

LEGE ARTIS

Language yesterday, today, tomorrow

Vol. XI. No 1 2026

COGNITIVE MECHANISMS IN MULTIMODAL MISINFORMATION: THE CASE OF ANTI-VACCINE TWEETS

*Bożena Duda** 

Paulina Mormol-Fura 

University of Rzeszów, Rzeszów, Poland

**Corresponding author*

Received: 7.08.2025 **Reviewed:** 30.01.2026 and 30.03.2026

Similarity Index: 1%

Bibliographic description: Duda, B. & Mormol-Fura, P. (2026). Cognitive mechanisms in multimodal misinformation: The case of anti-vaccine tweets. In *Lege artis. Language yesterday, today, tomorrow*. Trnava: University of SS Cyril and Methodius in Trnava, XI (1), p. 41-61. ISSN 2453-8035 DOI: <https://doi.org/10.34135/lartis.26.11.1.03>

Abstract: This study investigates the cognitive mechanisms underpinning multimodal misinformation in anti-vaccine tweets. Multimodal misinformation is understood as misleading content communicated through the interaction of verbal and visual modes in social media messages. The study focuses on metaphor and metonymy as key resources in the construction of verbo-pictorial meaning in online communication. The findings indicate that metonymy plays a central role in shaping multimodal representations of vaccination, while metaphor is of secondary importance.

Keywords: multimodal misinformation, metonymy, metaphor, anti-vaccine tweets, discourse framing.

1. Introduction

The topic of misinformation, though by no means new, has received considerable scholarly attention over the past decade (see, for example, Allcott & Gentzkow 2017; Di Domenico et al. 2021; Fulgoni & Lipsman 2017; Grieve & Woodfield 2023; Tandoc et al. 2018). Much of this research has been conducted within the fields of media studies, sociology and political communication and has primarily focused on the societal, political and economic consequences of misinformation. However, comparatively fewer studies address the linguistic and multimodal mechanisms through which misleading content is constructed and communicated in social media environments (e.g., Cheng et al. 2021; Di Domenico et al. 2021; Wilson et al. 2023). In particular, the role of cognitive mechanisms, such as metaphor and metonymy, in shaping multimodal misinformation on social media remains relatively underexplored (e.g., Abdel-Raheem 2023; Sperandio 2020). Consequently, further research



into the cognitive and semiotic processes underlying the construction of multimodal misinformation is warranted. The aim of the present study is to examine how metaphor and metonymy operate in verbo-pictorial anti-vaccine tweets. The analysis draws on insights from cognitive linguistics and multimodal discourse analysis.

Attention is therefore devoted to the multimodal nature of misinformation circulating on social media in relation to vaccination debates. Within the cognitive linguistic framework, this analysis focuses on metaphor and metonymy as mechanisms shaping meaning in verbo-pictorial communication, while insights from Critical Discourse Analysis are used as a supporting perspective to contextualise the discursive positioning of social actors and viewpoints (Hart 2008; 2010; 2011). For the purpose of the present study, *multimodal misinformation* is understood as misleading or factually inaccurate content conveyed through the interaction of more than one semiotic mode, most commonly verbal and visual elements. The term *anti-vaccine tweets* is used to refer to social media messages published on Twitter (now X) that express scepticism toward vaccination or discourage vaccine uptake. Against this background, the study addresses the following research question: how do metaphor and metonymy function as cognitive mechanisms structuring multimodal misinformation in anti-vaccine tweets?

2. Misinformation – a terminological challenge

In order to understand the complex nature of misinformation it is crucial to note that the first occurrence of intentional falsification of news items goes back to the 16th-century political newsletters *avvisi*, which appeared in Italy and spread all across Europe, and which were soon accused of circulating false information, for example to mislead an enemy during a war. In more recent history, as reported by Grieve and Woodfield (2023: 2-3), fabricated news was used in order to manipulate the public during World War I (to help American President Wilson refrain from involvement in the war), during the Cold War (to undermine the USA and other foreign countries by the use of the so-called *dezinformatziya* in the USSR), or during the Iraq war (to justify the joining of the UK in the coalition with the USA). It seems that political issues, such as international conflicts and elections, are most likely the source and the topic of false information. The COVID-19 pandemic, though not a war in a literal sense, was often conceptualised as one (see Musolff 2022), and became a topic around which misinformation multiplied. As Tandoc et al. (2018: 13) elucidate, "[...] fake news needs the nourishment of troubled times in order to take root. Social tumult and divisions facilitate our willingness to believe news that confirms our enmity toward another group". Although the authors

specifically refer to fake news, this observation may be extended more generally to misinformation, which likewise thrives in the contexts of social division and uncertainty.

Even though the fabricating of news and information has been with us since the 16th century, what definitely changed about it during the second decade of the 21st century is the new channel through which misinformation spreads more easily and far more quickly, namely social media, and digital communication in general. These new means of communication and news dissemination have led to people being virtually bombarded with information non-stop, and have resulted in a state recognised as *infodemic*, characterised by an overwhelming excess of information that is often false or misleading (van der Linden 2022: 460). What is more, people can now choose which news providers they want to follow and, hence, they can only focus on the information which aligns with their views and beliefs. This phenomenon has become known as *echo chambers* and is believed to reinforce people's existing beliefs and to decrease the likelihood of encountering diverse or opposing viewpoints (cf. Grieve & Woodfield 2023: 4). Regrettably, despite the fact that the information shared on social media is rarely fact-checked, people tend to perceive it as just as reliable as news shared through traditional outlets, with the exception of the press (Wang et al. 2019: 2). To complicate this matter further, the systematic literature review performed by the authors (2019: 7) reveals that false information is prevalent online and frequently enjoys greater popularity than legitimate news, with social media sites such as Twitter (now X) causing considerable concern in view of their exceptional ability to spread misinformation (Jussila et al. 2021: 2). Bearing in mind the unprecedented transmission of false information online, it is hardly surprising that researchers working within the field tend to utilise models and terminology derived from the domain of epidemiology; thus, misinformation is conceptualised as a viral pathogen passed on from one person to another, with certain individuals acting as superspreaders and others joining forces to cognitively immunise society against it (see van der Linden 2022). On the other hand, it is worth mentioning that social media has enabled greater public scrutiny and may prevent misinformation, in general, from spreading.

