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LAY ATTRIBUTION OF AGENCY AND RESPONSIBILITY TO AI AND REMOTELY PILOTED DRONES IN MILITARY CONTEXT: VIGNETTE EXPERIMENT IN RUSSIA

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Abstract. The paper introduces a comprehensive vignette design that explores the attribution of responsibility and agency in military contexts, explicitly focusing on the interaction between two sovereign countries, the type of military operation, and the type of actor involved. The study gathered data from 1103 participants through an online survey. The results reveal several significant conclusions. Participants tend to attribute higher levels of agency to actors engaged in non-military operations than military-related ones. Human actors receive the highest ratings in terms of both responsibility and agency. Unmanned Aerial Vehicles (UAVs) equipped with artificial intelligence are attributed more agency and responsibility than remotely piloted drones. Participants tend to attribute higher levels of agency to the side of the conflict associated with their own state. We found that trust, positive attitudes towards UAVs, and the tendency to anthropomorphize them positively correlated with agency and responsibility attribution. These findings provide valuable insights into the evolving percep-

ОБЫДЕННОЕ ПРИПИСЫВАНИЕ АГЕНТНОСТИ И ОТВЕТСТВЕННОСТИ ВОЕННЫМ БЕСПИЛОТНЫМ ЛЕТАТЕЛЬНЫМ АППАРАТАМ: ВИНЬЕТОЧНЫЙ ЭКСПЕРИМЕНТ НА РОССИЙСКОЙ ВЫБОРКЕ

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Аннотация. В статье представлены результаты факторного виньеточного эксперимента, исследующего атрибуцию ответственности и агентности в военных контекстах. Особое внимание уделено взаимодействию между двумя суверенными государствами, типу военной ситуации и степени автономности вовлеченных акторов. Выборка исследования составляет 1103 участника, прошедших онлайн-опрос. Участники исследования склонны приписывать более высокий уровень агентности акторам, участвующим в невоенных операциях, чем в военных. Люди, выступающие в роли акторов, получили самые высокие оценки как с точки зрения ответственности, так и с точки зрения агентности. Беспилотным летательным аппаратам (БПЛА), оснащенным искусственным интеллектом, приписывается больше агентности и ответственности, чем беспилотникам на дистанционном управлении. Участники исследования склонны приписывать более высокий уровень ответственности стороне конфликта, представляющей их собственtion of modern warfare, where the integration of human combatants, conventional warfare, and advanced technologies, such as artificial intelligence-driven autonomous algorithms, is becoming increasingly prominent.

ную страну. Мы обнаружили, что доверие, позитивное отношение к БПЛА и тенденция к антропоморфизации БПЛА положительно коррелируют с атрибуцией агентности и ответственности. Эти результаты дают общее представление о меняющемся восприятии современных военных конфликтов, где все более заметной становится интеграция в военных действиях как людей-комбатантов, так и передовых технологий, среди которых автономные системы, управляемые искусственным интеллектом.

Keywords: lay expertise, studies of science and technology, human-AI interaction (HAII), factorial experiment, unmanned aerial vehicles (UAV), war studies, actor-network theory

Ключевые слова: обыденное знание, исследования науки и техники, взаимодействие человека и ИИ, факторный эксперимент, беспилотные летательные аппараты (БПЛА), исследования военных конфликтов, акторно-сетевая теория

Introduction

Artificial Intelligence (AI) is advancing rapidly, with research focusing on the concept of consciousness and responsibility perception concerning AI-equipped technological objects [Ashrafian, 2015; Coeckelbergh, 2009]. While extensive attention from researchers and the public has been paid to everyday contexts, such as the growing interest in self-driving cars [Awad et al., 2018; Lee, Kolodge, 2018; Peng, 2020], the significance of understanding agency and responsibility becomes even more crucial when it comes to matters of life and death. Tragic incidents, like the death of Elaine Herzberg in a self-driving car accident [Stilgoe, 2020: 2], underscore the need for a deeper comprehension of these concepts.

The issue of life and death is particularly apparent in military conflicts contexts, as exemplified by the Oerlikon GDF-005 case, where a “robot cannon” caused unexpected casualties due to visual classification errors[1]. Most studies on agency and responsibility attribution have primarily focused on non-combatant and civilian deaths and injuries [Kazim, Koshiyama, 2021]. Researchers show that current knowledge in the field remains limited, necessitating further investigation into the intricate dynamics of characteristics attribution by the general public to non-human actors within modern wars context [Azafrani, Gupta, 2023: 27].

Previous research in this sphere has predominantly relied on vignette experiments that present scenarios with clear moral distinctions, typically involving terrorists and global organizations fighting against them, which is mainly inspired by armed conflicts in the Middle East. These studies have provided valuable insights

[1] Shachtman N. Robot Cannon Kills 9, Wounds 14 // Wired. 2007. October 18. URL: https://www.wired.com/2007/10/robot-cannon-ki/ (accessed: 04.05.2024).

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into public support towards drones [Kreps, 2014: 5; Kreps, Wallace, 2016: 10], their capability to divert the public's attention [Boddery, Klein, 2021: 5], and support for the use of force in case of civilian casualties [Walsh, 2015: 516]. However, they have not addressed military situations with complex moral narratives when there is no "obvious villain" represented by non-state and non-governmental actors [Smirnov, 2021]. Even though these entities threaten sovereign states, their internal structure is strikingly different [Kaspe, 2021: 177]. The approach mentioned above showed that it is easier for the non-experts to attribute agency and responsibility to the lawful state or international actors while disregarding the multifaceted factors that come into play in scenarios including institutionalized sides, each with their own political, social, and strategic objectives, which complicate the attribution of agency and responsibility.

Recent conflicts have witnessed a significant surge in the use of drones, leading to a transformative impact on the nature of modern warfare. Drones have been used in a variety of state collisions, including the Nagorno-Karabakh conflict between Azerbaijan and Armenia [2], the confrontation between Israel and Iran [3], and the border tensions between Serbia and Kosovo [4], Israel and Palestine [5]. The most prominent example of this shift is Russian Special military operation in Ukraine in 2022. Daily news reports highlight both sides' active deployment of drones, fulfilling various functions such as frontline attacks [6], reconnaissance, fire adjustment, and surveillance. Notably, a specific incident in April 2023, referred to as an "aerial duel" or "jousting match", gained public attention [7]. This occurrence was not an isolated incident, as evidenced by an earlier video clip from October 2022 captured from a first-person view drone engaged in a similar "duel" [8]. Importantly, first-person view drones play a significant role in facilitating the acceptance of combatants' surrender, with specific surrender instructions communicated through these drones [9]. Furthermore, recommendations for surrender to drones were also posted in governmental media sources, emphasizing their

[2] Dixon R. Azerbaijan's Drones Owned the Battlefield in Nagorno-Karabakh — and Showed Future of Warfare // The Washington Post. 2020. November 11. URL: http://www.washingtonpost.com/world/europe/nagorno-karabkah-drones-azerbaijan-aremenia/2020/11/11/441bcbd2-193d-11eb-8bda-814ca56e138b_story.html (accessed: 04.05.2024).

