

A Computational Method for Quantitative Analysis of Ethos

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ABSTRACT

Digitalisation is rapidly transforming our societies, transforming the dynamics of our interactions, transforming the culture of our debates. One of the major threats associated with digitalisation – which manifests itself in online misbehaviour such as hate speech, fake news, echo chambers, cyber tribalism, filter bubbles, and so on – is a violation of the basic condition for *trusting* and *being trustworthy*. Thus, when we calibrate our focus on this critical requirement for constructive, reasonable, and responsible interactions, then *ethos*, that is, *ethotic (mis)behaviour*, becomes central for the study of rhetoric. If we are also interested in the constitutive feature of interactions in the digital society, that is, the *upscaled network of communication*, then the new approach to the study of rhetoric: its subject-matter and methodology, with a core focus on ethos, must be taken. We claim that the optimal way of developing such an approach should address the key problem that tackles the overlap between ethos and technology: How to study ethos computationally in order to accurately recognise its focal role in the whole ecosystem of rhetorical devices as contemporaneously employed in the digitised discourse? To answer this question, we present a new research program, called *The New Ethos*, which employs AI-based technology to investigate rhetoric at scale, that is, distributed and digitised communication networks in which volume of information and velocity of message proliferation take on a hitherto unknown scale. In this paper, we present *Rhetoric Analytics*, a suit of computational tools that calculate and visualise statistical patterns, trends and tendencies in rhetorical use of language. This allows us to explore, for example, how social media users react to rhetorical strategies of Donald Trump and Hilary Clinton in the presidential elections or how people argue about COVID-19 vaccines on Reddit. This opens the path to comprehend the present and the future of human communication and human condition. By unifying philosophy, linguistics and Artificial Intelligence, this goal becomes closer than ever before.

KEYWORDS

Trust and the digital society; ethos and ethotic misbehaviour; rhetorical use of language; rhetoric at scale; rhetoric analytics; AI-based technology

1. Introduction

The remarkable dynamics and the rapidly growing scale of social activities driven by multi-dimensional digitalisation processes affect numerous spheres of the communication, including ways public speakers and social media users refer to their own or others' *ethos* understood as a persona or character of a communicating subject (Fahnestock

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and Harris 2023; Tindale 2011). In the traditional model of the communication associated with ancient study of rhetoric (Aristotle 2004), speakers express their ethos via a public speech. Its key feature is that it creates a centralised communication network in the sense of spreading ethos to an audience through a speaker who is a focal point of the communication and around whom an audience is gathered (see Figure 1a). Here, even if some sub-groups of recipients emerged while listening to the speech, such as supporters exclaiming their assistance or opponents signalling their disagreement, they are still centred around the speaker.

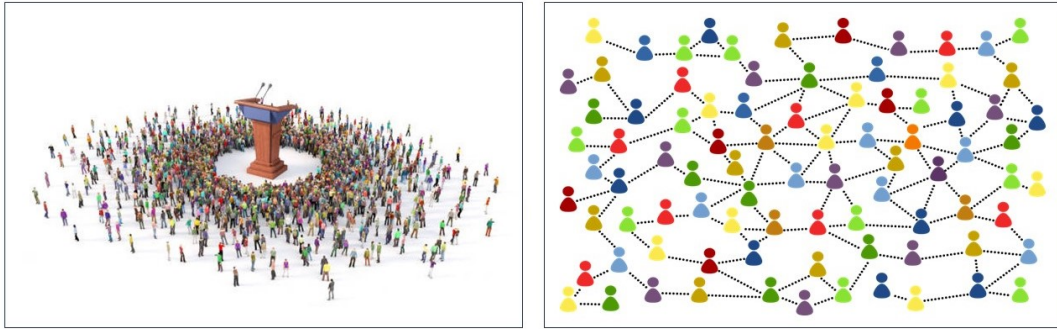


Figure 1. From traditional agora to new agora in the digital society: Transformation of rhetorical situation from (a) a speaker in front of a group to (b) speakers within the crowd.

This situation has significantly changed in the digital rhetoric (Hess and Davison 2018) which sets up a *new environment* for employing rhetorical devices. In the new agora (see Figure 1b), the centralised communication has been replaced with the distributed communication network that is digitised and upscaled. As opposed to a speaker as a single centre of the traditional rhetoric model, in the digital society there are numerous “ethotic centres” as subjects within the communication (i.e. we deal with the transformation from ‘a speaker’ to ‘speakers’, see the caption of Figure 1). That leads us to a situation in which speakers do not only influence audience with rhetorical figures and tropes that reveal or bolster their character, but they also address ethotic position of other social media users, through both supporting and attacking them. In the contemporary institutional and social media, ethos, instead of constituting a loosely associated set of monads, tends to be involved in networks of expertise (Kjeldsen et al. 2022). That is, in this new rhetorical situation, speakers do not stand ‘in front of’ their audience, but they are positioned strictly ‘within’ it (see the caption of Figure 1). Finally, the digitalisation of communication channels results in a massive increase of interacting users and information. Such a network of communication is not a ‘group’ anymore, but rather a ‘crowd’ (see the caption of Figure 1) whose dynamics is close to the behaviour of a continuous fluid in physics or ecology.

In this new environment, the complexity of the trust relation towards various bearers of ethos comes to the fore. Once we set our focus on trust, then ethos – understood as a key component for trustworthy communication – and ethotic misbehaviour – conceived as a serious threat for promoting a model of trustworthy communication – becomes the centre of the study of rhetoric. Once we calibrate our attention on the dynamics of communication in the digital society where ethos in its connection to trust plays a vitally important role, then the *new approach* to the study of rhetorical devices with its unique subject-matter and methods emerges as an urgent need for theorising about ethos in the digitised communication. To address this challenge, at least two

requirements need to be met. First, this novel approach should be methodologically adjusted to the scale and features of the new rhetorical situation by being able to not only study local cases of use of rhetorical appeals to ethos in the new decentralised rhetorical situation, but also being able to process, understand, and possibly predict major ethotic patterns, trends and tendencies in the social media to track the large scale dynamics of ethos as it changes globally. For this purpose, computational tools to capture ethotic behaviour large scale are required.

Second, providing rhetoric and communication theorists with such tools would give us a comprehensive understanding of ethotic behaviour, if ethos was studied in connection with the uses of other key rhetorical devices. To this end, a conceptual framework to capture ethotic behaviour related to the uses of e.g. logos and pathos (Aristotle 2004; Braet 1992; Žmavc 2012), along with other rhetorical devices as intertwined phenomena, is required in order to portray the complexity and variety of communication processes in the digital society. Thus, such an inquiry should definitely not give up, but by all means incorporate the classical approaches to rhetoric as ones to illuminate discourse in digital contexts (Hess and Davisson 2018) and be open to new avenues for theorising about ethos. This paper aims at providing the solution to both these problems by establishing a *new research programme*, called The New Ethos (<https://newethos.org/research-area/>), that studies rhetoric in the decentralised, up-scaled and highly interactive new agora. We thus propose an answer to the following research question: how to computationally study contemporary ethotic behaviour in the digital society so that the main types of ethotic behaviour in connection to other crucial rhetorical phenomena are grasped large scale?