Within the realm of studies focusing on false information, one may distinguish the three most commonly used, overlapping terms, namely: *misinformation*, *disinformation*, and *fake news*. Owing to the paucity of precise definitions, said labels are often used interchangeably (Jussila et al. 2021: 3). Recent research on health-related misinformation has further highlighted the complexity of defining and addressing misleading information in contemporary communication environments. In particular, studies in health communication emphasise the persistence of inaccurate beliefs, and the difficulties associated with correcting misinformation once it becomes embedded in public discourse (see Schulz

& Nakamoto 2024; Zhou & Shen 2025). Such research demonstrates that misinformation is not only a matter of factual inaccuracy but also involves cognitive and communicative processes shaping how individuals interpret and retain information. In view of these complexities, many studies adopt the broader term *misinformation* to refer to misleading or inaccurate content circulating in digital communication, without necessarily determining the communicative intentions behind it (see Jussila et al. 2021; van der Linden 2022; Wang et al. 2019). Therefore, in order to avoid confusion, for the purpose of the ongoing analysis the authors adopted the all-embracing term *misinformation* for all types of false, factually inaccurate or misleading information circulating online. In doing so, we aim not only to prevent prospective terminological discrepancies, but also to bypass a number of yet unresolved issues, a few of which we shall now briefly describe. To start with, *disinformation* and *misinformation* are both used in reference to false or misleading information, with the former often being seen as concocted wilfully, and the latter characterized as being created or shared without malicious intentions (Wardle & Derakhshan 2017). However, in any scientific investigation in which the researcher assumes the role of an observer rather than a participant "intent can be difficult to establish" (van der Linden 2022: 460). Further controversies surround the term *fake news*, described in "Fake news: Understanding media and misinformation in the digital age" (2020: 15) as "social media circulation of false information mimicking the style of contemporary news". Viewing the above definition from the wide perspective of current research (e.g., van der Linden 2022: 360-461) and keeping in mind the ever-so-subtle ways in which Internet users are being manipulated on a daily basis, one may come to the conclusion that news items do not have to be blatantly *fake* in order to be misleading. Furthermore, it is worth noting that after the 2016 US presidential election, the term under scrutiny started functioning in the public domain as a politicised rhetorical device to such a degree that certain scholars insist upon rejecting it altogether in favour of the already-mentioned *misinformation* (Wang et al. 2019: 2).

As noted above, *multimodal misinformation* is understood in this study as misleading or factually inaccurate content conveyed through the interaction of verbal and visual modes. In social media communication such messages frequently combine written text with images, memes, screenshots or other visual elements which contribute to the interpretation of the message and shape its persuasive potential. In the present study, the focus is on verbo-pictorial messages circulating on social media platforms.

The term *anti-vaccine tweets*, introduced above, refers to social media messages expressing scepticism toward vaccination, questioning vaccine safety or effectiveness, or discouraging

vaccination uptake. The term *tweet* is retained throughout the paper because the analysed material was collected when the platform was still officially called Twitter, and its messages were referred to as tweets. Although the platform was rebranded as X in 2023 and the term *post* is now used in the interface, the term *tweet* remains widely used in academic literature.¹ From a linguistic perspective, tweets may be treated as a genre of short-form digital discourse characterised by brevity, high intertextuality and frequent multimodal composition combining textual and visual elements. While tweets often circulate alongside other forms of misinformation, such as fabricated news or misleading headlines, they constitute a distinct genre of social media communication whose structural and multimodal properties influence how misinformation is constructed and interpreted.

3. Corpus data and methodology

Having identified the phenomena that constitute the mainstay for the upcoming discussion, we shall now describe the methodological aspects of our study. Principally, the present paper attempts to address the following research question: how do metaphor and metonymy function as cognitive mechanisms structuring multimodal misinformation in anti-vaccine tweets?

As regards the subject matter of the paper, it focuses solely on misinformation revolving around the topic of the COVID-19 pandemic. The choice of relevant research material was inspired by a report² published in 2021 by the non-profit organization The Center for Countering Digital Hate³ (henceforth CCDH), which examined a sample of anti-vaccine content shared and posted on Facebook and Twitter. The main assumption governing the foregoing inquiry was that while a great many people may disseminate anti-vaccine information on social media platforms, the original message they share can be traced back to a handful of creators. Despite being a mere hypothesis, the above-mentioned conjecture seems valid, since – according to the report – 12 individuals (i.e., Joseph Mercola, Robert F. Kennedy, Jr., Ty and Charlene Bollinger, Christiane Northrup, Sherri Tenpenny, Rizza Islam, Rashid Buttar, Ben Tapper, Erin Elizabeth, Sayer Ji, Kelly Brogan and Kevin Jenkins), labelled as *The Disinformation Dozen*, were proven to be responsible for up to 65% of anti-vaccine content on the social media platforms scrutinised in the sample, including 17% of anti-vaccine information shared on Twitter (now X).

Following this and bearing in mind the research question posed above, we first decided to create a corpus composed of messages shared by the members of *The Disinformation Dozen*. Specifically, we aimed to collect the 100 most retweeted tweets from each individual. Since Twitter itself does not possess any in-built functionality that would allow its users to segregate tweets based on the number

of retweets, we were forced to employ an external instrument that offers such a feature, in this case the social media content analysis tool *Popsters*⁴. During data collection, several limitations emerged. In May 2022, Twitter introduced its crisis misinformation policy, leading to the suspension of numerous accounts disseminating anti-vaccine content. Although most accounts were later reinstated, some tweets had been permanently removed. Consequently, the accounts of Ty and Charlene Bollinger and Kelly Brogan were excluded from the study. In addition, the accounts of Kevin Jenkins and Ben Tapper were reinstated only in January 2023, resulting in a reduced number of tweets within the selected timeframe. As a result, the final corpus comprises 932 tweets that were among the most frequently retweeted posts produced by the analysed accounts, rather than the initially intended 1,200.