[3] Lieber D., Faucon B. Israel Drone Strike Hit Iranian Weapons Facility // The Wall Street Journal. 2023. January 30. URL: www.wsj.com/articles/israel-drone-strike-hit-iranian-weapons-facility-11675110298 (accessed: 04.05.2024).

[4] Savic M. Serb Military Downs Drone in South near Kosovo Border // Bloomberg. 2022. November 2. URL: www.bloomberg.com/news/articles/2022-11-02/serb-military-shoots-down-drone-in-south-close-to-kosovo-border/ (accessed: 04.05.2024).

[5] Al-Rujoub A. Israeli Drone Strike Kills 4 Palestinians in Northern West Bank // Anadolu Ajansı. 2024. July 3. URL: https://www.aa.com.tr/en/middle-east/israeli-drone-strike-kills-4-palestinians-in-northern-west-bank/3264597 (accessed: 22.08.2024).

[6] Russian Border Guards Learn to Use Attack Drones in Ukraine // Radio Sputnik. 2024. May 28. URL: https://radiosputnik.ru/20240528/bespilotniki-1948850744.html (accessed: 22.08.2024). (In Russ.)

[7] Cook E. Ukraine Drone Wins 'Jousting Match' Against Russian UAV in Aerial Duel // Newsweek. 2023. April 4. URL: www.newsweek.com/ukraine-drone-jousting-match-video-russia-uav-1792386 (accessed: 04.05.2024).

[8] Hambling D. Ukraine Wins First Drone vs. Drone Dogfight against Russia, Opening a New Era of Warfare (Updated). // Forbes. 2022. October 14. URL: www.forbes.com/sites/davidhambling/2022/10/14/ukraine-wins-first-drone-vs-drone-dogfight-against-russia-opening-a-new-era-of-warfare/?sh=5bc8634319a5 (accessed: 04.05.2024).

[9] Barnes J. Watch: Russian Soldier 'Follows the Drone' as He Is Lured to Surrender in Ukraine // The Telegraph. 2023. May 10. URL: www.telegraph.co.uk/world-news/2023/05/10/russian-soldier-follows-to-drone-surrender-ukraine/ (accessed: 04.05.2024).

involvement in this process[10]. These media attention instances underscore the complex engagement of non-human actors within the complex web of military operations, assuming roles traditionally assigned to human combatants. The proliferation of technologically advanced tools such as drones, underscores both the potential for pacification by minimizing collateral damage and unintended casualties and the escalation of conflict through their lethal capabilities. Moreover, the blurring of boundaries between conventional and asymmetric warfare exacerbates the complexity of attributing agency and responsibility in these dynamic contexts, posing significant challenges to efforts aimed at conflict resolution and peacebuilding.

In light of the circumstances mentioned earlier, our study aims to address the gaps in the current literature by examining the dynamics of agency and responsibility attributed to non-human actors in the context of military conflicts between states. Although previous research has examined lay attributions of agency and responsibility, it has primarily focused on asymmetric conflicts with clear moral distinctions, such as those between states and insurgents or in counterterrorism operations. In contrast, we examine military conflicts between two equal agents — states. The data from Russians are particularly relevant given the ongoing special military operation, which is an open military conflict with Ukraine. Specifically, we aim to investigate the factors that influence the lay perceptions of individuals regarding this phenomenon, which is successfully achieved through the use of vignettes in assessing moral judgments regarding blame and responsibility attribution [Deviatko, Gavrilov, 2020: 2—4]. Our research endeavors to contribute to a more comprehensive understanding of how agency and responsibility are ascribed to AI- and remotely piloted military drones compared to human combatants.

To achieve this objective, we employ a factorial experiment utilizing vignettes that simulate real-life scenarios [Atzmüller, Steiner, 2010]. Through this methodological lens, our endeavor is to offer discerning perspectives on ethical decision-making frameworks and the overarching discourse surrounding public perceptions of advancing technology in contemporary conflicts. By delving into the intricate dynamics of agency and responsibility attribution within military spheres, we aim to illuminate pathways for informed decision-making and future policy formulation.

Theoretical Framework

The theoretical framework of this study on the attribution of agency and responsibility to non-human actors in military scenarios is built upon the contemporary theories proposed by M. DeLanda and G. Chamayou on the role of material objects in warfare. By synthesizing theoretical insights with empirical findings, we aim to elucidate the complex interplay between human perceptions, technological advancements, and ethical considerations in contemporary warfare contexts. This comprehensive approach aims to foster deeper insights into the ethical dimensions of modern conflicts

[10] Santora M. Ukraine is Offering Russian Soldiers Detailed Instructions on How to Surrender to Its Drones // The New York Times. 2022. December 26. URL: www.nytimes.com/2022/12/26/world/europe/ukraine-is-offering-russian-soldiers-detailed-instructions-on-how-to-surrender-to-its-drones.html (accessed: 04.05.2024); Koshechkina V. Soldier of the Armed Forces of Ukraine Read a Note Dropped from a Russian Drone and Surrendered. What Was in the Message? // lenta.ru. 2024. April 18. URL: https://lenta.ru/news/2024/04/18/soldat-vsu-prochital-zapisku-sbroshennuyu-s-rossiyskogo-bespilotnika-i-sdalsya-v-plen-chto-bylo-v-poslanii/ (accessed: 04.05.2024). (In Russ.)

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and inform strategies for promoting accountability and public transparency. Moreover, we extensively review recent literature examining the various factors influencing the lay attribution of agency and responsibility to non-human actors, specifically focusing on military drones.