In order to obtain an answer to this question that would take into account the aforementioned new subject-matter of the digital environment for the ethotic behaviour, we should take into account the appropriately adapted methods that The New Ethos needs to incorporate. First, since we deal with a new type of evidence available for online communication: a large volume of digitised data (Wu et al. 2020), we are able to move away from a traditional model of investigating cases of speech to applying *computationally enhanced empirical and statistical methods* of rhetorical studies. As a result, we abstract from a subjective individual rhetorical styles, typical for speakers who we happened to select in our study, as well as from a subjective arbitrary circumstances of a speech such as a speaker being unwell on the day of the speech. In other words, statistics allow individual and subjective variations to be ignored, as they become negligible noise in a large sample of cases. This also means that we can study not only rhetorical styles of individual politicians, for example, Donald Trump and Hilary Clinton, but also rhetorical styles of types of speakers, for example, politicians, American politicians, right-wing politicians, and so on. On the other hand, thanks to the proposed perspective, the study of individuals is also deepened, as we are able to select not only a speech they gave on a special occasion, but we can analyse everything that they ever said on a given topic (e.g. on COVID-19 vaccination) on a given online platform (e.g. on Reddit).

For this to happen, we develop Rhetoric Analytics, i.e., a *sense-making AI-based tool* that provides insights into communication strategies used in a large-scale discourse. It is founded upon data analytics (*cf.* Walker 2015; Kelleher and Tierney 2018), i.e., a wide-spread (*cf.* Business Intelligence, Media Analysis), science-enabled range of techniques and processes used to convert raw data into insights, to quantitatively analyse such data in order to make conclusions about information, to interpret them in a meaningful way and to extract knowledge. This means that we are able to reveal

and analyse statistical patterns, trends and tendencies¹ of the variety of devices and strategies used in rhetoric of the digital society. In this paper, we tackle two research questions related to the overlap between ethos and technology in the digital society: (i) How to study computationally the interrelation between ethos and two other rhetorical devices from the Aristotelian triad, namely logos and pathos? (ii) How ethos is dynamically changed by using another rhetorical device, i.e., the technique of rephrasing what has been previously said in the discourse? In order to answer these questions, we propose two computational tools: LEPAn (Logos - Ethos - Pathos Analytics) designed for the study of ethos in relation of logos and pathos; and DynRephAn (Dynamics of Rephrase Analytics) designed for tracking the dynamics of ethotically loaded language in the process of rephrasing speaker’s own or other speakers’ words. The design of these tools allows experts in the fields of rhetoric, communication and argumentation studies to identify visualised rhetorical patterns, trends and tendencies of using ethos across the topics and discourse genres. Thanks to be able to track such regularities as those related to frequencies of uses of ethos as compared to logos and pathos, proportions between positive and negative uses of ethos or frequencies of using the rhetorical device of rephrase to e.g. reinforce negative ethos in different discourse genres (such as in heated pre-election debates as compared to the regular parliamentary discourse), LEPAn and DynRephAn prove to be applicable in formulating new research question for the study of rhetoric in the digital society.

The paper is structured as follows. In Section 2, we describe an initial work that pioneered our approach. Section 3 describes corpora and annotation schemes that we currently apply in the quantitative analysis of ethos. In Section 4, the Rhetoric Analytics technology is introduced with its two foundational modules: (i) LEPAn for analysing the use of logos, ethos and pathos; and (ii) DynRephAn for analysing the dynamics of the use of ethos as it changes as a result of rephrasing information. These two analytics tools, by linking ethotic phenomena to the broader rhetorical context, help us explore systemic dependencies between ethos and other key rhetorical devices, for the sake of obtaining deeper insights into the overall role of ethos across the genres, with the special focus on the specificity of rhetoric of the digital society.

2. Initial work

The proposed approach encompasses the constant ‘dialogue’ between theoretical frameworks to model key ethotic phenomena and empirical data in the wild that either confirm or point to the need for adjusting theories to better fit the rich and diverse language of ethos, the features of which dynamically change across the media and discourse genres. The urge for an empirically-revised theorising about ethos stems from the motivation for being at the same time close to the real data and grasp them with a sophisticated enough conceptual apparatus. Theories are treated as a grounding for annotated corpora which then help revising theories to be able to capture actual and typical ethotic behaviour. Establishing the strong and well-justified links between theories and corpora is then vital for taking theoretical accounts of ethos to be implemented for user-centered AI tools which enrich theories and corpora.

In line with the approach to adapt rhetorical theories to capture ethotic phenom-

1. A *pattern* of X is a repeated or regular occurrence of X , i.e., a sequence of data points that follow a recognisable shape or structure. A *trend* of X is a general direction in which X is developing over time or, in our case, over the course of dispute. A *tendency* of X is similar to trend in that both specify a direction, though a tendency accounts for probable dynamics of X .

ena in the wild, our initial work in the area consisted in applying corpus linguistics methods to study some selected ethotic phenomena such as appeals to ethos types, employing ethos of historical persona to discuss decisions about the cultural heritage, and associating people’s ethos with objects in the world. In (Koszowy, Budzynska, et al. 2022) we proposed to adapt Aristotle’s distinction between *phronesis* (Practical Wisdom), *arete* (Moral Virtue) and *eunoia* (Goodwill) to analyse ethos types as they are referred to in the Hansard UK parliamentary debate record from the late period of the Thatcher government (1979-1990). For this purpose, we designed a corpus creation method inspired by the agile corpus methodology (Voormann and Gut 2008) which encompassed three iterations of ethos types annotation. We have shown how the annotation results affect modifications of our annotation scheme of ethos types, i.e. their empirically-revised theory. In this way, we have shown how a rhetorical theory of ethos can be adapted in designing an annotation scheme to be able to capture some ethotic phenomena (in this case: ethos types).

Further, the work on ethos of historical figures has led us to expand the research field of ethos studies to systematically capture not only speakers’ strategies that go beyond building their ethos through public speeches, but also an argumentation scheme for reasoning from character of public figures (whether historical persona or other public figures such as actors, politicians, influencers) to actions in the world. The key feature of such a scheme lies in the association of public figure’s ethos with a wide variety of extra-linguistic objects such as monuments, portraits, movies, buildings (i.e. objects which are associated with the life and works of this person). Such techniques are employed, for example, when one argues that a certain motion picture should not be public anymore because of an actor’s undesirable behaviour. In (Budzynska, Koszowy, and Pereira-Fariña 2021), we discussed argumentative structures of associating ethos with objects in the world in search for the neat modelling of those structures for the purpose of their future annotation schema. For that reason, we proposed a semiotic take of the relation between an extra-linguistic object and the matching claim for or against a discussed action of removing that object from the public space.

Apart from developing the methodological framework to neatly combine ethos theories and data, new or so far insufficiently explored discursive strategies have been analysed and modelled. Within this thread, a model for appealing to ethos of historical figures has been proposed in (Pereira-Fariña, Koszowy, and Budzynska 2022). Building on the corpus analysis of the debates on cultural heritage in five countries (Spain, Poland, RSA, UK, and US), we analysed discursive strategies for and against removing some cultural objects associated with historical figures around whom historical controversies regarding their ethos arose, such as those in the UK related to Edward Colston and his involvement in slavery. As a result of these controversies, arguments have been put forward in favour of removing his portrait from the parlour wall of the Bristol City Council (p. 194). For the sake of obtaining deeper insights, we studied radio, newspaper, and webpage debates and created the corpus of annotated discursive strategies with the total of 7.6k words of discussions on the contested cultural heritage across these five cultural contexts. Thanks to the diversity of these data to cover various media, roles of the participants (such as reporters, experts, and policy makers), and the ways historical figures are typically perceived, we were able to hypothesise about how such variables can affect the frequencies of certain discursive strategies that contain ethos in particular datasets. Interestingly enough, we have noticed that if a historical figure is perceived as immensely and decidedly bad in a given society, then speakers tend to employ strategies of reframing the debate from ethotic features and moral principles towards aesthetic, legal or economic context.