As regards data collection, the timeframe adopted for the purpose of the study spans 19 months, starting on 1st September 2021 and ending on 31st March 2023. The choice of the starting point was not arbitrary, as it coincides with the official approval of the first COVID-19 vaccine, namely Pfizer-BioNTech⁵, an event which undoubtedly generated intense anti-vaccine sentiments that were frequently voiced in online discussions.

Since the research material was meant to be analysed both quantitatively and qualitatively, it had to be subjected to additional processing aimed at classifying collected examples. The initial corpus comprised 932 tweets and was divided into two analytically distinct categories: 458 mono-modal tweets operating exclusively on the verbal mode, and 474 multimodal tweets combining verbal and visual elements. The latter category also included tweets containing automatically generated link previews (see Fig.1), as these incorporate visual components (i.e., thumbnails) that contribute to interpretation and user engagement.



Figure 1. An example of a link preview. Source: <https://x.com/RobertKennedyJr/status/1578886708547837952>

Given the multimodal focus of the study, only the latter group (N = 474) was subjected to further analysis. From this subset, 158 tweets were retained based on their explicit reference to vaccination. Within this reduced dataset, metaphorical and/or metonymic mappings were identified in 113 tweets, indicating that figurative cognitive mechanisms play a prominent role in vaccination-related multimodal misinformation.

As noted above, in an effort to answer the research question, the present study seeks to synthesise both quantitative and qualitative data. In the strict sense, the paper falls within the ambit of explanatory sequential mixed methods, as described by Creswell and Creswell (2018: 51-52; 304-305), in which a quantitative analysis is followed by a qualitative one, as a means to foster a more complete and complex understanding of the research problem in question.

Following the cognitive linguistic approach to Critical Discourse Analysis (CDA) as proposed by Hart (2008; 2010), the analysis focuses on cognitive mechanisms of metaphor and metonymy, which are used to reinforce and spread ideologies (cf. Duda & Nycz 2022 for other expressive functions of metaphor and metonymy in discourse). This approach also responds to the long-standing problem in CDA of how to account for the mediation between discourse and society, for which Wodak (2006) explicitly argues that socio-cognitive concepts are indispensable, as they provide the missing link

between linguistic form, social practice, and ideological meaning. This falls within the scope of referential strategies, which – according to Hart (2010: 49) – "can be used to exploit human capacity for categorizing coalitional groups in terms of a dichotomous in-group and out-group". What is more, the way in which in-groups and out-groups are constructed depends on a number of cues, cultural ones being the most prominent. Most importantly, as illustrated by Hart (2010; 2011), metaphor as a construal operation – especially involving the blending of elements from two input spaces, through a generic space, to create the fourth emergent output space (Fauconnier & Turner 2002) – has an incredible power of representing and reinforcing people's beliefs, which is crucial for text-producers in constructing ideologically loaded messages. In turn, metonymy being a kind of profiling/backgrounding cognitive mechanism – as based on Littlemore's (2015) research findings, as well as those of Hart (2011) and Brône and Feyaerts (2003) – plays a number of roles in ideological discourse, for example as a referential strategy to emphasise certain characteristic features of social actors or as a marked reference-point construction in humour processing.

In turn, the distinction between mono-modal and multimodal tweets is based on a well-grounded understanding of modality as "the channel used as the manner of execution" (Żebrowska 2014: 8), and of modes which "embody the qualities of perception" (Holly 2009: 392, as quoted in Żebrowska 2014: 9). Since the distinction between the two terms is largely a matter of analytical focus, the term mode will be employed throughout the present study. As Górska (2020: xiii) elucidates, a single communicative act may be expressed with the use of different semiotic modes (verbal, visual/pictorial, gestural, sound, music, and so on) which may be combined in a number of ways. The present research focuses on multimodal tweets operating on at least two modes, here verbal and visual/pictorial being the most frequent combinations. Within the pictorial mode, the examples chosen for the qualitative analysis represent only the so-called static visuals, that is photos and pictures, as the analysis of videos and clips (dynamic visuals, to use Forceville's (2020) taxonomy) requires more elaborate analytical tools, and hence will be incorporated in our future research on manipulation and misinformation in digital discourse.

4. Quantitative distribution of metaphor and metonymy

In the final dataset of 113 messages, metonymy proved to be the dominant device, with a total of 158 metonymic instances identified, often with more than one metonymic relation occurring within a single tweet. The most frequent metonymic patterns – restricted to those identified more than once in the dataset – are presented in Table 1, and include INSTRUMENT FOR ACTION (e.g. *syringe* for vaccination), PERSON FOR ACTION ASSOCIATED WITH THAT PERSON (e.g. *Dr Fauci* for

mandatory vaccination), PRODUCER FOR PRODUCT (e.g. *Pfizer* for vaccine), SYMBOL FOR INSTITUTION (e.g. *a gavel* for court in the context of vaccine-related lawsuits), ACTION FOR EFFECT (e.g. *vaccination* for myocarditis), PRODUCT FOR ACTION (e.g. *vaccine* for vaccination), and PART FOR WHOLE (e.g. *a hole in the skin* for vaccine injection) alongside a range of less frequent but analytically relevant institutional and causal relations.

Table 1. Recurrent metonymic patterns in the multimodal anti-vaccine dataset. Source: Own processing

Metonymic pattern	Frequency
Instrument for action	25
Person for action	17
Producer for product	17
Symbol for institution	15
Action for effect	14
Product for action	12
Part for whole	10
Container for contents	8
Cause for action	6
Institution for people	5
Institution for action	4
Person for institution	3
One of many	3
Feature for a person	3
Effect for action	2
Place for institution	2
Tool for profession	2
Place for people	2

The foregoing distribution suggests that metonymy functions as a key cognitive mechanism, enabling the compression of complex medical, social, and institutional processes into cognitively salient representations that facilitate ideological positioning and the effective dissemination of misinformation without the need for explicit argumentation.