Modern Technologized War and "The Theory of Drone"

René Girard's book "Battling to the End: Conversations with Benoît Chantre" provides a notable example of reinterpreting classical theories of war [Girard, 2010]. Girard draws on Von Clausewitz's "On War" to illustrate the theory of mimetic violence, portraying Von Clausewitz as a precursor to modern apocalyptic total wars [Girard, 1976]. Girard argues that the emotional tension among troops and civilians serves as the fundamental cause of war's perpetuation, surpassing political objectives and leading to extreme states, making peaceful coexistence impossible. While technological advancements and warfare impose some limits on uncontrolled violence, feelings of hatred and the desire to destroy the enemy remain unrestricted. Girard's mimetic theory highlights the principle of transference, shared by Von Clausewitz [Girard, 2010: 34]. Girard convincingly demonstrates military conflicts' inevitable escalation and transformation in response to technological progress.

However, it is vital to highlight the significance of works that specifically delve into the realm of military technology, such as "War in the Age of Intelligent Machines" by Manuel DeLanda [DeLanda, 1991], in which he explores the history of army development and military art from the perspective of how technical inventions influence the army's structure. Drawing heavily on actor-network theory [Latour, 2007; Law, 2002] and assemblage theory [DeLanda, 2019], DeLanda is focused on analyzing communication among participants, information transmission, and distribution, all impacting decision-making and strategic choices. The network stage tests the war machine's ability to coordinate actions amidst increased uncertainty due to the vast amount of information circulating between military actors. To address this, the decision-making threshold is lowered, allowing greater initiative in the field and resulting in more responsibility, enabling different parts of the war machine to function with reduced uncertainty while relieving higher-level command of the responsibility burden [DeLanda, 1991: 73—74].

In recent years, there has been a notable surge in scientific interest dedicated to the in-depth study of drones, which serve as the primary focus of our research. One notable scholar in this field is Grégoire Chamayou, who explores drone warfare in his work "A Theory of the Drone" [Chamayou, 2015]. Chamayou argues that distant drone warfare, due to its minimal risk to the technologically equipped side, challenges fundamental principles of the right to kill in war. The advantage of drone technology lies in its ability to create the effect of human presence, essentially becoming an extension of the operator's consciousness. Drones are not only used for target destruction but also for reconnaissance and data collection, which represents a modern embodiment of the "divine eye", resembling a panopticon, enabling continuous surveillance, archival storage of data, and automated identification of suspicious behavior [ibid.: 37].

The dominance of drones in the airspace shifts the battlefield from solid ground to unrestricted and dynamic airspace, introducing a vertical dimension to warfare [ibid.: 53—54]. This creates the concept of "kill boxes", where each box represents an autonomous zone for temporary extermination, allowing mobility and responsiveness for rapid movement and control over these “cubes.” In traditional warfare, the risk zone was defined by the land or sea where battles took place, but with the permeable nature of airspace and the flexibility of drones, war can occur anywhere. Despite the fact that it is seen as a “product of specific histories of military strategy” [Elish, 2017: 1121], it challenges applying the ethics and laws of war to acts of violence as the geographical boundaries of war zones become stretched and blurred [Chamayou, 2015: 58]. Ultimately, Chamayou’s work highlights the absurdity of applying centuries-old theories of war and ethical principles to a landscape where military action lacks a defined location.

Determinants of the Lay Attribution of Agency and Responsibility in Military Contexts

The concept of AI having a mind and consciousness of its own is a topic of ongoing debate and speculation among scientists, philosophers, and public intellectuals. Most researchers in AI argue that current AI systems, including advanced machine learning models, are not conscious entities that lack the fundamental qualities associated with consciousness, such as subjective experience and genuine understanding [Haladjian, Montemayor, 2016: 217—218; Torrance, 2008: 520]. However, some arguments favoring AI consciousness suggest that AI systems exhibit surprising behaviors because their algorithms resemble a “black box” [Kuznetsov, 2020: 176—177] and might possess consciousness. Proponents of this view argue that if AI systems can process information, exhibit complex behaviors, and demonstrate self-awareness or subjective experiences, they should be considered conscious beings [Ng, Leung, 2020: 70].

It is imperative to contemplate various modalities of human involvement in drone operations: (a) human in the loop, where active human intervention directly influences decision-making and control of unmanned systems; (b) human on the loop, wherein humans make strategic and tactical decisions but maintain intermittent contact with the drone; (c) human out of the loop, indicating the comprehensive exclusion of humans from the decision-making chain [Matthias, 2004]. The different levels of human inclusion in drone activity allows us to determine the degree of autonomy of algorithm operation in each individual situation, which directly correlates with the share of attributed responsibility.

Agency, in the context of AI and drones, is defined as “how much an agent can act in the world of its own accord” [Takayama, 2015: 161], which grasps the capacity of these technologies to act autonomously and make decisions based on their programming or learning algorithms. However, other authors point out the need to consider the drone’s interactivity, autonomy and adaptability, as well as morality, when determining agency [Floridi, Sanders, 2004]. Responsibility in the context of AI and drones refers to backward-looking moral responsibility, which we understand as the “normative position of an actor concerning facts that have already occurred, for instance, someone being subject to moral blame (or praise) for one particular past action of them” [De Sio, Di Nucci, 2016: 9] and “ability to have meaningful moral interactions with others and understand the nature and meanings of their actions and the effects of these on others” [ibid.: 10].

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The common attribution of agency and responsibility to drones can be primarily explained by several key predictors, including trust in technology, attitudes toward technology, the degree of anthropomorphisation of technology, trust in governmental institutions, and interpersonal trust. It is essential to recognize that participants' attitudes towards technology and their level of trust in drones impact their perceptions of agency and the inclination to accept or reject drones [Li, Hess, Valacich, 2008: 43]. Furthermore, considering Von Clausewitz's notions that war is an extension of politics through alternative means [Von Clausewitz, 1976: 69], it becomes imperative to assess participants' trust in governmental institutions and other people in general as the agents employing drones [Gulevich, Osin, 2023; Jensen et al., 2018].

In the context of machines lacking legal responsibility [Marchant et al., 2011: 281], the degree of anthropomorphisation of drones becomes essential for determining their capacity for agency and accountability. There is a noticeable trend toward humanizing technology both in military and everyday interactions [Wagner et al., 2023: 11—12]. People give human names to voice assistants and personal devices, and it has become customary to express emotions toward technology and communicate with it as if it were human [Korbut, 2019: 38].

Empirical studies do not show whether the attribution of agency and responsibility in military interactions is influenced by the specific situations of drone use in modern warfare, which explains the inclusion of this factor in the study design. Various roles fulfilled by drones, such as reconnaissance, defense, and air attacks, present distinct contexts for assessing agency and responsibility. Drones' diverse functions and roles in modern warfare contribute to nuanced attributions of agency and responsibility, with each situation shaping the perception of these factors differently.

