freedom	P value
v30_NATO_mem	v31_NATO_ext	118.9375	16	0.0
v30_NATO_mem	v3_degree	20.1331	24	0.6892
v30_NATO_mem	v11_fin_sit	69.554	36	0.0007
v31_NATO_ext	v3_degree	23.2235	24	0.5066
v31_NATO_ext	v11_fin_sit	50.9422	36	0.0505
v3_degree	v11_fin_sit	46.1222	54	0.7683

Source: compiled by the authors

We used Cramer's V analysis, which measures the association strength between two categorical variables. It ranges from no association 0 value to strong association value 1.

Table 11: Cramer's V results

Variable 1	Variable 2	Cramer's V
v30_NATO_mem	v31_NATO_ext	0.5085
v30_NATO_mem	v11_fin_sit	0.3889

Source: compiled by the authors

Strong association is found between NATO membership and NATO expansion, suggesting that individuals' stance on NATO membership is closely tied to their views on its enlargement. A moderate association was found between NATO membership support and financial situation, this indicates that economic background has an impact on an individual's opinion about NATO membership, but the connection is not as strong as in the case above.

As a next step Bonferroni correction was applied to the Dunn's post-hoc test, which is used to identify which specific groups within v30_NATO_mem and v31_NATO_ext significantly differ from each other.

Table 12: Dunn's test with Bonferroni correction

	1	2	3	4	5
1	1.000000	1.000000	0.939203	0.390864	0.000277
2	1.000000	1.000000	1.000000	1.000000	0.000672
3	0.939203	1.000000	1.000000	1.000000	0.000362
4	0.390864	1.000000	1.000000	1.000000	0.003772
5	0.000277	0.000672	0.000362	0.003772	1.000000

Source: compiled by the authors

Group 5 whose stance is that they support NATO membership differs significantly from all other groups, meaning individuals in this category have a statistically distinct opinion compared to the rest, as they also support NATO expansion. All the other groups have relatively similar perspectives, as indicated by their non-significant p values. The strongest statistical difference is observed between Group 1 and Group 5 suggesting polarised opinions, which is true, as these groups are NATO non-supporters and supporters.

The Bonferroni correction was applied to the Dunn's post-hoc test, which is used to determine which specific categories of v30_NATO_mem and v11_fin_sit significantly differ from each other. Please note that the variable showing the participants financial situation (v11_fin_sit) has been set up identically to the Hungarian Central Statistical Office's Microcensus, on a scale from 1–10, where 10 is the richest category.

Table 13: Dunn's test with Bonferroni correction

	1	2	3	4	5	6	7	8	9	10
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2	1.0	1.0	1.0	1.0	1.0	1.0	0.969	1.0	1.0	1.0
3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4	1.0	1.0	1.0	1.0	1.0	1.0	0.937	1.0	1.0	1.0
5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
7	1.0	0.969	1.0	0.937	1.0	1.0	1.0	1.0	1.0	1.0
8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Source: compiled by the authors

This suggests that people with different financial situations do not have significantly different views on NATO membership or the economic situation does not influence this preference.

The Cramer's V and Dunn's post-hoc test may look contradictory but we must consider that Cramer's V looks at the overall association, if there is some level of relationship between the variables, but in the end, the Dunn–Bonferroni test confirms that no individual financial category differs significantly in a way that passes the strict statistical threshold.

As this hypothesis was only partially true, we rejected it.

Discussion

As mentioned previously, our results are limited by the sample size of the survey. In general, a random sampling method may give a margin of error that is mathematically exact, but because of practical reasons (e.g. limited resources) most of the surveys use non-probability sampling, where the participating population is adjusted according to the larger target population's distribution.

NATO usually conducts a public opinion survey among the Alliance Members twice a year: one before the yearly summit, the other in around November. They use a sample size of 1,000 persons per country (or in smaller countries 500 persons), and non-probability sampling. Instead of random selection, the survey uses a method where respondents are chosen based (weighted) according to the latest population statistics. At the writing of this article, the newest survey is the NATO Annual Tracking Research 2022, where field work was done in November of 2022.

As another widely recognised survey, the Eurobarometer surveys typically conduct 1,000 interviews per country. In smaller countries, such as Luxembourg, Malta and Cyprus, the sample size is usually 500 interviews.

According to this practice we can say that for a more reliable result a sample size of 500–1,000 would be needed, if possible weighted for the Hungarian population census results of 2022.

The John Lukacs Institute of Ludovika University of Public Service (formerly known as the Institute for Strategic and Defence Studies) has a more focused series of studies, where starting from 2019 every odd year they publish an analysis about the threat and security perceptions in the Central and Eastern European Region. In the Czech Republic, Poland, Hungary, Romania and Slovakia as former satellite states of the Soviet Union, the perspective on today's Russia differs from the rest of the NATO members. Here the sample size was also 1,000 per country.

As we lack public data on the HDF and citizen engagement, or regarding how citizens see HDF and soldiers in general, accurate disinformation remedies are hard to find. We recommend educating the next generation regarding this topic as part of the Fundamentals of National Defence course and in Civics and Social Studies classes.