In contrast, metaphorical mappings were relatively rare in the dataset, with only 22 metaphorical instances identified. Among these, orientational metaphors accounted for 13 cases, including MORE/GOOD IS UP (10 instances) and LESS/BAD IS DOWN (3 instances), while the remaining examples involved incidental instances of metaphorical blending rather than systematic metaphorical frameworks. The marked imbalance between the frequency of metonymy (158 instances) and metaphor (22 instances) suggests that multimodal anti-vaccine misinformation relies primarily on local, context-dependent metonymic shortcuts rather than on elaborate cross-domain metaphorical mappings. These quantitative tendencies provide the empirical grounding for the qualitative analysis

that follows, in which selected verbo-pictorial tweets are examined to illustrate how specific metonymic and metaphorical construals interact with visual framing to enhance the persuasive force of misinformation.

5. Multimodal analysis of selected verbo-pictorial tweets

In alignment with the mixed-methods approach outlined above, the examples for the upcoming qualitative analysis were selected using purposive sampling, also referred to as a qualitative method of filling the sample. This approach entails "selecting research subjects rather than starting with a predetermined sampling frame" (Robinson 2023: 5645). The decision to employ this method was guided by its successful application in studies examining Twitter (now X) (cf. Sibona & Walczak 2012; Sibona et al. 2020), as well as in research analysing multimodal texts (Czachur et al. 2022; Mormol-Fura & Kopecka 2025). More importantly, however, using purposive sampling in our study allows for the selection of diverse and representative examples that most effectively demonstrate the cognitive mechanisms involved in the manipulation of verbo-pictorial information, or more specifically, the creation of COVID-19 misinformation within the realm of digital discourse.

5.1 Metonymy and irony/humour in COVID-19 tweets

The first two examples in the ongoing analysis are centred around manipulation and misinformation through injecting humour, and also, as described by Tandoc et al. (2018: 6-7) through playing "on the ludicrousness of issues". Here, metonymy contributes primarily to humour and irony through marked reference-point constructions and incongruity (cf. Brône & Feytaerts 2003). In contrast, the third example illustrates a more typical use of metonymy as a referential and expressive cognitive mechanism, whereby selected elements of a scene are foregrounded in order to shape the evaluative interpretation of the message (cf. Littlemore 2015; Hart 2011).

In the first example presented in Figure 2 below, the combination of three modes may be observed, namely visual (iconic), written language and spoken language. At a visual level, we can see a close-up from the poster advertising the well-known 1990s film entitled *Mrs. Doubtfire* picturing the main character; here, an iconic visual representation serves the purpose of providing the background for the wordplay which takes place at a verbal level. The name is changed from *Mrs. Doubtfire* to *Mrs Doubt Pfizer* in order to evoke a PRODUCER FOR PRODUCT metonymic mapping, whereby the name of the pharmaceutical company stands for the vaccine it produces, thus activating associations related to vaccination through a single lexical element. At the level of written language, in turn, the second element of the morphologically complex surname, that is *-fire*, is changed to an independent

morpheme *Pfizer*, while at the level of spoken language, the modification involves a mere addition of the sound [z].



Figure 2. Ben Tapper's tweet of 3 February 2023.
Source: <https://x.com/DrBenTapper1/status/1621286669067362304>

The cognitive mechanism of metonymy, which is at work here, whereby Pfizer stands for a COVID-19 vaccine the company produces, plays a couple of roles (see Brône & Feyaerts 2003). Firstly, metonymy is used here as a euphemism to juxtapose contrastive 'out-group' and 'in-group' perspectives on vaccination (see Littlemore 2015) and hence forms coalitional groups through polarisation schema (van Dijk 1998). Instead of using the direct term *anti vaxxer*, the author of the tweet postulates the use of the milder indirect term *Mrs Doubt Pfizer*, in this way suggesting that their attitude towards vaccination is not as strict as those belonging to the 'out-group' should think, but rather reserved. Additionally, the combination of these three modes generates a humorous effect in making up the new name – *Mrs Doubt Pfizer* – for a person who is reluctant to have the COVID-19 vaccination, or inoculation in general. The specificity of humour interpretation in this tweet depends on the selection through profiling and metonymy (Brône & Feyaerts 2003: 13-14; Hart 2011: 174-179), whereby the term *anti vaxxer* profiles that out-groupers see the author and the members of their group as opponents or enemies of vaccination, and the term *Mrs Doubt Pfizer* highlights that the author and the members of their group, in-groupers, actually see themselves as not the ones opposing COVID-19 vaccines, but doubting it and asking questions. In this way the author skilfully and gently reinforces their audience's beliefs about COVID-19 vaccines, and most likely about inoculation in general, a strategy consistent with the construction of in-group and out-group identities described in CDA (van Dijk 1998; 2006).

As for the second example presented in Figure 3, the tweet combines two modes, namely visual and written language. What strikes a reader most in the visual aspect of this tweet is its largely metonymic

nature. There is a clear contrast between the person on the left (covered in a large number of symbols and icons and carrying a large Progress Pride Flag combined with a sign symbolising Islam) and the person on the right (wearing black and carrying a small American flag). Looking at the individual on the left, we can name a number of metonymic mappings that give rise to an almost grotesque picture of a faceless figure embodying a wide range of ideas and/or institutions.



Figure 3. Christiane Northrup's tweet of 29 December 2022.
Source: <https://x.com/DrChrisNorthrup/status/1608255299261022208>

First of all, five syringes evoke a CONTAINER FOR CONTENTS metonymic mapping (a syringe metonymically represents a vaccine) or as INSTRUMENT FOR ACTION metonymy, in which a syringe stands for taking a vaccine. In more detail, the two syringes in the person's right arm most likely represent the original two doses of COVID-19 vaccines and the three syringes in the person's left arm may represent booster shots. Another, here COVID-19 related, metonymic mapping SALIENT PROPERTY OF A CATEGORY FOR THE WHOLE CATEGORY is realised visually through the surgical face mask, which represents COVID-19 restrictions. The remaining symbolic signs (Progress Pride Flag, black star and crescent, Black Lives Matter, red hammer and sickle, Pink Venus and Fist, Chinese yin yang, CNN, Google, YouTube, Facebook, Twitter and a few others) all represent metonymically different ideologies and institutions through a PART FOR WHOLE relationship. In this case, a symbol stands for an institution (e.g., CNN, Facebook, Twitter) or for an ideology (e.g., Islam, Communism). It may also represent a social movement or a group of people (e.g., LGBTQ, people of colour, women's liberation movement). In contrast, the person on the right is wearing black and the only symbol that we can see is an American flag, which may be interpreted metonymically as standing for national identity or a set of socio-political values associated with it. Unlike the person on the left who is faceless, the one on the right has the face of an ancient philosopher,

blond hair, blue eyes and a beard, and is known as Yes Chad, whose image is often used in social media to debase an interlocutor, especially when the interlocutor tries to mock or bully the other party. Here, the image may be interpreted as MEMBER OF A CATEGORY FOR CATEGORY (GREEK PHILOSOPHERS) metonymy, and more specifically as a metonymic pattern GREEK PHILOSOPHER/-S FOR WISE/INTELLIGENT PEOPLE.