Furthermore, exploring the role of technological advancements, such as artificial intelligence and automation, expands the discourse by raising questions about the impact of human-machine collaboration on attributions of agency. The degree of autonomy the actor exhibits emerges as a crucial factor, as agency relies on the ability to act freely and independently from other actors involved [Rosendorf, Smetana, Vranka, 2022: 179].

The actor's position within the interaction framework presents a unique scenario with an equal footing between two sovereign countries. This aspect differentiates it from previous studies that often focused on non-state actors as crucial agents [Kreps, 2014][11]. Moreover, the similarity in technological advancements and military capabilities further accentuates the participant's evaluation of "their" side versus "other," highlighting the significance of individualization and intra-group affiliations in the attribution of agency and responsibility [Leach et al., 2008: 147].

Hypotheses

The aforementioned theoretical foundations raise the following hypotheses.

We hypothesize that type of mission fulfilled by agent will affect the attribution of agency (Hypothesis 1.1) and responsibility (Hypothesis 1.2) to actors so it would vary across factor levels (*e.g.* for fire attack vs. defense), although we cannot determine

[11] Singer P. W. Military Robots and the Laws of War // The New Atlantis. 2009. Winter. URL: www.thenewatlantis.com/publications/military-robots-and-the-laws-of-war (accessed: 21.06.2024).

the specific direction of this effect. Previous studies suggest that the strict hierarchical organization within armed forces may decrease soldiers' self-assessed agency [Caspar et al., 2020: 2]. Additionally, integrating robots within the complex chain of command can lead to the diffusion of responsibility [Hellström, 2013: 105]. However, there is a lack of clear evidence regarding the direction of the effect in the lay attribution of agency and responsibility to actors in the military versus non-military contexts.

We propose that there will be a significant effect in attributing higher agency to human actors compared to unmanned aerial vehicles (UAVs) and that there will be a difference in the attribution of agency to UAVs, with higher agency attributed to UAVs equipped with artificial intelligence (AI) compared to remotely piloted UAVs (Hypothesis 2.1). Similarly, we anticipate the same pattern in the attribution of responsibility (Hypothesis 2.2), with the same direction of differences: human actors > UAVs with AI > remotely piloted UAVs. Recent studies in the field [Liu, Du, 2022: 1776] support these hypotheses, highlighting similar effects in attributing consciousness, agency, and moral responsibility. Testing these hypotheses is especially important, as this pattern has been found in other studies focusing on peaceful technologies but has not yet been confirmed in situations of military conflict between states.

Furthermore, we hypothesize that the actor's affiliation with a particular side of the conflict will affect the attribution of agency and responsibility. We anticipate that higher agency rates will be attributed to the side with which participants associate themselves, based on previous studies [Fritsche, 2022] on in-group identification and agency perception (Hypothesis 3.1). Conversely, we expect higher responsibility rates to be attributed to the institutionalized enemy's side of the conflict (Hypothesis 3.2), supported by patterns of blame attribution found in previous research [Hameleers, Bos, De Vreese, 2016: 23].

Methods

Design and procedure

The study used a factorial survey with random assignment. We manipulated three factors in the vignettes: (1) the type of military-related mission, which included eight factor levels, seven of which ranged from fire attack to peacekeeping mission, and one non-military (control) level; (2) the actor, which included three factor levels (human, remotely piloted UAV, and UAV equipped with artificial intelligence); and (3) the actor's side of the conflict, which included two factor levels (participant's country and opposing country in conflict). The study employed an $8 \times 3 \times 2$ factorial design, resulting in 48 vignettes. For conditions used for vignette construction, see Supplementary Materials (§ 2)[12]. We utilized G*Power [Faul et al., 2007] to calculate the desired sample size based on the following criteria: effect size = 0.25, $\alpha = 0.01$, df = 14 (where df = $= (3-1) \times (8-1) \times (2-1)$), number of groups = 48 ($8 \times 3 \times 2$), and statistical power = 0.99. The calculated desired sample size is 720 participants.

Participants were presented with eight randomly selected vignettes from the pool of 48. After reading each description, they assessed the actor's agency and responsibility for the action. Participants also evaluated their attitudes toward the technolo-

[12] Data and Supplementary Materials are made available at: https://monitoringjournal.ru/index.php/monitoring/publicFile/submissionFileId?fileId=16988&hash=45ef1c70b5cbe15b34ec13993bc7cfdb.

gies and provided sociodemographic and social background information. The questionnaire took a rough average of 13 minutes to complete.

Participants

The target population for sampling in this study was the general Russian public. Respondents were recruited for the web survey using Yandex.Toloka. All active users of the platform were shown an announcement about the study and had the opportunity to participate in exchange for a modest compensation. The survey itself was programmed on the 1KA platform. The sample was carefully controlled to include only participants who were residents of Russia. Before accessing the questionnaire, participants were informed about the topic's sensitive nature and given detailed instructions on evaluation of vignette scenarios. Participation was voluntary, anonymous, and participants had the right to revoke their consent at any time. Data collection was carried out on March 27—29, 2023.

Only participants that fully completed the questionnaire and passed attention checks embedded in the survey were included in the analysis. As a result, out of those 1,888 volunteers who agreed to participate, 547 incomplete and 148 inattentive cases were filtered out [Berinsky, Margolis, Sances, 2014]. We also removed 90 cases at the extreme end of the completion time spectrum (⩾1,440 seconds, equivalent to 23.4 minutes), as this would indicate that the participant was distracted while responding to the questionnaire [Buchanan, Scofield, 2018].

The sample for this study consisted of 1,103 participants, including 552 females (50.05 %), 548 males (49.68 %), and three participants identified as "other" category (0.27 %). The age range of participants was 18 to 54 years old ($M = 31.50$, $SD = 7.50$). The ethnicity of participants is mainly Russian ($n = 439$, 39.80 %), but a fair share of the sample reported more than one ethnic identity ($n = 314$, 28.47 %) or preferred not to report it ($n = 256$, 23.21 %). Tatars ($n = 19$, 1.72 %) stand out among the ethnic minorities in Russia as the most represented in the sample. Educational backgrounds varied, with 423 participants (38.35 %) specializing in STEM-related fields, 665 participants (60.29 %) in Humanities, and 15 participants (1.36 %) unable to determine their specialization. Most participants reported having medium knowledge about UAV ("saw UAV on photos, video or in real life and heard something about it"), with 793 participants (71.90 %) falling under this category.

Please refer to the Supplementary Materials (§ 1) for additional information on the data acquisition and sample characteristics.