Building upon this initial work and aiming at addressing the research questions posed in Section 1 that concerns the adequate selection of computational methods to study uses of ethos in the digital society, our approach (see Figure 2) pursues to understand *ethos* through bridging theories of rhetoric with the practice of language use. In

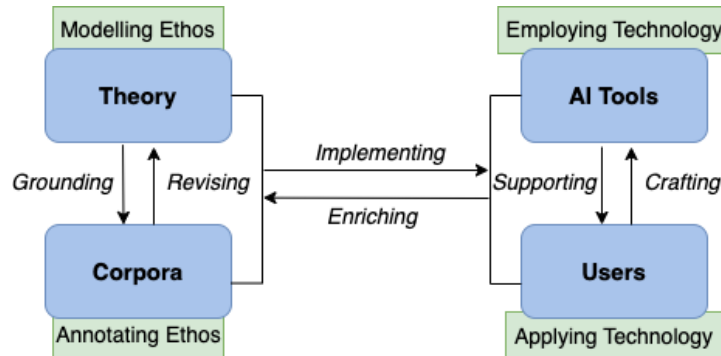


Figure 2. A proposed approach to ethos and technology: Pipeline of methods (blue rounded rectangles) and goals (green rectangles) in The New Ethos.

other words, we exploit existing or create new models of ethos in order to analyse language use of ethos in selected types of discourse. As a result, The New Ethos delivers: (i) theoretically-grounded corpora of ethos-structured data; and (ii) empirically-revised theories of ethos. We then implement theories and corpora of ethos in *technology*. We understand technology here in two senses. First, we think of technology which impacts our communication nowadays, that is, online platforms which shapes user behaviour to be upscaled, decentralised and highly interactive. Second, we mean technologies that support users in understanding uses of ethos and intervening against misuses of ethos. As a result, The New Ethos further delivers: (iii) AI-aided applications of analysing ethos; and (iv) user-crafted AI tools for computationally enhanced analysing of ethos. The development of this technology is inspired by Argument Analytics (Lawrence et al. 2016; Lawrence et al. 2017), a tool that supports argument analysis by providing scholars with large-scale insights into patterns of speakers’ communicative behaviour observed on a large scale. Argument Analytics computes properties of an argument graph and interprets them as properties of a debate such as divisive (controversial) issues raised during the dispute or like-mindedness of participants who share similar opinions. In Rhetoric Analytics, we follow this path, however, we do not fully exploit at the moment properties of graphs in calculating statistics, i.e., we do not take into account how nodes are connected in a graph, but we do calculate properties of nodes themselves. On the other hand, we extend this approach from arguments to ethos in connection to various rhetorical devices and strategies. The current stage of the implementation of our technology is presented in Section 3 and 4.

3. Data and annotation

Our computational method is quantitative which means it requires data of annotated texts. So far, we exploit four corpora manually annotated with rhetorical devices: PolarIs1, US2016reddit, US2016tv and Hansard (see Table 1). All corpora are available at <https://newethos.org/resources>.

The first two datasets comprise online discussions on COVID-19 vaccines that took

place in 2021 (PolarIs1); and reactions to televised presidential debates in the US in 2016 (US2016reddit). Both datasets are collected from the Reddit platform, an internet forum with 330 million average monthly active users, where discussions are organised in self-forming communities of interest called subreddits (Raemdonck 2019). Corpora from social media comprises public discussions from two such subreddits: r/conspiracy and r/politics, respectively. The choice of the Reddit platform is driven by constraints posed by other social media platforms. First, Twitter restricts a post to 280 characters which makes the annotation of logos very limited (Elliott-Maksymowicz, Nikolaev, and Porpora 2021). This leads to a simplistic representation and lower density of this rhetorical device on Twitter. Availability of data is another important factor for choosing Reddit. Platforms such as Facebook and (recently) Twitter introduce restrictions on data collection which make this process more time consuming as well as more expensive. Nonetheless, we plan to retrieve and annotate data from other social media platforms in the future, as it will allow us to compare the rhetorical use of language across social media platforms and further test our hypotheses.

Data store		Words		ADUs		Turns		Speakers	
		#	%	#	%	#	%	#	%
Online	PolarIs1	30,014	50	2,706	41	2,721	39	465	26
	US2016reddit	30,099	50	3,827	59	4,263	61	1,317	74
	Total	60,113	29	6,533	59	6,984	52	1,782	88
Offline	US2016tv	58,900	40	4,277	77	4,357	77	76	31
	Hansard	90,000	60	2,117	33	2,180	33	174	69
	Total	148,900	71	6,394	49	6,537	48	250	12
Average		52,253	25	3,232	25	3,383	25	508	25
Total		209,013	100	12,927	100	13,531	100	2,032	100

Table 1. Datasets used in our technology of Rhetoric Analytics. ADUs mean argumentative discourse units, i.e., segments of a text which are building blocks of argumentation in the text. Turns mean posts in online discussions and speakers’ moves in offline debates.

The second group of datasets collects offline discussions. The US2016tv corpus comprises transcripts of 3 televised presidential debates in the US from 2016 (Visser et al. 2020): the first Republican primary debate, the first Democratic primary debate, and the first presidential debate. Finally, Hansard is a collection of transcripts of UK parliamentary debates from 1979-1990, i.e. the time period of Margaret Thatcher as a prime minister.

Discussions in these corpora have been first manually segmented into text units (argumentative discourse units, ADUs) during the annotation of logos. It is the fundamental step upon which other annotation layers are built. The annotation of logos follows the theoretical framework of Inference Anchoring Theory (IAT) (Budzynska and C. Reed 2011) in which logical, illocutionary and dialogical dimensions of argumentation are represented.² Three types of relations between propositions are distinguished here: an inference (pro-arguments, L+), a conflict (con-arguments, L-) and a rephrase (L \approx). The annotation of logos applied to the US2016tv and US2016reddit corpora is presented in (Visser et al. 2020). In Ex. (1), we give three arguments that are labelled according to the IAT annotation scheme.

- (1) a. PAUL: *I’ve also gone to Chicago. I’ve gone to Detroit. I’ve been to Ferguson, I’ve been to Baltimore.* PAUL: *I want our party to be bigger, better and bolder.* [US2016tv, Label L+]

2. The first version of the IAT annotation scheme, which was used in this work for the annotation of logos, is available at: <https://arg.tech/~jacky/US2016-guidelines.pdf> (Visser et al. 2020).

- b. Professor_Matty: *COVID 19 vaccine is great.* SerpentineApotheosis: *Data shows they are not so great.* [PolarIs1, Label L-]
- c. Patrick Jenkin: *My right hon. Friend was well received.* Patrick Jenkin: *My right hon. Friend was well received by the war pensioners' organisations.* [Hansard, Label L≈]

The inference relation holds between a proposition, i.e. a premise of an argument, that supports another proposition, i.e. a conclusion of an argument such as in the the first example. Here, Senator Paul justifies his visits to American cities (conclusion) with his wish to make the Republican party bigger, better and bolder (premise). Next, the conflict relation holds between two propositions, if they cannot be true at the same time. This is illustrated in the second example, where SerpentineApotheosis attacks the claim that COVID-19 vaccine is great. The rephrase relation holds between two utterances, called rephrase-input and rephrase-output, that are similar in content, but the output, while keeping the core content of the input, introduces some novel content for achieving a certain rhetorical gain. In the example (1-c), Patrick Jenkin rephrases his first claim by specifying by whom his addressee (the right honourable Friend) was well received.

Building upon the layer of logos, we then annotated each ADU with ethos that we understand broader than (Aristotle 2004), i.e., as the character of the speaker that can be supported or attacked by another speaker. More specifically, a text unit (an ADU) contains an appeal to ethos when either a favourable (positive) or unfavourable (negative) reference to a speaker (a person, a group of persons or an organisation) is linguistically signalled.³ Ex. (2) presents the two types of ethotic appeals:

- (2) a. Mr. Nott: *Mr. Henderson is absolutely right* [Hansard, Label E+]
- b. 69L46: *Reading/watching CNN is like eating junk food out of the trash* [PolarIs1, Label E-] the first example illustrates positive ethos with Mr. Nott endorsing Mr. Henderson as being absolutely right, while the second example gives an illustration of negative ethos with a user 69L46 attacking CNN through an unfavourable comparison.