Additionally, at the verbal level there is an 'us and them' construal represented in the speech bubbles, which can be interpreted as a form of discursive polarisation strategy. The person on the left saying *They brainwashed you*, suggests that *they* – meaning a dominant social group or institution, the 'out-group' – influenced the beliefs of the person on the right. The latter replies, *Really?*, which is clearly an ironic question implying that, looking at all these symbols, it is actually the person on the left that must have been manipulated by all of the groups and organisations visually represented all over him/her. This example is multimodal evidence that, as Littlemore (2015: 103) suggests, "metonymy [...] has the potential to be a more manipulative trope than metaphor because it is more subtle and less likely to be noticed". Such constructions contribute to the discursive framing of anti-vaccine positions as acts of resistance against perceived institutional authority and demonstrate how metonymy contributes not only to humour and irony, but also to the discursive construction of ideological divisions.

In contrast to the previous examples, which rely on humour and irony, the following tweet, presented in Figure 4, illustrates a more typical form of metonymic construal, frequently observed in the dataset, where visual elements associated with vaccination activate the broader vaccination context and frame the issue in expressive terms. The tweet combines two modes, namely visual and written language. At the visual level, the image depicts a syringe being placed next to a vial containing a vaccine, both positioned on a medical tray. The visual composition foregrounds objects associated with the act of inoculation and thereby evokes the concept of VACCINATION through several metonymic mappings. First of all, the syringe functions as an instance of INSTRUMENT FOR ACTION metonymy, whereby the instrument (syringe) stands for the act of vaccination. Closely related is the PRODUCT FOR ACTION relation, in which the vaccine itself stands metonymically for the process of vaccination. Additionally, the hand holding the syringe may be interpreted as PART FOR WHOLE metonymy, where a body part (hand) stands for the person performing the action, most plausibly a medical professional administering the injection.

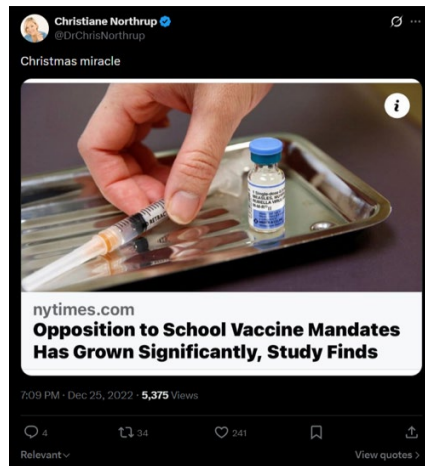


Figure 4. Christiane Northrup's tweet of 25 December 2022.
Source: <https://x.com/DrChrisNorthrup/status/1607076044854464513>

At the verbal level, the short caption *Christmas miracle* introduces an evaluative frame that contrasts with the visual representation of medical intervention. The juxtaposition of the caption with the image suggests that the reported increase in opposition to school vaccine mandates – referenced in the link preview to a New York Times article – is presented as a positive or celebratory development. In this way, the tweet relies on visually grounded metonymic relations to activate the concept of VACCINATION, while simultaneously framing the reported social reaction to vaccine mandates in an approving light, and thereby presenting opposition to vaccination policies as a form of legitimate resistance.

5.2 Conceptual blending in COVID-19 tweets

In a small number of verbo-pictorial tweets we observe clear emergent structures, which may be interpreted in terms of conceptual blending (see Fauconnier & Turner 2002; Hart 2008; 2010). Therefore, one representative example is discussed below to illustrate how verbo-pictorial tweets may construct persuasive meanings through integration networks.

In the example shown in Figure 5 below, we also observe a construction of verbo-pictorial blended space involving an emergent structure, in which elements in each input space are combined together through completion, as illustrated in Figure 6 below. In two counterpart input spaces the theme of superheroes is conveyed visually, referred to as Truth Heroes, alongside the textually presented action of fighting for people who *are injured and gas-lighted by Big Pharma*. The two input spaces are connected through a generic space, which contains the abstract theme/action structure of agents defending others against a perceived threat. Elements from both inputs are selectively projected into the blended space, where the members of the so-called Disinformation Dozen (as presented in CCDH)

are conceptualised as heroic defenders fighting on behalf of victims of alleged pharmaceutical manipulation, and resisting the perceived dominance of institutional actors such as governments and pharmaceutical companies. Note that the faces of the superheroes depicted on the tweet are mimetic icons of the Twitter profile pictures of the so-called Disinformation Dozen. The blending process here results in the emergent structure, whereby providing people with true information about vaccines by the 'information dozen'/experts, is conceptualised as superheroes fighting for people in need (those injured and tricked). It is worth noting that selective projection is present in the blended space analysed. The part and parcel of our background knowledge about superheroes is that they are good and that they always fight evil in the world. These relevant structures, however, are not projected in the blended space because, most probably, the author chose to leave this implied rather than overtly stated. As Hart (2008: 97) elucidates, "integration networks are constructed according to speakers' communicative (and rhetorical) intentions. In other words, ideologically, speakers may choose to recruit a particular structure in order to promote a certain perceived reality", a process that aligns with CDA accounts of discursive representation and ideological positioning.