Measures

For all of the composite scales used in the study, we calculated the overall scale score for each participant by averaging evaluations of all items on the respective scale.

Perceived Agency. After each of the eight vignettes participant was asked to evaluate the following items "To what extent does the agent make a free decision?" and "To what extent does the agent act independently?" on an 11-point scale ranging from "0" — "To the extremely low extent" to "10" — "To the extremely high extent." Participants gave highly coherent evaluations ($\alpha = 0.906$, 99CIα [0.901, 0.911], r Pearson $= 0.830$, $p \leqslant .01$).

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Perceived Responsibility. Alongside items on agency, after each vignette, participants were asked to evaluate the items on responsibility — "To what extent is the agent responsible for the act committed?" and "To what extent is the agent aware of the consequences of their actions?" on an 11-point scale ranging from "0" — "To the extremely low extent" to "10" — "To the extremely high extent." Participants gave highly coherent evaluations ($\alpha = 0.936$, 99CIα [0.932, 0.939], r Pearson = 0.880, $p \leqslant .01$).

Institutional Trust. For measuring institutional trust, we used a slightly modified ESS core module scale European Social Survey [13]. We asked participants to rate their trust in the eight following institutions in Russia: judicial system, police, army, political parties, deputies of parliament, government, regional authorities, and President of Russia. We used a 7-point scale ranging from "0" — "Absolutely do not trust" to "6" — "Absolutely trust." Cronbach's alpha suggests a high level of internal consistency for the scale ($\alpha = 0.953$, 99CIα [0.948, 0.959]).

Trust to UAV. For assessing trust in UAVs, we used a shortened version of the HCI (Human-Computer Interaction) scale proposed by Jensen et al., designed to specifically access the trustworthiness of drones [Jensen et al., 2018]. We asked participants to evaluate items about the ability, integrity and benevolence of UAVs on a 7-point scale ranging from "0" — "Absolutely disagree" to "6" — "Absolutely agree." Two items in the survey represented each component of the evaluation. Cronbach's alpha for six items in the scale suggests an acceptable level of internal consistency ($\alpha = 0.758$, 99CIα [0.727, 0.786]).

Attitude toward UAV. The original 8-item scale was composed by the authors of this paper to assess attitudes toward UAVs. We asked participants to subjectively evaluate to which degree UAV has a moral capacity, intentions, and intelligence (please refer to the Supplementary Materials, § 3 for the scale items) on a 7-point scale ranging from "0" — "Absolutely disagree" to "6" — "Absolutely agree." Cronbach's alpha suggests an acceptable level of internal consistency for the scale ($\alpha = 0.782$, 99CIα [0.756, 0.807]). Further in the research, a factor analysis using PCA with orthogonal rotation was carried out, resulting in two latent factors with eigenvalue >1: "Attitude to the ability of the UAV to act" and "Attitude to the ability of the UAV to reflect," — with the total explained variance of 55.893 %. Factor scores were saved as variables to be used in the GLM as covariates.

Individual Differences in Anthropomorphism (IDAQ). We measured individual incline toward anthropomorphism of technical objects using six relevant items from the IDAQ scale proposed by Waytz, Cacioppo, Epley [Waytz, Cacioppo, Epley, 2010]. This scale measures participants' subjective willingness to attribute human characteristics to inanimate objects (*e. g.* "To what extent does the average computer have a mind of its own?"). We asked participants to subjectively evaluate to which degree various technical objects bear the characteristics of a human on a 7-point scale ranging from "0" — "To the extremely low degree" to "6" — "To extremely high degree." Cronbach's alpha suggests an acceptable level of internal consistency for the scale ($\alpha = 0.778$, 99CIα [0.750, 0.803]).

[13] Source Questionnaire. URL: www.europeansocialsurvey.org/methodology/ess_methodology/source_questionnaire (accessed: 20.03.2023).

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Other measures, included in the survey. We measured social trust using the ESS 3-item Social Trust scale ($\alpha = 0.760$, 99CIα [0.726, 0.791]). We assed the technology usage frequency with an 8-item scale proposed by Zmud, Sener, Wagner [Zmud, Sener, Wagner, 2016] ($\alpha = 0.631$, 99CIα [0.586, 0.673]). For assessing perceived risks (*e. g.* "…may result in loss of privacy") and benefits (*e. g.* "…would make our lives more comfortable") of UAV usage, we used shortened and modified PANT (Public Attitudes Toward Nanotechnology) scale [Lin, Lin, Wu, 2013], ($\alpha = 0.631$, 99CIα [0.585, 0.673]).

Analytical Strategy

We aim to assess the impact of experimental factors and individual characteristics on the lay attribution of agency and responsibility to human and non-human actors. To achieve this, we treated three experimental factors as fixed factors while considering individual indexes as covariates in the model. We constructed separate models for agency and responsibility attribution, respectively. In the initial stage, we assessed models that included all potential covariates and eliminated insignificant ones through a stepwise process to obtain the final models. We controlled models for the absence of residual heterogeneity in covariates, the unimodal distribution of residuals, and the absence of multicollinearity of covariates.

All calculations were performed using IBM SPSS software with a significance level (α) of 0.01, corresponding to a 99 % confidence level. We employed General Linear Modeling (GLM) instead of Repeated Measures ANOVA for the analysis. This decision was made due to utilizing an entirely random assignment of vignettes to participants, resulting in expected missing values for unassigned experimental conditions. It is important to note that this approach may yield smaller calculated effect sizes, as all experimental factors are treated independently, analogical to between-groups factors in Repeated Measures ANOVA. To determine the effect direction of the main experimental factors, we compared the marginal means without adjusting the confidence intervals for the assumption of equal variances.

Results

Agency Attribution

The analysis revealed that social trust level ($F = 2.574$, $p = 0.109$, $\eta^2_p = 0.000$), perceived risks and benefits of UAV usage ($F = 0.895$, $p = 0.344$, $\eta^2_p = 0.000$), and frequency of technology usage ($F = 0.057$, $p = 0.811$, $\eta^2_p = 0.000$) did not exhibit a statistically significant effect on lay attribution of agency to actors in the military context. Consequently, these variables were excluded from the model. The model, which included the experimental factors and covariates, accounted for 37.6 % of the variance in agency attribution ($R^2_{adjusted} = 0.376$); see Table 1 for the model's results.