Summary

In our first article we explored the concept of hybrid warfare, the new art of war of the 21st century. By using psychological operations and disinformation campaigns they have a strategic role in influencing public perception and undermining military operations. We highlighted the difficulty of addressing such campaigns due their cost efficiency, the anonymity of sources and the international nature of online platforms. Moreover, based on the literature review of this new concept, we analysed scientific trends of misinformation and disinformation. It is not surprising that academic discourse increasingly focuses on misinformation and disinformation at the global level, especially regarding global events like the Covid–19 pandemic and the Russian–Ukrainian war. But this trend clearly started to accelerate slowly around 2013. We believe that this will remain an ongoing challenge in the future, and one whose importance will continue to grow. Following up these results, we have collected the top one hundred keywords in connection with disinformation and misinformation. We choose network analysis, because with this method we have the opportunity to highlight strong connections between keywords. With disinformation keyword connections there was a strong connection between disinformation and fake news, social media and misinformation. This was expected since these keywords often go hand in hand. Unexpectedly, the human element also took centre stage in the network. This means that the researchers focus on the human side of disinformation. The same analysis was done with the keyword misinformation. Compared to disinformation, Covid–19 related keywords were more present and more connected; especially vaccine related. The human keyword also took a central position in the network with the same dominancy compared to the previous results. Overall researches were somewhat different related to these two keywords, to disinformation the focus was wider, while misinformation had a smaller Covid–19 related focus.

In our second article we found that based on network research, sentiment analysis suggests that Hungary's stance regarding the Russian–Ukrainian war and the narratives surrounding it can give cause for concern. The divergence between Hungarian society and the narratives and perceptions of Hungary's allies and global public opinion poses significant risks. Hungarian-speakers may be more exposed to psychological operations, particularly due to the tendency of the individuals to align with perspectives that oppose issues they also perceive negatively – often without realising the underlying intent of cognitive influence behind them. We also found that Hungarian social media usage patterns tend to reduce exposure to global discourse, as they differ from the more diverse news consuming habits and tendencies of the international communities. Additionally, negative perceptions of Hungary may harm her bilateral relations with other countries, affecting cooperations on a large scale. The consequences of influencing operations are almost impossible to predict. In addition to harming international relations or just by simply eroding trust in government and media credibility, the increasing societal tensions could undermine the democratic governance system and values. The trend of rising extremism in Europe could continue and could lead to fracture in the EU.

In conclusion, Hungary must prepare herself for psychological operations mainly by raising public awareness. The risks posed by them is immense and recognising them is crucial to the national interest. With international cooperation and the effective allocation of resources, appropriate countermeasures can be developed to detect and counter such operations in a short timeframe. Ensuring resilience hinges on public awareness regarding influence campaigns, so risk mitigation should begin here.

In our last article we attempted to identify the most important factors influencing NATO and crisis management, whether demographic or socioeconomic, or simply awareness regarding the HDF's activities. Because of the comparatively small sample size of the respondents, we were unable to find a definite factor for the abovementioned attitudes. We believe that after the war ends, some kind of peacekeeping force will be needed to prevent the situation in Ukraine from escalating again, so it is necessary to prevent disinformation initiatives seeking to discourage the Hungarian population from supporting any kind of crisis management.

In the ongoing Russian–Ukrainian war, the HDF was not targeted by disinformation campaigns, only attacks on Hungary on the political level were performed. The HDF's peacekeeping missions are Hungary's biggest contribution to our allies in NATO and the EU, and professionally seen the biggest success, but sadly, as we have seen, it falls short of expectations in online presence. Hopefully, this trend will improve in the future, as the defence of Hungary relies on the entire society, and this requires trust in the HDF's capabilities and the support of citizens.

In our article series we highlighted the security challenges posed by information operations. These operations use the dissemination of misinformation, disinformation and malinformation to manipulate the public's political will, while destroying trust in the government and public institutions. Worse still, freedom of expression, the "cornerstone" of traditional democracy, is being used to amplify this effect. While addressing the topic of fake news is a complex problem, it is important to recognise the colossal impact social media platforms can have, as they offer an easy to use and low-cost medium for disinformation campaigns. It also makes us ask the question: To what extent is an individual accountable for spreading misinformation online? Where can we, as a society, draw the line to protect ourselves against this?

Since political leaders in democratic societies determine military objectives and operations, this kind of operation can pose a serious threat to national security, hindering or multiplying the costs and risks of military operations. We explored the divergence of Hungarian public sentiment, particularly the trends of being susceptible to foreign influence through disinformation campaigns. It is a fact that the HDF's international peacekeeping operation contributions and cooperation with allies in NATO and the EU can be regarded as a professional success. However, their online presence remains limited and this also shows that societal support needs to be enhanced. Trust in the HDF's self-defence capability is critical to national defence, as well as societal resilience.

In conclusion, our research advocates for enhanced international cooperation, and proactive measures to mitigate the risk posed by information operations. To heighten the general public's awareness, a more effective education and strategy are needed to combat this challenge. We believe this is vital to safeguard the security of Hungary and our allies.

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