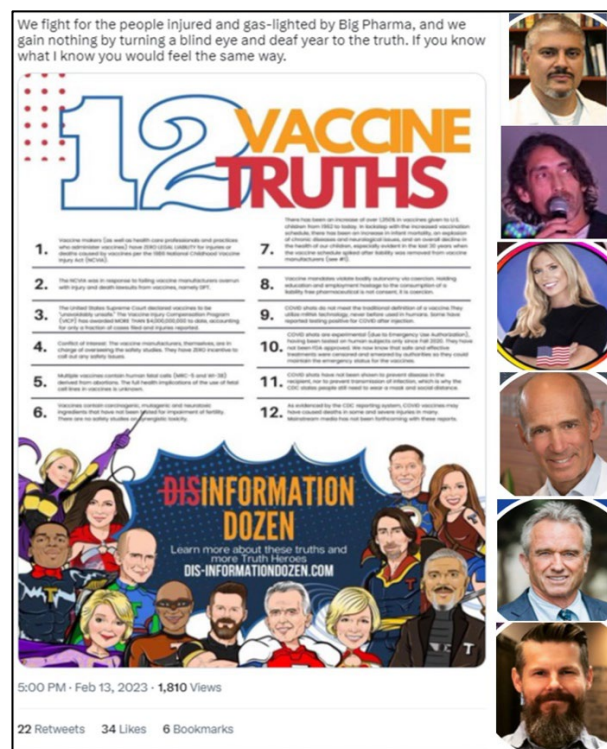


Figure 5. Ben Tapper's tweet of 13 February 2023, and – on the right – profile photos of some of the people portrayed in the tweet. Source: <https://x.com/DrBenTapper/status/1625162953161953282>

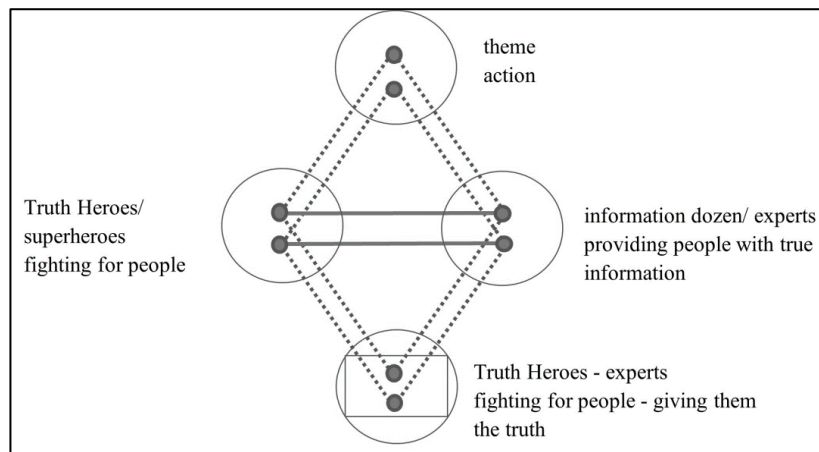


Figure 6. Conceptual blending network for 'superheroes fighting for the truth for people'. Source: Own processing

Additionally, an aspect of the tweet that strikes the recipient is what in "Multimodal argumentation and rhetoric in media genres" (2017) is called multimodal paradox. There is a clear contrast between the two states presented in the tweet, namely the name of the group *disinformation dozen*, which shows completely opposed viewpoints on the COVID-19 vaccines. There is, again, 'us and them' construal, through which we, 'in-group', believe we are information dozen, and they, 'out-group', think we are disinformation dozen. This juxtaposition is further evidenced in the statement, *If you know what I know you would feel the same way*, which suggests that the author of the tweet has the knowledge, which gives them power and emphasises their superior position.

6. Conclusions

The data analysis conducted as part of our research shows that verbo-pictorial tweets constitute a substantial proportion of the dataset and frequently rely on visually grounded cognitive mechanisms to convey simplified and emotionally salient representations of vaccination-related issues. It is possible that multimodal tweets are highly popular due to the fact that a single, often simple and symbolic, visual element can effectively encapsulate a significant amount of information that is easily decoded by the recipient. This economy of expression proves to be especially useful on Twitter (now X), which is a predominantly text-based platform with imposed character limitations (the length of a single tweet cannot exceed 280 characters). In other words, visually aided tweets are more expressive than messages which consist solely of text. Consequently, the results of our analysis contribute to the already existing research-based evidence, which shows that visual (mis)information is more persuasive and triggers emotional response more than pure verbal content (e.g., Heley et al. 2022). Heley et al. (2022: 515), who present a typology of visual misinformation stating the importance of using visuals as a manipulative discourse strategy, also stress that "visual manipulations are often imperceptible and easily overlooked, resulting in individuals accepting visual images as reality".

What is more, not only are visuals more engaging and salient, but they are also better understood, remembered longer and shared more eagerly.

As for cognitive mechanisms, metonymy emerges as the dominant device in the dataset analysed, while metaphor plays a supporting and often complementary role. Importantly, metonymy performs different functions depending on the communicative context. In some cases, it operates as a reference-point mechanism contributing to irony or humour, often through incongruity and the reinforcement of stereotypical representations used to ridicule an opponent in a debate. In other cases, however, metonymy assumes a more typical referential and expressive function, whereby selected elements are foregrounded in order to guide the evaluative interpretation of vaccination-related issues. This expressive potential of metonymy, as well as its capacity to become a manipulative discourse strategy, has already been acknowledged by researchers in cognitive linguistics and discourse studies (see, for example, Littlemore 2015). The presented analysis confirms these observations and further demonstrates that verbo-pictorial metonymy may be complex, highly productive, and frequently combined with other cognitive mechanisms, most notably metaphor. Many of these metonymic constructions also contribute to the discursive framing of vaccination debates as a struggle between institutional authority and individual autonomy, thereby presenting anti-vaccine positions as forms of resistance against perceived external control. In turn, the use of verbo-pictorial metaphor in the tweets allowed the authors to produce innovative and persuasive or, manipulative, construal operations with the view to stressing the opposing 'us and them' and hence manifesting negative representation of the 'out-group' (see Hart 2008).