Finally, ADUs were labelled with pathos specified as an attempt that the speaker makes to elicit emotions, positive or negative, in the hearer.⁴ In Ex. (3), we provide illustration of such an annotation:

- (3) a. jblank84: *The good news is that you can, friend!* [PolarIs1, Label P+]
- b. foodVSfood: *shooting down a Russian jet seems like it could be an escalation* [US2016reddit, Label P-] in the first example, jblank84 aims to induce positive emotions by complimenting their interlocutor, while in the second example foodVSfood aims to arouse in readers negative emotions in the form of fear of the escalation of conflict with Russia.

The distribution and reliability of the annotation of these labels are shown in Table 2. Annotation layer of logos is the most dense, as it contains 9,092 labels in total, while ethos layer contains 3,247 labels. The average reliability of logos and ethos annotation is quite robust, i.e. average Cohen's kappa for these layers is 0.713 and 0.793, respectively. Pathos layer is the least dense, as it contains 2,289 labels. The

3. The second version of an annotation scheme for ethos supports and attacks (Ethos_AnnSch.v02) is available at: <https://newethos.org/resources/>.

4. The first version of the pathos annotation scheme, used in this work, is available at: <https://github.com/barbara-k/pathos-annotation>.

Annotation	Logos				Ethos			Pathos		
	L+	L-	L \approx	IAA	E+	E-	IAA	P+	P-	IAA
PolarIs1	1,233	630	639	0.618	59	440	0.752	152	653	0.417
US2016reddit	1,144	581	281	0.817	492	847	0.793	190	1,294	0.573
Total	2,377	1,211	920	0.817	551	1,287	0.773	342	1,947	0.495
US2016tv	1,479	184	328	0.609	165	605	0.734	n/a	n/a	n/a
Hansard	646	272	527	0.550	171	468	0.835	n/a	n/a	n/a
Total	2,125	456	855	0.609	336	1,073	0.785	n/a	n/a	n/a
Average	2,251	834	888	0.713	222	590	0.779	171	974	0.495
Total	4,502	1,667	1,775	-	887	2,360	-	342	1,947	-

Table 2. Annotation of logos, ethos and pathos used in Rhetoric Analytics. The table shows the number of annotated labels for: pro-arguments (L+), con-arguments (L-), rephrases (L \approx); ethotic supports (E+), ethotic attacks (E-); positive pathos (P+), negative pathos (P-); as well as the reliability of annotation, i.e. interannotator agreement (IAA) for layers of logos, ethos and pathos. The n/a values concern layers that have not been annotated yet because of time constraints.

low number here is the result of pathos not been annotated in offline corpora yet. The reliability of pathos annotation is lower than IAA for logos and ethos. Still we consider it as satisfactory, given that it is much more challenging task, i.e., it requires an annotator to decide upon an intention of the speaker: whether the speaker does attempt/intend or does not attempt/intend to elicit emotions in the hearer.

4. Rhetoric Analytics

Rhetoric Analytics is a sense-making technology that provides insights into strategic use of language in argumentative discourse. In this section, we introduce two foundational modules of Rhetoric Analytics: LEPAn, i.e. a system for quantitative analysis of ethos in the context of the other two rhetorical devices, i.e., logos and pathos (Section 4.1); and DynRephAn, i.e. a system for quantitative analysis of ethos as it changes when speakers rephrase what they say (Section 4.2). Both systems are available at <https://newethos.org/technologies>.

4.1. Inspecting the use of rhetorical devices in the wild

LEPAn is the foundational tool of the Rhetoric Analytics technology, as it allows us to inspect the use of the key communication strategies: logos, ethos and pathos, in the rhetoric of the digital society. It enables an analyst to understand not only patterns of using a single rhetorical device, but also to investigate comparison between them. In this section, we exclude rephrase, L \approx , so that we study the same kinds of uses: positive and negative (+/-), for each device (L/E/P). We come back to rephrase in Section 4.2. Moreover, we apply LEPAn to two corpora: Reddit discussions on COVID-19 vaccines (PolarIs1); and Reddit reactions to the US 2016 presidential TV debates (US2016reddit); as pathos has not been annotated in the offline debates yet.

Let us first think about our intuitions of how ethos as well as logos and pathos are used in the wild. Please take a moment to answer the following questions: **(Q1)** Do you believe that ethos is used equally frequently as logos and as pathos in social media? **(Q2)** Do you think that speakers in the digital communication are equally positive and equally negative when they use each of these rhetorical devices? **(Q3)** How much do patterns of positive and negative uses of logos, ethos and pathos deviate from the average use of any rhetorical device? **(Q4)** Do you believe that rhetorical use of language is topic-dependent? **(Q5)** What causes can topic-dependencies have?

In order to test our intuitions, let us now look at the data. Figure 3 gives an answer to the **Q1** question. The data reveals that the use of logos is by far the most frequent.

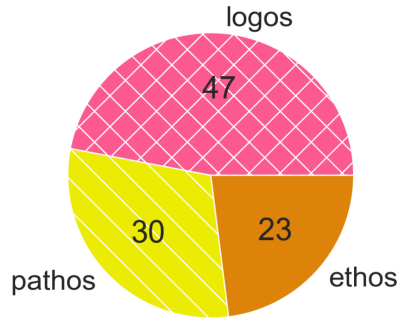


Figure 3. Comparison of how speakers use ethos vs how speakers use logos and pathos in social media according to our corpora of online discussions.

In online debates, it constitutes 47% of all uses of rhetorical devices. The next most frequently used device is pathos: 30%, closely followed by ethos: 23%. In other words, the indisputably first place belongs to logos that constitutes almost the half of our rhetorical effort online, while pathos and ethos share the second place, as they are almost equally popular in the rhetoric of the digital society.

Yet this empirical evidence does not take into account that these rhetorical strategies are always used either in a positive or in a negative way: it might therefore be the case that negative ethos is similarly used to negative logos and negative pathos, even though ethos is used differently to logos and pathos. The answer to this issue, formulated

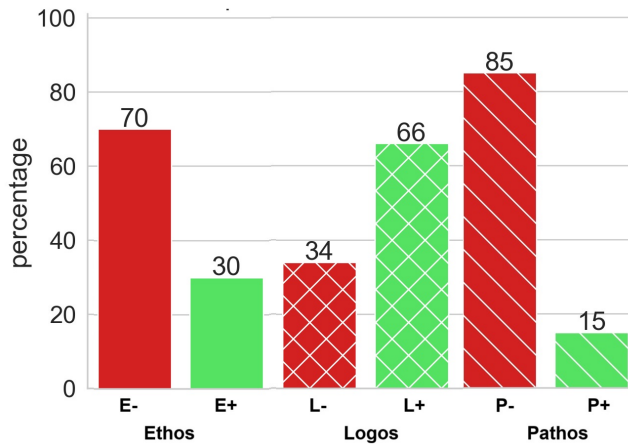


Figure 4. Comparison of how speakers use positive/negative ethos vs how speakers use positive/negative logos and pathos in online discussions.

as **Q2**, is given in Figure 4. Results indicate that differences between the rhetorical devices are deeper when we consider their polarity: we observe that negative uses dominate over positive uses for ethos and pathos (red bars are larger than green bars in their cases). The opposite holds for logos for which supports are more prevalent than attacks (the green bars are larger in the case of logos). Furthermore, we see that the ratio between the negative and positive uses of logos and ethos seem to be similar, however reversed: 70% negative vs 30% positive ethos, and ca. 30% negative vs ca. 70% positive logos. Negative pathos is employed the most frequently, which gives the

ratio 85% negative vs 15% positive pathos.