The Type of Mission. The factor of mission type significantly impacts the attributed agency ($F = 12.202$, $p < 0.001$, $\eta^2_p = 0.010$). The evaluations of the peacekeeping mission (A4) and the control condition (A8) significantly displayed the highest levels of the attributed agency. Additionally, the evaluation of defense missions (A2) stood out significantly. The agency of defending actors was rated higher compared to fire attack ($MD = 0.282$, $SE = 0.102$, $p < 0.01$, 99CI [0.020, 0.544]), fire adjustment ($MD = 0.278$, $SE = 0.102$, $p < 0.01$, 99CI [0.014, 0.542]), and air attack ($MD = 0.464$, $SE = 0.103$,

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$p < 0.001$, 99CI [0.199, 0.728]). For an overview of all pairwise mean differences, please refer to Table 2.

Table 1. ***Model Coefficients for Agency Attribution (N = 1103)***

	B	df	Mean Square	F	p	η_p^2
Corrected Model		55	560.506	97.241	.000	.380
Absolute Term	1.857	1	1067.497	185.198	.000	.021
Experimental Factors (main effects)						
The Type of Mission (A)		7	70.332	12.202	.000	.010
The Actor (B)		2	12640.412	2192.960	.000	.334
The Side of Conflict (C)		1	67.733	11.751	.001	.001
Experimental Factors (interaction effects)						
A * B		14	60.201	10.444	.000	.016
A * C		7	5.840	1.013	.419	.001
B * C		2	14.205	2.464	.085	.001
A * B * C		14	3.553	.616	.854	.001
Covariates						
Institutional Trust (ESS)	.064	1	70.073	12.157	.000	.001
Trust to UAV (HCI)	.152	1	210.984	36.603	.000	.004
Attitude to the Ability of the UAV to Act	.450	1	1303.525	226.146	.000	.025
Attitude to the Ability of the UAV to Reflect	.147	1	168.139	29.170	.000	.003
Individual Differences in Anthropomorphism (IDAQ)	.211	1	324.028	56.215	.000	.006
Control variables						
Gender	–.270	1	151.738	26.325	.000	.003
Age	–.011	1	54.254	9.412	.002	.001
Subjective Evaluation of Income	.048	1	63.695	11.050	.001	.001

Results showed (refer to the Supplementary Materials, Fig. 1.1.) that participants attribute higher agency to actors in non-military related operations than military ones.

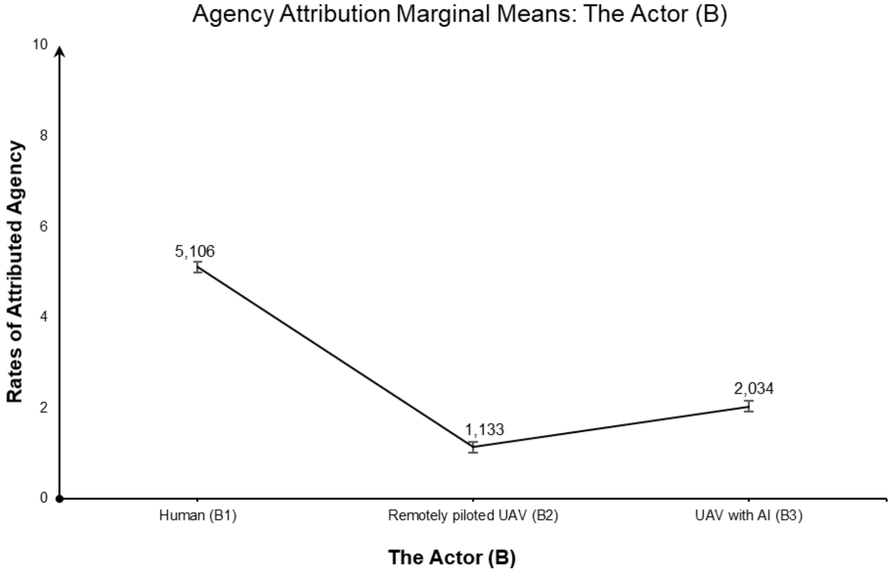
The Actor. The factor of the actor was found to have a significant impact on the attributed agency ($F = 2192.960$, $p < 0.001$, $\eta^2_p = 0.334$), with an effect size of 0.334, making it the most powerful effect in the model. The evaluations of human actors' agency were significantly higher compared to remotely piloted UAVs (MD = 3.974, SE = 0.063, $p < 0.001$, 99CI [3.812, 4.135]) and UAVs with AI (MD = 3.072, SE = 0.063, $p < 0.001$, 99CI [2.910, 3.234]). Notably, there was a significant difference in the attribution of agency to drones: UAVs with AI were attributed higher agency compared to UAVs under remote control (MD = 0.901, SE = 0.063, $p < 0.001$, 99CI [0.740, 1.063]). Participants rated human agency as the highest and differentiated between UAVs, attributing higher agency to those more autonomous and equipped with AI algorithms (see Fig. 1.2).

Table 2. ***Pairwise Differences in Attributed Agency, by factor (A) The Type of Mission***

J \ I	Fire Attack (A1)	Defense (A2)	Reconnaissance (A3)	Peacekeeping Mission (A4)	Adjustment of Fire (A5)	Air Attack (A6)	Suicide Bombing / Loitering Munition (A7)
Fire Attack (A1)							
Defense (A2)	–.282**						
Reconnaissance (A3)							
Peacekeeping Mission (A4)	–.516**	–.234*	–.418**				
Adjustment of Fire (A5)		.278**		.512**			
Air Attack (A6)		.464**	.279**	.698**			
Suicide Bombing / Loitering Munition (A7)				.419**		–.278**	
Control: Moon Soil Sampling (A8)	–.526**	–.244*	–.428**		–.522**	–.708**	–.429**

Notes: The difference (I — J) between factor levels is calculated for the corresponding cells. ** Significant with α = .01, * significant with α = .05. Non-significant differences are omitted.

Figure 1.2. Agency Attribution Marginal Means by factor (B) The Actor.
Scale ranging from 0 = “To absolutely low extent” to 10 = “To extremely high extent”.
Marginal means are presented, 99CI for means indicated with error bars



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The Side of Conflict. The factor of actor's affiliation was found to have a significant effect on the attribution of agency ($F = 11.751$, $p < 0.01$, $\eta^2_p = 0.001$). In scenarios where two state actors were engaged in a battlefield, participants tended to attribute higher agency to the side of the conflict associated with their own state (MD = 0.176, SE = 0.051, $p < 0.01$, 99CI [0.044, 0.308]). Conversely, participants attributed lower agency to the other side of the conflict (refer to the Supplementary Materials, Fig. 1.3.).