When viewed through the prism of CDA (see van Dijk 2006), the examples discussed in this article may be interpreted as instances of discursive strategies that contribute to the construction and reinforcement of ideological positions in online communication. As evidenced by the qualitative analysis, the creators of misinformation employ a range of strategies typical of manipulative discourse, including emphasising their privileged access to knowledge, discrediting institutional sources of information, and encouraging audiences to adopt particular beliefs as factual. These strategies are closely related to the construction of in-group and out-group distinctions, which play a central role in shaping the interpretation of vaccination debates.

Undoubtedly, there remain a number of issues which necessitate further investigation, such as multimodal analysis of dynamic visuals combined with verbal messages also found in a number of tweets. Last but not least, although misinformation is the scope of studies of many scholars

representing various fields of knowledge, the integration of cognitive linguistics frameworks into discourse studies dealing with misinformation will not only enrich our knowledge on the topic, but may also result in constructing mechanisms of dealing with misinformation in an effective way.

Notes and abbreviations

1. Google Scholar search limited to publications from 2023 onward (i.e., following Twitter's rebranding as X) returned approximately 2,090 results for the search term *X posts*, compared to approximately 39,200 results for *tweet*, indicating the continued dominance of the latter term. Some most recent publications serving as evidence include, for example, Elmas et al. 2025 and Xu et al. 2026.
2. Available at: <https://counterhate.com/research/the-disinformation-dozen/>
3. CCDH aims to "protect human rights and civil liberties online" and "stop the spread of online hate and disinformation through innovative research, public campaigns and policy advocacy" (source: <https://counterhate.com/about/>).
4. Available at: <https://popsters.com/>. Intended primarily for influencers and professionals working in marketing, *Popsters* allows its users to analyse what types of posts attract audiences on a number of social media platforms.
5. <https://www.fda.gov/news-events/press-announcements/fda-approves-first-covid-19-vaccine>

CCDH – Centre for Countering Digital Hate

CDA – Critical Discourse Analysis

References


1. Abdel-Raheem, A. (2023). Where Covid metaphors come from: Reconsidering context and modality in metaphor. In *Social semiotics*, 33 (5), p. 971-1010. DOI: <https://doi.org/10.1080/10350330.2021.1971493>
2. Allcott, H. & Gentzkow, M. (2017). Social media and fake news in the 2016 election. In *Journal of economic perspectives*, 31 (2), p. 211-236. DOI: <https://doi.org/10.1257/jep.31.2.211>
3. Brône, G. & Feyaerts, K. (2003). *The cognitive linguistics of incongruity resolution: Marked reference-point structures in humor*. Unpublished manuscript. Leuven: University of Leuven, Department of Linguistics.
4. Cheng, Z., Kai, L. & Yanhong L. (2021). Linguistic characteristics and the dissemination of misinformation in social media: The moderating effect of information richness. In *Information processing & management*, 58 (6), p. 1-16. DOI: <https://doi.org/10.1016/j.ipm.2021.102679>
5. Creswell, J.W. & Creswell, J.D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. 5th ed. Los Angeles: Sage.
6. Czachur, W., Opiłowski, R. & Smykała, M. (2022). Multimodal practices of empathy and fear in Polish refugee discourse: Analysis of magazine covers. In *GEMA Online® journal of language studies*, 22 (3), p. 63-85. DOI: <https://doi.org/10.17576/gema-2022-2203-04>
7. Di Domenico, G., Tuan, A. & Visentin, M. (2021). Linguistic drivers of misinformation diffusion on social media

- during the COVID-19 pandemic. In *Italian journal of marketing*, 4, p. 351-369. DOI: <https://doi.org/10.1007/s43039-021-00026-9>
8. van Dijk, T.A. (2006). Discourse and manipulation. In *Discourse & society*, 17 (3), p. 359-383. DOI: <https://doi.org/10.1177/0957926506060250>
 9. van Dijk, T.A. (1998). *Ideology: A multidisciplinary approach*. London – Thousand Oaks – New Delhi: Sage publications. DOI: <https://doi.org/10.4135/9781446217856>
 10. Duda, B. & Nycz, K. (2022). Cognitive precision and expressiveness in stock market communication: A contrastive perspective. In *GEMA Online® journal of language studies*, 22 (4), p. 1-20. DOI: <https://doi.org/10.17576/gema-2022-2204-01>
 11. Elmas, T., Yilmaz, F. & Gürbüz, N. (2025). "Refugees from Ukraine are called humans": A corpus-based critical discourse analysis of Turkish tweets about Ukrainian refugees. In *Media, culture & society*, 47 (1), p.75-95. DOI: <https://doi.org/10.1177/01634437241271051>
 12. *Fake news: Understanding media and misinformation in the digital age*. (2020). Zimdars, M. & McLeod, K. (eds.). Cambridge, MA: The MIT Press. DOI: <https://doi.org/10.7551/mitpress/11807.001.0001>
 13. Fauconnier, G. & Turner, M. (2002). *The way we think: Conceptual blending and the mind's hidden complexities*. New York: Basic Books.
 14. Forceville, C. (2020). *Visual and multimodal communication: Applying the relevance principle*. Oxford: Oxford University Press. DOI: <https://doi.org/10.1093/oso/9780190845230.001.0001>
 15. Fulgoni, G.M. & Lipsman, A. (2017). The downside of digital word of mouth and the pursuit of media quality: How social sharing is disrupting digital advertising models and metrics. In *Journal of advertising research*, 57 (2), p. 127-131. DOI: <https://doi.org/10.2501/JAR-2017-020>
 16. Górski, E. (2020). *Understanding abstract concepts across modes in multimodal discourse a cognitive linguistic approach*. New York – London: Routledge. DOI: <https://doi.org/10.4324/9780429282737>
 17. Grieve, J. & Woodfield, H. (2023). *The language of fake news*. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/9781009349161>
 18. Hart, C. (2008). Critical discourse analysis and metaphor: Toward a theoretical framework. In *Critical discourse studies*, 5 (2), p. 91-106. DOI: <https://doi.org/10.1080/17405900801990058>
 19. Hart, C. (2010). *Critical discourse analysis and cognitive science*. London: Palgrave Macmillan. DOI: <https://doi.org/10.1057/9780230299009>
 20. Hart, C. (2011). Moving beyond metaphor in the cognitive linguistic approach to CDA: Construal operations in immigration discourse. In *Critical discourse studies in context and cognition*. Hart, C. (ed.). Amsterdam – Philadelphia: John Benjamins Publishing Company, p. 171-192. DOI: <https://doi.org/10.1075/dapsac.43.09har>
 21. Heley, K., Gaysynsky, A. & King, A.J. (2022). Missing the bigger picture: The need for more research on visual health misinformation. In *Sci commun*, 44 (4), p. 514-527. DOI: <https://doi.org/10.1177/10755470221113833>
 22. Jussila, J., Suominen, A.H., Partanen, A. & Honkanen, T. (2021). Text analysis methods for misinformation-related research on Finnish language Twitter. In *Future internet*, 13 (6), p. 1-16. DOI: <https://doi.org/10.3390/fi13060157>
 23. Littlemore, J. (2015). *Metonymy: Hidden shortcuts in language, thought and communication*. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/CB09781107338814>
 24. van der Linden, S. (2022). Misinformation: Susceptibility, spread, and interventions to immunize the public. In *Nature medicine*, 28 (3), p. 460-467. DOI: <https://doi.org/10.1038/s41591-022-01713-6>
 25. Mormol-Fura, P. & Kopecka, B. (2025). Commodification of misinformation: A multimodal analysis of conspiracy-