When we further inspect the differences between patterns of the positive and negative uses of logos, ethos and pathos, we can ask **Q3**, i.e., how much they deviate from the average use of rhetorical devices. Figure 5 addresses this question by providing standard deviations from the baseline computed as an average value of the frequency of these three devices. Now, logos and pathos are closer to each other: they have sim-

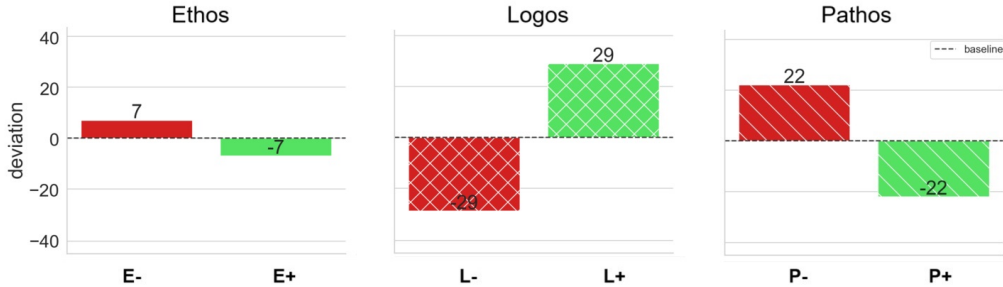


Figure 5. Deviation from the baseline (dotted horizontal line) in the use of positive/negative ethos versus logotic and pathotic devices in social media.

ilar, yet reversed proportions of deviation, while the pattern of the use of ethos is significantly different. That is, the first two devices deviate from the average by 29% and 22%, though the use of logos is overly positive (29% above the baseline), while the use of pathos is overly negative (22% above the baseline). On the other hand, the use of ethos is close to an average use of rhetorical devices: we observe here only a slight preference for the negative use (7% above the baseline).

Next, we can ask whether the differences in uses of negative and positive rhetorical devices are stable across different topics of online discussions: Figure 6 answers the **Q4** question. We observe that the ratio between negative and positive uses of logos

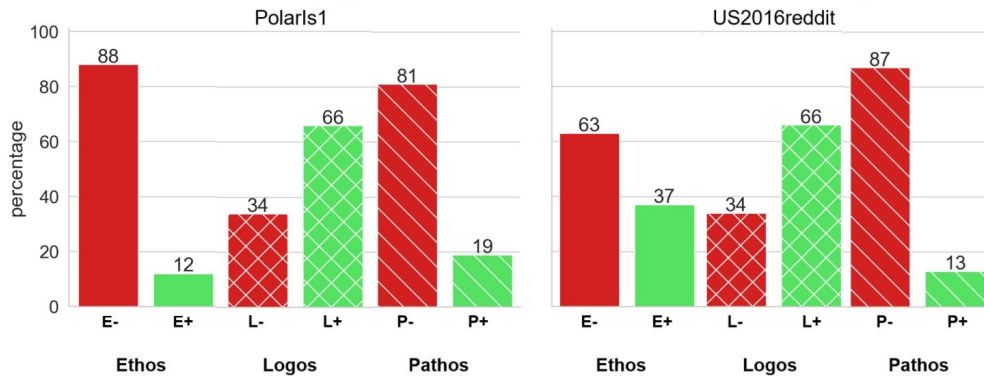


Figure 6. Comparison of how speakers use ethos vs how speakers use logos and pathos in two online discussions: PolarIs1 (bar charts on the left-hand side) and US2016reddit (bar charts on the right).

and pathos are very similar in online discussions regardless of the topic: 34% negative vs 66% positive logos (the proportion is identical), and ca. 80% negative vs ca. 20% positive pathos (the proportion differ by 6% across these topics). Negative ethos, on the other hand, differs significantly across in two corpora: attacking other speakers is much more frequent in the discussions on COVID-19 (87%) than in the discussions on US 2016 presidential elections (63%). This means that ethotic behaviour, unlike logos

and pathos, is more sensitive to a topic under discussion. Ex. (4)-(7) illustrate ethotic strategies employed in the PolarIs1 and US2016reddit corpora with the label ‘Target’ indicating who is attacked or supported in each case.

- (4) DamitCyrill: *Unfortunately in England the only news that calls out all this BS is talkradio* [PolarIs1, Label E+, Target: Talk Radio]
- (5) princesskenzie27: *people are seriously seriously brainwashed* [PolarIs1, Label E-, Target: pro-vaccine people]
- (6) Hyperdrunk: *O’Malley is strong, firm, and on-point* [US2016reddit, Label E+, Target: O’Malley]
- (7) MidCornerGrip: *You can say “I’m an idiot” in three words, you used too many* [US2016reddit, Label E-, Target: 134jammy]

In (4), the user DamitCyrill supports ethos of Talk Radio by claiming that it is the only reliable source of information in England. Example (5) show the attack on people who advocate COVID-19 vaccination on the grounds that they are ‘brainwashed’. In (6), Martin O’Malley is supported by the user Hyperdrunk for his good characteristics of being strong, firm and on-point during the TV debate. Example (7) shows that the user MidCornerGrip attacks another user 134jammy for what 134jammy previously said on Reddit. One general conclusion here is that both public figures, such as politicians and media, as well as interlocutors, i.e. other users, are targets of ethos supports and attacks from Reddit users. Could the differences in targets of ethotic appeals explain different ratios of the use of negative and positive ethos across topics?

To give an answer to the **Q5** question, we distinguished *direct* ethotic appeals, i.e. appeals to ethos of opponents in the discussion (other online users), and *3rd party* ethotic appeals, i.e. appeals to ethos of persons (typically public figures) who do not take part in the discussion, but who are talked about in the context of COVID-19 or presidential debates. The former, a direct attack, is illustrated by examples (8)-(9) where users SerpentineApotheosis and MarcoPolo attack other users (Professor_Matty and thelast1) involved in the ongoing debate on Reddit. Here, they make a direct address to a person using the pronoun ‘you’. In the examples (10)-(11), users TheMerkabahTribe and JenkinsPalabroESQ attack the character of a group (medics in (10)) or a public figure (Donald Trump in (11)) who are not directly involved in the discussion on Reddit.

- (8) SerpentineApotheosis: *Pretty sure you’ll just continue to support your preferred narrative despite official government statistics handed to you* [PolarIs1, Analytic: Direct E-, Target: Professor_Matty]
- (9) MarcoPolo: *you are flat out wrong* [US2016reddit, Analytic: Direct E-, Target: thelast1]
- (10) TheMerkabahTribe: *They sold us a working parachute, and that’s not what we got.* [PolarIs1, Analytic: 3rd party E-, Target: medics]
- (11) JenkinsPalabroESQ: *Trump is a clown* [US2016reddit, Analytic: 3rd party E-, Target: Trump]

The data, presented in Figure 7, reveals that the difference between ethotic behaviour in both corpora is due to the hostility towards 3rd party rather than the hostility between Reddit users. Notice that direct ethotic appeals behave similarly across topics: ca. 80% negative vs ca. 20% positive ethos (the proportion differ by 7%