Covariates and control variables. In addition to the manipulated experimental factors, participants' individual characteristics influence agency attribution rates. Participants with higher levels of trust in governmental institutions (B = 0.064, 99CI [0.017, 0.112], SE = 0.018, T = 3.487) and higher trust in UAVs (B = 0.152, 99CI [0.087, 0.217], SE = 0.025, T = 6.050) tend to attribute higher levels of the agency to the actors. Participants who hold stronger beliefs in the ability of UAVs to act (B = 0.450, 99CI [0.375, 0.527], SE = 0.030, T = 15.038) and reflect (B = 0.147, 99CI [0.077, 0.217], SE = 0.027, T = 5.401) also tend to attribute higher agency to all actors. Similarly, participants with higher levels of individual tendencies in anthropomorphism (B = 0.211, 99CI [0.138, 0.283], SE = 0.028, T = 7.498) attribute higher agency to the actors. The model was controlled for gender, with male participants showing significantly higher rates of agency attribution (B = −0.270, 99CI [−0.405, −0.134], SE = 0.053, T = −5.131). Older participants tend to attribute lower levels of agency (B = −0.011, 99CI [−0.019, −0.002], SE = 0.003, T = −3.068), while participants with higher subjective income tend to attribute higher levels of agency (B = 0.048, 99CI [0.011, 0.086], SE = 0.015, T = 3.324).

Responsibility Attribution

The analysis showed that social trust level ($F = 2.866$, $p = 0.090$, $\eta^2_p = 0.000$), institutional trust ($F = 2.388$, $p = 0.122$, $\eta^2_p = 0.000$), and perceived risks and benefits of UAV usage ($F = 0.379$, $p = 0.538$, $\eta^2_p = 0.000$) did not have a statistically significant effect on lay attribution of responsibility to actors in the military and non-military context. None of the control variables showed statistically significant effects on responsibility attribution. As a result, these variables were excluded from the model. The model, which included the experimental factors and covariates, accounted for 59.7 % of the variance in responsibility attribution ($R^2_{adjusted} = 0.597$). Please refer to Table 3 for detailed results of the model.

Table 3. ***Model Coefficients for Responsibility Attribution***

	B	**df**	**Mean Square**	**F**	**p**	**η_p^2**
Corrected Model		52	1337.931	251.469	.000	.599
Absolute Term	.140	1	521.385	97.996	.000	.011
Experimental Factors (main effects)						
The Type of Mission (A)		7	10.156	1.909	.064	.002
The Actor (B)		2	32956.115	6194.231	.000	.586
The Side of Conflict (C)		1	31.272	5.878	.015	.001

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	B	df	Mean Square	F	p	η_p^2
Experimental Factors (interaction effects)						
A * B		14	15.990	3.005	.000	.005
A * C		7	.931	.175	.990	.000
B * C		2	9.519	1.789	.167	.000
A * B * C		14	.897	.169	1.000	.000
Covariates						
Frequency of Technology Usage (PANT)	.179	1	75.811	14.249	.000	.002
Trust to UAV (HCI)	.145	1	199.049	37.412	.000	.004
Attitude to the Ability of the UAV to Act	.386	1	964.145	181.215	.000	.020
Attitude to the Ability of the UAV to Reflect	.097	1	73.295	13.776	.000	.002
Individual Differences in Anthropomorphism (IDAQ)	.209	1	319.043	59.965	.000	.007

The Type of Mission. The analysis revealed that the type of mission factor did not significantly affect the attribution of responsibility ($F = 1.909$, $p = 0.064$, $\eta^2_p = 0.002$). No further analysis of marginal means was conducted.

The Actor. The factor of the actor had a significant impact on the attribution of responsibility ($F = 6194.231$, $p < 0.001$, $\eta^2_p = 0.586$), with a substantial effect size of 0.586, making it the most influential factor in the model. Consistent with the pattern observed in agency attribution, human actors were attributed significantly higher levels of responsibility compared to remotely piloted UAVs (MD = 5.975, SE = 0.060, $p < 0.001$, 99CI [5.820, 6.131]) and UAVs with AI (MD = 5.671, SE = 0.061, $p < 0.001$, 99CI [5.515, 5.827]). It is noteworthy that there was a significant difference in responsibility attribution to drones (see Fig. 2.1): UAVs with AI were attributed higher levels of responsibility compared to remotely piloted UAVs (MD = 0.304, SE = 0.060, $p < 0.001$, 99CI [0.149, 0.459]).

The Side of Conflict. The effect of the actor's affiliation with a particular side of the conflict did not reach statistical significance at the 99% confidence level. However, a significant effect was observed when the significance level was lowered to .05 ($F = 5.878$, $p = .015$, $\eta^2_p = .001$). Similar to the pattern detected and confirmed in agency attribution, participants tended to attribute higher levels of responsibility to the actor associated with their own country (MD = –0.120, SE = 0.049, $p = .015$, 99CI [–0.273, 0.007]), while attributing lower levels of responsibility to the opposing side.

Covariates. We observed several significant effects indicating the association between specific individual characteristics of participants and their rates of responsibility attribution. Participants who reported higher frequencies of technology usage tended to attribute higher levels of responsibility to the actors (B = 0.179, 99CI [0.057, 0.301], SE = 0.047, T = 3.775). Moreover, participants with higher levels of trust in UAVs were more likely to attribute higher levels of responsibility (B = 0.145, 99CI [0.084, 0.206],