- themed T-shirts. In *Contributions to general and comparative linguistics*, 14, p. 203-230. DOI: <https://doi.org/10.23817/bzspr.14-8>
26. *Multimodal argumentation and rhetoric in media genres*. (2017). Tseronis, A. & Forceville, C. (eds.). Amsterdam – Philadelphia: John Benjamins Publishing Company. DOI: <https://doi.org/10.1075/aic.14>
 27. Musolff, A. (2022). 'War against Covid-19': Is the pandemic management as war metaphor helpful or hurtful? In *Pandemic and crisis discourse: Communicating COVID-19 and public health strategy*. Musolff, A., Breeze, R., Kondo, K. & Vilar-Lluch, S. (eds.). London: Bloomsbury Academic, p. 307-320. DOI: <https://doi.org/10.5040/9781350232730>
 28. Robinson, R.S. (2023). Purposive sampling. In *Encyclopedia of quality of life and well-being research*. Maggino, F. (ed.). 2nd ed. Cham: Springer, p. 5645-5647. DOI: https://doi.org/10.1007/978-3-031-17299-1_2337
 29. Schulz, P.J. & Nakamoto, K. (2024). *Worse than ignorance: The challenge of health misinformation*. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/9781009289542>
 30. Sibona, C. & Walczak, S. (2012). Purposive sampling on Twitter: A case study. In *2012 45th Hawaii international conference on system sciences*. January 4-7, 2012, Maui, USA, IEEE, p. 3510-3519. DOI: <https://doi.org/10.1109/HICSS.2012.493>
 31. Sibona, C., Walczak, S. & White Baker, E. (2020). A guide for purposive sampling on Twitter. In *Communications of the association for information systems*, 46 (1), p. 537-559. DOI: <https://doi.org/10.17705/1CAIS.04622>
 32. Sperandio, N.E. (2020). The role of multimodal metaphors in the creation of the fake news category: A proposal for analysis. In *Revista de estudos de linguagem*, 28 (2), p. 777-799. DOI: <https://doi.org/10.17851/2237-2083.28.2.777-799>
 33. Tandoc, E.C., Lim, Z.W. & Ling, R. (2018). Defining "fake news": A typology of scholarly definitions. In *Digital journalism*, 6 (2), p. 137-153. DOI: <https://doi.org/10.1080/21670811.2017.1360143>
 34. Wang, Y., McKee, M., Torbica, A. & Stuckler, D. (2019). Systematic literature review on the spread of health-related misinformation on social media. In *Social science & medicine*, 240, 112552, p. 1-12. DOI: <https://doi.org/10.1016/j.socscimed.2019.112552>
 35. Wardle, C. & Derakhshan, H. (2017). *Information disorder: Toward an interdisciplinary framework for research and policymaking*. Strasbourg: Council of Europe.
 36. Wilson, A., Wilkes, S., Teramoto, Y. & Hale, S. (2023) Multimodal analysis of disinformation and misinformation. In *Royal society open*, 10 (12): 230964. DOI: <https://doi.org/10.1098/rsos.230964>
 37. Wodak, R. (2006). Mediation between discourse and society: Assessing cognitive approaches in CDA. In *Discourse studies*, 8 (1), p. 179-190. DOI: <https://doi.org/10.1177/1461445606059566>
 38. Xu, Y., Friginal, E. & Hu, C. (2026). A multi-dimensional analysis of English tweets by Chinese and American automotive companies. In *International journal of applied linguistics*, p. 1-12. DOI: <https://doi.org/10.1111/ijal.70132>
 39. Zhou, J. & Shen, L. (2025). *Persistence of misinformation*. Cambridge: Cambridge University Press. DOI: <https://doi.org/10.1017/9781009397339>
 40. Żebrowska, E. (2014). Multimodal messages. In *Journal of multimodal communication studies*, 1 (1), p. 8-15. DOI: <https://doi.org/10.14746/jmcs.2014.1.1.2>

Contact data

Author 1#

	<p><i>name:</i> <i>academic title / rank:</i> <i>department:</i> <i>institution:</i> <i>email:</i> <i>fields of interest:</i></p>	<p>Bożena Duda PhD in linguistics / Assistant Professor Institute of English Studies University of Rzeszów al. mjr. W. Kopisto 2b, 35-315 Rzeszów bduda@ur.edu.pl Cognitive semantics, metaphor and metonymy, multimodality, discourse studies, intertextuality.</p>
---	--	--

Author 2#

	<p><i>name:</i> <i>academic title / rank:</i> <i>department:</i> <i>institution:</i> <i>email:</i> <i>fields of interest:</i></p>	<p>Paulina Mormol-Fura PhD in linguistics / Assistant Professor Institute of English Studies University of Rzeszów al. mjr. W. Kopisto 2b, 35-315 Rzeszów pmormol@ur.edu.pl Multimodal discourse analysis, sociolinguistics, media linguistics, taboo in language.</p>
--	--	--