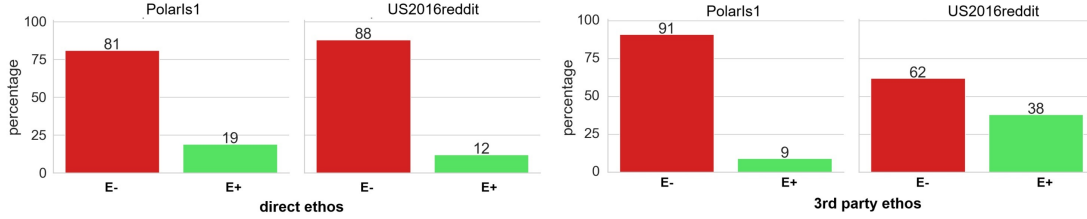


Figure 7. Comparison of how speakers use ethos when targeting one another with ethotic supports or attacks (direct ethos) vs how speakers use ethos when targeting persons from outside of the debate (3rd party ethos).

between topics), so the difference is stable here and it is very close to the difference between negative vs positive pathos (see Figure 6). At the same time, we observe that 3rd party ethotic appeals are topic-dependent, i.e. there is much more hostility towards 3rd parties in the discussions on COVID-19 (91%) in comparison to the discussion about presidential elections (62%). In other words, supports of public figures are very infrequent when people talk about vaccinations (only 9%), while supports of public figures in the debate on US 2016 elections constitute almost 40% of ethotic appeals. This means that while the PolarIs1 discussion takes place in a slightly more friendly environment (7% more direct supports between users), the participants of these discussions talk about public figures almost exclusively in a negative way. On the other hand, in the US2016reddit discussion users are slightly more negative towards each other than in PolarIs1, but they are much more supportive towards public figures (i.e., towards presidential candidates) as there will be a lot of supporters of Donald Trump and of Hilary Clinton amongst the disputants in this corpus.

In the next section, we move from looking at ethos *statically*, i.e. addressing a question on frequencies and kinds of ethotic appeals that speakers use in total in a given discourse, to looking at ethos *dynamically*, i.e. addressing a question on ways people change ethotic strategies in order to achieve their rhetorical goals.

4.2. Tracking the dynamics of appeals to ethos

DynRephAn is an analytic tool that allows us to track the dynamics of the language of ethos in rephrase structures. Whereas the LEPAn analytics excluded rephrase ($L \approx$), DynRephAn in turn makes it the central concept the whole study is built upon. This is due to the fact that the phenomenon of rephrase, unlike argumentation and conflict, has a rich potential for analysing and modelling ethos as it changes when speakers rephrase what they say. According to some approaches, rephrase is understood as a communicative phenomenon of saying something that has been previously said in an alternative way (see the example (1-c) in Section 3) in order to achieve certain rhetorical aims (Koszowy, Oswald, et al. 2022). In what follows we define rephrase in terms of a relation between two text spans which we will henceforth call *rephrase input* (i.e. the original utterance) and the *rephrase output* (i.e. the reformulated one), where the latter, while keeping the core of a former, also introduces some novel content (Konat, Budzynska, and Saint-Dizier 2016; Younis et al. 2023). This feature of rephrase brings in an opportunity to treat the annotation of rephrase instances as a potentially interesting material for comparing rephrase elements in terms of how ethos is modified in the discourse.

The rationale behind the inquiry into the ethos dynamics lies in: (i) providing a representative linguistic evidence for the experimental research on the persuasiveness

of some typical uses of rephrase by establishing rephrase analytics as a significant part of the broader rhetoric analytics project; and (ii) tracking the dynamics of rephrase in the corpora in order to obtain insights at scale into how rephrase ‘behaves’ in terms of adding or subtracting a certain kind of a persuasive load to a message. Our goal is to study how rephrase can serve as a rhetorical tool to bolster or diminish speaker’s ethos, as compared to argumentative structures that play a comparable role (Kjeldsen, Molster, and Ihlen 2022).

Before the relevant observations regarding the ethos dynamics can be made, we need to describe the types of rephrase developed in DynRephAn and then employed in our analysis. We differentiate three main types of dynamics that are related to the uses of ethos (see Table 3)⁵: (i) *amelioration*: a transition from either an ethos attack or ‘no ethos’ to an ethos support, (ii) *pejorativisation*: a change from either an ethos support or ‘no ethos’ to an ethos attack; and (iii) *neutralisation*, where a transition from either an ethos support or an ethos attack to ‘no ethos’ has been made. Moreover,

Rephrase type	Ethos dynamics	
	Strong	Weak
Amelioration	$E^- \approx \triangleright E^+$	$E^0 \approx \triangleright E^+$
Pejorativisation	$E^+ \approx \triangleright E^-$	$E^0 \approx \triangleright E^-$
Neutralisation	$E^+/E^- \approx \triangleright E^0$	
No_Change	$E^0 \approx \triangleright E^0$	
	$E^- \approx \triangleright E^-$	
	$E^+ \approx \triangleright E^+$	

Table 3. Conceptual framework to capture how ethos ($E^{+/-/0}$: ethotic support, ethotic attack, and ethotically neutral utterance, respectively) is changed in the dynamics of rephrase ($\approx \triangleright$).

amelioration and pejorativisation have their strong and weak variants. For example, the notion of amelioration encompasses both rephrasing an ethos attack in a rephrase input to an ethos support in an output (strong amelioration) and reformulating an ethotically neutral input to an ethotic support (weak amelioration). As long as the corpora are concerned (see Table 1), the current version of DynRephAn works on three types of discourse: (i) *social media* (US2016reddit and PolarIs1 corpora); (ii) *traditional media* (US2016); and (iii) *face-to-face* discussions (Hansard).

From these corpora, DynRephAn extracts a variety of speakers’ communicative strategies of moderating and framing the discourse with ethos. The analytics tool is capable of generating the distribution of neutralisation and (weak and strong) amelioration and pejorativisation (see Figure 8); and word clouds that depict the most frequent words for a given dynamics of rephrase. The design of the DynRephAn application allows us then to compare the selected instances of rephrase with its selected types (e.g. pejorativisation vs amelioration in the chosen corpora, see Figure 9). Apart from standard two-dimensional bar charts, for a better comparison the DynRephAn tool also provides three-dimensional visualisations in which all of the measures can be displayed in a single graph (see Figure 10).

Having introduced the conceptual framework to capture ethos dynamics in rephrase structures, let us now test our intuitions related to an overlap between rephrase and ethos. What kind of rhetorical insights can be obtained thanks to the knowledge of an ethotic load in rephrase input and output? More specifically, we would like to ask the following questions: **(Q6)** What kind of ethotic dynamics in rephrase is most

5. The DynRephAn tool also takes into account analogous kinds of rephrase to track the dynamics of sentiment expressions in rephrase, however, this aspect of our study goes beyond the scope of this paper.

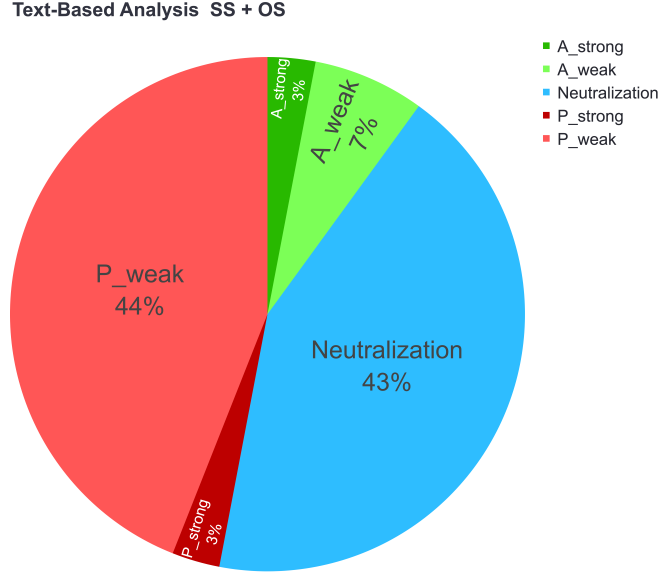


Figure 8. The dynamics of ethos in rephrase in the PolarIs1 corpus.

likely to be observed in heated pre-election face-to-face debates as compared to the regular parliamentary sessions? Wouldn't rephrasing speaker's words in the former serve adding an ethotic attack on an opponent much more frequently than in case of a parliamentary debate which would have no election context and thus wouldn't so frequently require reformulating previous statements uttered in a debate to launch a verbal attack on the opponent? And if we were to compare the ethotic dynamics of rephrase across the media: **(Q7)** Would there be any significant difference between a discussion on the same topic in face-to-face discourse, a televised debate, and social media reactions to the debate? Wouldn't the latter, due to the anonymity of the participants on social media, promote and thus reinforce ethotic attacks in the rephrase output more frequently than in case of the traditional media where speakers are well known to an audience? Finally, we can ask: **(Q8)** How such differences between self-rephrase and others-rephrase look like across the media (face-to-face public discourse, televised debates, and social media discussions)?