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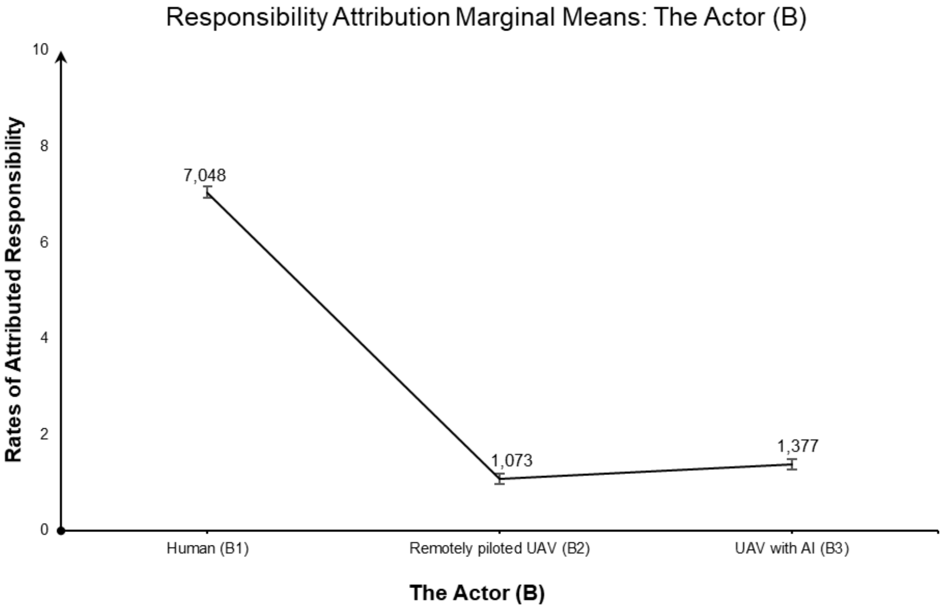
SE = 0.024, T = 6.117). Participants who held stronger beliefs in the ability of UAVs to act (B = 0.386, 99CI [0.312, 0.460], SE = 0.029, T = 13.462) and reflect (B = 0.097, 99CI [0.030, 0.164], SE = 0.026, T = 3.712) also tended to attribute higher levels of responsibility. Similarly, participants with higher levels of individual tendencies in anthropomorphism (B = 0.209, 99CI [0.139, 0.278], SE = 0.027, T = 7.744) attributed higher levels of responsibility to the actors.

Figure 2.1. Responsibility Attribution Marginal Means by factor (B) The Actor.
Scale ranging from 0 = "To absolutely low extent" to 10 = "To extremely high extent".
Marginal means are presented, 99CI for means indicated with error bars.



Discussion

Regarding Hypothesis 1.1., the effect is detected; its direction is that participants tend to attribute higher agency to actors who are acting in non-military related operations, compared to military ones.

This is an interesting result, obtained by incorporating an experimental factor into the research design that distinguishes different types of missions performed by agents, including non-military ones (control). First, this can be explained by the institutional context of the military environment, which is highly hierarchical and composed of numerous coordinated agents. Scholars studying subjectivity and agency argue that the ability to influence decision-making processes requires access to corresponding legal, material, and financial resources [Cleaver, 2004: 273]. Applied to combatants, this suggests that they are perceived as having less autonomy over their actions than civilians, as reflected in public opinion [Caspar et al., 2020: 5]. Second, it can be assumed that information about agents operating in non-military contexts is more accessible to the general public. Unlike civilian institutions, military structures are often more closed, making it difficult to form a comprehensive understanding of their activities. This lack of transparency may reduce the willingness of participants to attribute greater agency to military actors [Diakopoulos, 2020: 212]. Third, military operations may be perceived as more standardized and less volatile compared to non-military operations [Huntington, 1981], which could result in lower attributions of agency to agents acting within military contexts. Further investigation of this assumption could be conducted by incorporating military rank as a factor in the experimental design, as well as controlling for participants' assessments on the openness of military operations and their awareness of the activities of military agents.

Hypothesis 1.2 is not supported due to the lack of any significant effect. Based on these findings, we can conclude that the military or non-military context of action does not significantly influence lay responsibility attribution in the study.

The findings support Hypothesis 2.1: participants rated human agency as the highest and differentiated between UAVs, attributing higher agency to those more autonomous and equipped with AI algorithms. Hypothesis 2.2. is also supported: participants rated human actors with the highest levels of responsibility and differentiated between UAVs, attributing higher levels of responsibility to those more autonomous and equipped with AI algorithms.

The agency of fully autonomous drones with AI is rated higher than that of remotely piloted ones, suggesting a perceived increase in the ascribed agency with an increase in "autonomous power" — the "level of actions, interactions and decisions an agent is capable of performing on its own" [Hellström 2013: 101]. In the context of attributing responsibility, the same results are observed, which corresponds to the degree of actor agency and shows the "coercion effect" between agency and responsibility [Caspar et al., 2020: 2]. They can be related to the "responsibility gap" [Santoni De Sio, Mecacci, 2021: 1058] in using high-tech objects. We assume that when autonomous drones are used, the lay understanding tend to shift some degree of responsibility from the human to the drone. However, this conclusion cannot be drawn from the existing factor design, which opens one of the possibilities for further development of the research topic.

The findings support Hypothesis 3.1: participants tended to attribute higher agency to the side of the conflict associated with their own state. Conversely, participants attributed lower agency to the other side of the conflict. However, it is essential to note that Hypothesis 3.2 is not supported nor rejected due to the limited statistical power to detect a significant effect. Similar to the pattern detected and confirmed in agency attribution, participants tended to attribute higher levels of responsibility to the actor associated with their own country while attributing lower levels of responsibility to the opposing side.

Greater ascription of agency to one's own side can be interpreted as, on the one hand, a "mean to restore personal certainty after experiencing a loss of personal control" [Fritsche, 2022: 195], or, on the other hand, "active support of in-group goals" [ibid.: 196]. However, the lesser ascription of agency to the enemy may be associated with the negative bias and dehumanization of the out-group, also interpreted as a "perceptual screen," when "people belonging to the out-group are perceived as more similar to each other than they actually are," resulting in lower agency [Hameleers, Bos, De Vreese, 2016: 6].

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Conclusion

This paper explores the significance of understanding agency and responsibility in the context of non-human actors in state military conflicts in the view of public at large. It draws upon a theoretical framework that incorporates perspectives from R. Girard, M. DeLanda, and G. Chamayou on the role of technology in warfare, along with recent empirical studies on drone usage in modern military conflicts.

The primary contribution of this research is the assessment of agency and responsibility in military conflicts between two governmental actors made by general non-expert public, in contrast to previous studies that primarily examined scenarios involving non-state actors. The findings support the notion that human actors are attributed a greater degree of agency and responsibility than drones with varying autonomy levels. Moreover, an intriguing asymmetry is observed in attributions of agency, with participants' own side in the conflict being ascribed greater agency compared to the opposing faction. This asymmetry underscores the intricate interplay of cognitive biases, in-group favoritism, and contextual factors in shaping attributions of agency and accountability, thereby enriching our understanding of the complexities inherent in conflict dynamics.

It should be noted that the study was conducted during the ongoing of Special military operation between Russia and Ukraine. This is an additional factor influencing the results of the study, which, however, cannot be manipulated by the researchers. Further development of this research topic can be achieved by refining the factor design of the study to address more specific inquiries. For example, exploring the inclusion of military ranks for attributing responsibility and agency, along with power dispositions, could be valuable. Additionally, investigating the interaction between human and non-human actors within the same situation and time could provide insights into their responsibility distribution.

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