As providing answers to these and other questions may significantly enrich our knowledge about the most typical persuasive uses of rephrasing, they serve us as a research motivation to establish and develop the DynRephAn tool. The way of tracking the dynamics of ethos in rephrase encompass analysing various functionalities of our analytics tool. In what follows, Figures 8, 9, 10, and Table 4 constitute the quantitative analysis showing those aspects of the rephrase analytics interface that displays the distribution of the observed phenomena. The quantitative analysis is enriched with the qualitative analysis of Examples (12), (13), (14) which are provided for the inspection of the linguistic expressions that signal the change of ethos in rephrase.

To answer the **Q6** question, we compare the televised debates from US 2016 elections and the British parliamentary sessions as documented by Hansard (see Figure 9). The red bar that represents pejorativisation is slightly higher in case of Hansard than in case of US2016tv, although the difference is minor (5% vs 3%). Thus, the proximity of elections had not proven to have a catalysing impact on the frequency of ethotic attacks in comparison to regular parliamentary debate. It can be noticed that both

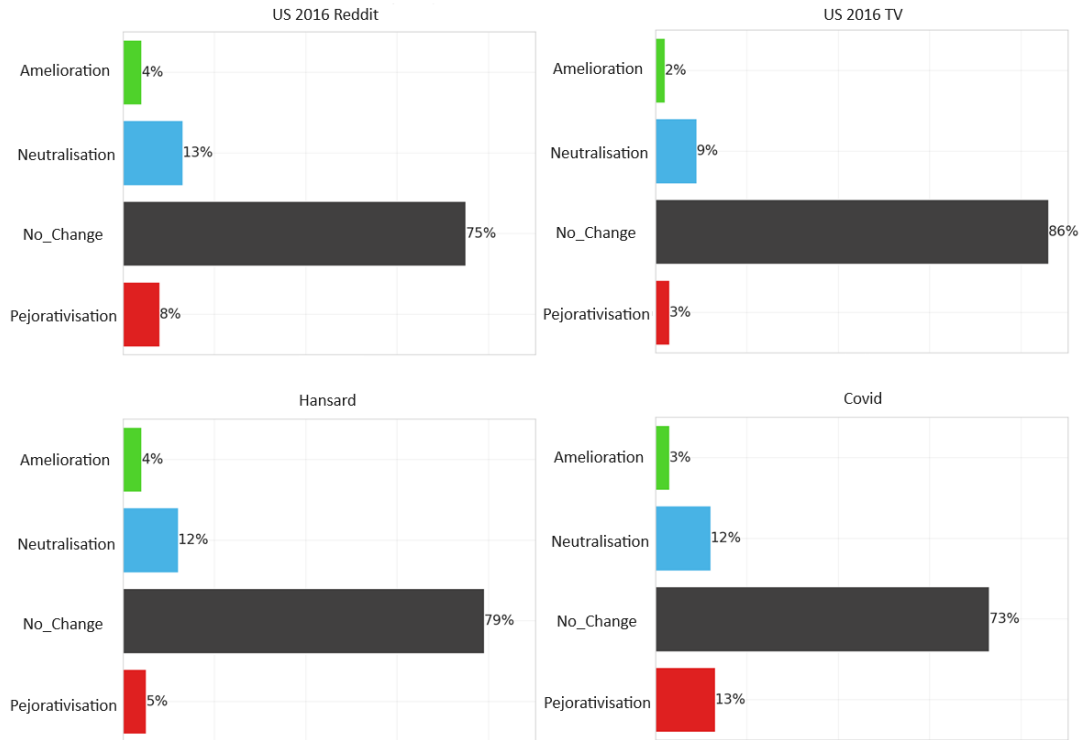


Figure 9. Comparison of the dynamics of ethos in rephrase in four corpora: US2016reddit, Elections, Hansard, and PolarIs1

results are relatively low in comparison to US2016reddit (8%) and PolarIs1 (13%). This observation might point to the fact that anonymity of online environment fosters pejorativisation which is less likely to appear in face-to-face communication.

The possible exacerbating impact of anonymity on ethotic rephrase in online environment is shown in the following example:

- (12) a. EffectiveAd4588: *blame unvaccinated people killing*
 b. StuffEtc: *Unvaccinated angel brutally cut selfish vaccinated person protecting leaves behind 20 children mixed race family 57 brother sisters and grieving kin* [PolarIs1, Analytic: Pejorativisation]

StuffEtc indicates that the person who protected the ‘selfish vaccinated man and was killed left behind twenty children. The speaker then increases the number to ‘mixed race family of 57 brothers and sisters. Such a hyperbole is unlikely to appear in traditional media, since the claim is incredible and even absurd and thus quite difficult to defend by a nonanonymous speaker. In this sense, anonymity in the social media environment may provide fertile ground for employing such rhetorical strategies as using bold hyperbole to attack someone’s ethos. The further textual analysis is a worthwhile subject of future work, as exploration of more specific instances would be needed in order to support the claim that pejorativisation is fostered by anonymity. This case shows that general observations captured with computational methods sometimes require to complement the quantitative analysis with more detailed qualitative investigation. The methods typical to traditional rhetoric can benefit from the computational approach, as the latter allows to detect the large-scale regularities the exploration of which could

form a basis for deriving vital conclusions.

With respect to the Q7 question (“whether or not there is any significant difference between a discussion on the same topic in face-to-face discourse, a televised debate, and social media reactions to the debate?”), we analyse the ethos dynamics across various media (see Figure 10). The Reddit users, as compared to speakers in traditional

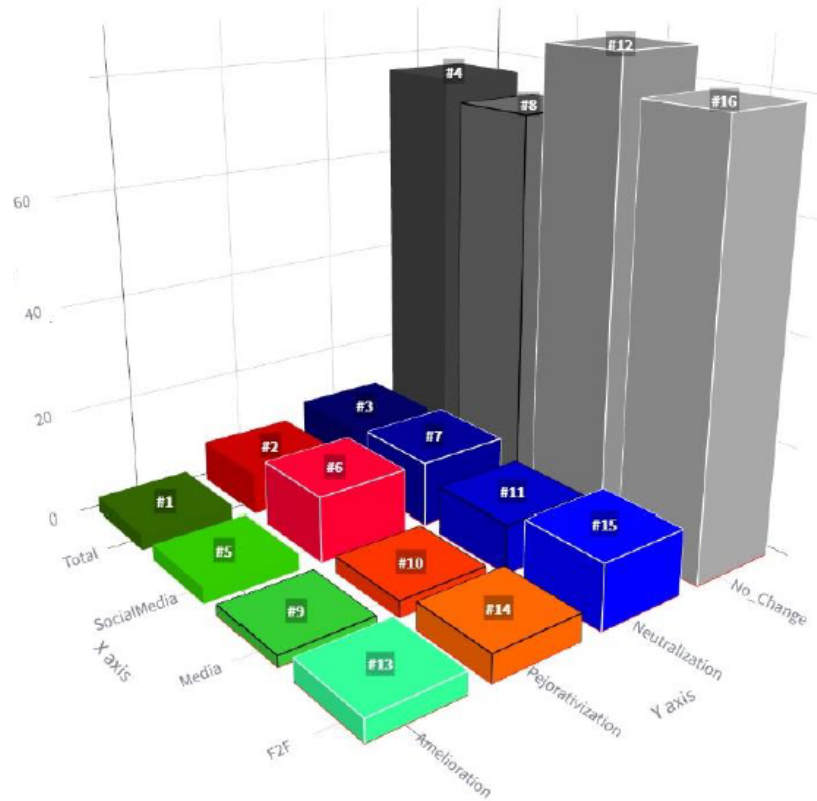


Figure 10. 3D visualisation of the dynamics of ethos in rephrase across media (social media, traditional media and face-to-face, see X axis).

media and face-to-face debates, much more frequently employ pejorativisation (12%) and neutralisation (12%) than amelioration (3%). This may help us point to some directions of future inquiry. For instance, given that pejorativisation is much more frequent on the studied sample of social media discourse than amelioration (12% vs 3%), the next larger corpus studies can test the hypothesis according to which the anonymous character of social media users who can hide their identity behind their nicknames ‘promotes’ such rhetorical uses of rephrase which are aimed at ethotically ‘worsen’ an output so that an opponent or a criticised idea is attacked, and thus rephrase can play the role of an ‘adversarial rhetorical device’, as in Example (12). Another issue that would be worthwhile further exploration is the higher frequency of amelioration in face-to-face communication as compared to the online discussions. The possible factor that contributes to this effect is the character of personal encounters which makes the participants willing rather to support the interlocutors’ stance than to oppose it. The verification of this supposition would show that amelioration is a counterpart of pejorativisation, serving as an ‘amicable rhetorical device’. An instance of such use is portrayed in the following example of British parliamentary debate:

- (13) a. Dean: *Social Security (No. 2) Bill represents sensible allocation of priorities in difficult circumstances*
 b. Patrick Jenkin: *Government’s right courage brings forward necessary measures to bring public expenditure under control* [Hansard, Analytic: Amelioration]

The ethotically neutral assessment of Security Bill in (13-a) was replaced by positive ethos that is encapsulated in the mention of the ‘government’s right courage’ in (13-b). The inspection of other corpora could help answer the question whether such an ‘amicable’ use is typical to parliamentary debate and serves some political purposes or rather represents general feature of face-to-face communication.

Another group of issues is related to the Q8 question about how the differences between self-rephrase and other-rephrase look like across the media (face-to-face public discourse, televised debates, and social media discussions). Our research shows that in face-to-face communication the speakers more often pejorise their own ethos (27%) than the ethos of other speakers (20%, see Table 4).⁶ Yet, in traditional media, other-

Ethos												
	Face-to-face			Media			Social Media			TOTAL		
	A	N	P	A	N	P	A	N	P	A	N	P
ALL	19%	57%	24%	11%	64%	25%	15%	52%	33%	17%	57%	26%
SS*	11%	60%	27%	15%	62%	23%	8%	67%	25%	11%	60%	29%
OS*	27%	53%	20%	0%	70%	30%	17%	48%	35%	27%	54%	20%

Table 4. The dynamics of ethotic *same-speaker* rephrase (SS); *other-speaker* rephrase (OS); and their combination (ALL) across media. Symbol A means amelioration, N: neutralisation and P: pejorativisation.

speaker pejorativisation (30%) is more common than same-speaker pejorativisation (23%) and likewise on social media (35% vs 25%). In the latter case, the anonymity seems to contribute to this effect, as it is easier to pejorise the ethos of the opponent without confronting them in person (see Example (12)). On the other hand, the instances of pejorativisation in face-to-face communication are often subtle and moderate, as in case of example (14) taken from the UK parliamentary debate corpus:

- (14) a. Mr. Tom King: *They decided right*
 b. Mr. Mullin: *I’m not sure whether the hon. Gentleman has read the important new statement on the party’s defence policy, which was accompanied by the statement that the Labour leadership was anxious to avoid supporters stampeding to demand deep cuts in defence* [Hansard, Analytic: Pejorativisation]

Here, Mr. Mullin only implicitly questions the ethos of Mr. Tom King, suggesting that he is unaware of some facts that might impact the opinion he expressed. The criticism here is conveyed in a way that begs to avoid confrontation, an effort that is much less likely to appear in online communication. Given these observations, the next straightforward research step would consist in testing in large scale the hypothesis that the social media environment fosters the use of rephrase as an ethos attack device.

The tested intuitions may bring in a promising research direction in the study

6. Note that whereas Figure 10 presents the overall distribution of all kinds of changes in all types of corpora, the data collected in Table 4 focuses just on the rephrase dynamics patterns that are particularly important from the point of view of tracking changes of ethos in the rephrase output as compared to the input, along with the conceptual framework to capture how ethos is modified within the dynamics of rephrase, as illustrated in Table 3.

of the dynamics of ethos. Statistical information about the frequency of instances of rephrasing across the corpora can help us study rephrase as a medium through which a debate evolves. A quantitative inquiry not only gives us an insight into the rhetorical strategies that are typical in some domains, but also facilitates forming hypotheses that can be then explored by means of a closer textual analysis. So, the overall point of developing analytic tools to track ethotic dynamics in rephrase is that they are capable of surfacing such complex rhetorical strategies as e.g. reframing a debate from one that is driven by mutual ethotic attacks towards an exchange that contains more neutral topics.

5. Conclusions

The inquiry into The New Ethos, understood in terms of the new research area (still inspired by the traditional rhetorical theories), the novel research goals, and the matching innovative methods to explore those aims, has so far taken the form of two Rhetoric Analytics tools: LEPAn and DynRephAn. They address the main research question of this paper introduced in Section 1. Whereas the central role of the LEPAn system consists in enabling to explore interrelations, overlaps and correlations between logos, ethos, and pathos as the three main layers for annotating rhetorical devices, the special role of the DynRephAn system consists in treating a propositional relation of rephrase as a process of how a debate is evolving, how ethos is being changed and manipulated by speakers in the debate.

The future lines of inquiry in this approach to ethos and technology are further driven by the pipeline presented in Figure 2. Firstly, in order to better test and prove the urge for revising and enriching theories to model speaker's ethotic behaviour, more corpora should be created so that the empirical grounding for the theories is more firmly justified. Moreover, creating more annotation layers, such as e.g. annotating speech acts or argument structures that overlap with ethos, seem to be the natural further step. Next, in order to do justice to elaborating a more robust and a more developed technology for studying rhetoric in the digital society, more complex statistics and visualisations should be developed.

The more the Rhetoric Analytics technologies are fine-tuned and user-friendly in terms of helping recipients capture key aspects of licit and manipulative uses of ethos, the more future areas for their outreach can be defined. Thus, some novel opportunities for the critical and analytical thinking education about ethos can be systematically explored by studying how the knowledge of complex ethos structures and strategies may help people become more immune to the polarising tendencies in the social media that are stimulated by tribal thinking, filter bubbles, echo chambers, offensive language, and hate speech. In this way, the connection between technologies and their applications, as presented on the right hand side of Figure 2, will be significantly strengthened by designing theoretically-driven, empirically-grounded, and technology-assisted education strategies for formulating the codes of conduct for good practices of employing ethotic appeals in the digital communities, along with guidelines for intervening against undesirable ethos-centred societal tendencies.

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