Analysing Language of the Dynamics of Ethos and Emotions in Rephrased Arguments[*]

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Abstract

In this paper, we present a model to study rephrase in argumentative settings which encompasses an annotation scheme along with a rephrase analytics toolset to capture the dynamics of rephrase relation in conjunction with other communication layers such as appeals to ethos (speaker's character) and expressed sentiment (speakers' emotions). To this end, we study posts on social media, TV presidential debates and parliamentary debates. The proposed account of corpus and analytical devices to study language of rephrase allow for a new approach for mining rephrase in natural language texts.

Keywords

Rephrase in Argumentation, Ethos Analysis, Emotion Analysis, Computational Linguistics

1. Introduction

The analysis of arguments in discourse, their graphical representations and their display in a readable form is the subject of research in various research areas, such as argumentation theory [*cf.* 1]; Inference Anchoring Theory (IAT) which links logical, dialogical and pragmatic aspects of communication [2]; computational equivalent of IAT, the Argument Interchange Format (AIF) ontology [*cf.* 3]; and computational linguistics, in particular argument mining [*cf.* 4]. In this paper, we propose to develop rephrase analytics as a potentially valuable complement to computational argument studies. The choice of rephrase is not coincidental, since rephrase, being far from a marginal phenomenon both in terms of the frequencies and its persuasiveness tested experimentally [*cf.* 5], is a powerful rhetorical device. Given the overlap between rephrase and argument structures [*cf.* 6], analytics of rephrased arguments can help us learn about the scale of these two crucial discursive phenomena by inspecting logos (logical arguments) resulting in a layer containing inference (RA); conflicts (CA), i.e. arguments in conflict with the previous argument(s); and rephrased arguments (MA), i.e. the same arguments repeated in a different way often with additional information. These elements are combined in the process of manual annotation into a graph structure.

In this study, only the rephrase (MA) of the whole IAT layer is used. More specifically, we investigate the speaker's initial statement (input), e.g., *CLINTON is going to increase regulations all over the place*, that has been rephrased by another or the same speaker (output), e.g. *CLINTON is going to regulate these businesses out of existence.* The input and the output may carry slightly different messages, in particular they may express: (i) either ethotic support, see Example (1), or attack, Example (2), i.e. a positive/negative description of the skills, charisma, virtues, character of the speaker or the institution: E+ or E-, respectively; and (ii) either positive emotions, see Example (3), or negative emotions, Example (4), i.e. positive/negative sentiment of the speaker(s): S+ or S-, respectively. In other words, input and output can have different ethos and sentiment values.

(1)   Silverfin113: *I love TRUMP's realness* [Label E+]

(2)   olivecorgi7: *New York is falsifying data* [Label E-]

(3)   TheInfinityBlaze: *This performance receives massive applause, incredible* [Label S+]

(4)   Mr. Nott: *there is a major problem with the low feedstock prices in the United States* [Label S-]

Building upon an AI-based tool: Dynamics of Rephrase Analytics (DynRephAn) [7], we present a model to study language of natural arguments in which speakers use rephrase to manipulate rhetorical devices of ethos and emotions. For example, a speaker can rephrase a neutral input into an output that has unchanged meaning but is loaded with negative emotions in order to influence his audience and achieve some rhetorical gain. This tool provides us with a variety of quantitative and qualitative analysis (such as n-grams or Part-Of-Speech) of a corpus of natural language text annotated with rephrase, ethos and emotions. The close inspections of linguistic patterns and interesting cases allows us to characterise ethos and emotions in rephrase. This opens a path to better understanding this complex rhetorical device and more accurate mining of rephrased arguments in natural language text.

2. Related work

Preliminary experimental findings in studying the persuasive effects of rephrase on the audience with crowd-sourced experiments have shown that rephrase – though not being as much persuasive as arguments are – is both be quite frequent in the pilot corpora and have a significant impact on changing audience's beliefs [8, 5]. On the computational end, automated or semi-automated detection of persuasively powerful uses of rephrase is poised to provide a valuable addition to the development of computational models of inferential structures and argument analytics [9]. As rephrase is a complementary propositional relation to inference and conflict [10], the linguistic study of the dynamics of rephrase is a natural point of departure for supplying the existing takes on argument mining with software-assisted tools for rephrase mining and visualisation (rephrase analytics). From this point of view, rephrase is a much more complex process than paraphrase production [*cf.* 11, 12] which is the repetition of a statement with no or very few new information.

Existing models and approaches to rephrase encompass both accounts of rephrase relation to

inference and argumentation, and the study of specific rephrase uses. In [6], a role of rephrase in argument structures has been shown in order with the categorisation of rephrase uses, such as reformulation with close terms, reformulation using semantically related terms and structure variations from unit, confirmation, summarisation, clarification of a complex issue, etc. In [13], rephrase structures in straw man argumentation (conceived as their misuse) have been discussed. A model of rephrase is proposed that takes into account the frequencies of rephrase instances in the pilot corpora and the experimental study to test the persuasiveness of rephrase in general, and particular rephrase types (such as specification along with ways it may affect the perceived ethos of a speaker) in particular, has been proposed in [8, 5]. These studies aim at elaborating a rephrase model that would be grounded in linguistic evidence for *illocutionary* aspects of rephrase, and experimental inquiry into their actual perlocutionary effects.

3. Transformation of ethos and emotions in rephrased arguments

The phenomenon of rephrasing, thanks to its relational nature, gives us the opportunity to compare original utterances with modified ones, and thus provides us with an excellent research laboratory for tracing the dynamics of ethos and sentiment as key communicative phenomena carried by rephrase which might be decisive in successful persuasion. Rephrase is typically conceived in terms of relation between two text spans we call *rephrase input* and *rephrase output*, where the latter, while keeping the core content of a former, also introduces some novel information [6]. The illustrative material is taken from the US 2016 Presidential Elections debates corpora annotated with OVA, Online Visualisation of Arguments software (http://ova.arg-tech.org/, [10]): the US2016tv corpus with presidential debates, and the US2016reddit corpus containing Reddit users' reactions to these debates (see https://newethos.org/resources).

The study of the dynamics of ethos in rephrase is aimed at tracking the dynamics of ethos across corpora in order to gain insight into the scale of how rephrase 'behaves' in terms of adding or subtracting ethotic load to messages. Consider Example (5), in which Anderson Cooper's statement in (5-a) about Lincoln Chafee's being Republican in the past is rephrased in (5-b):

(5)   a.   Cooper: *You've been a <u>Republican</u>* [Label E-]
       b.   Chafee: *I was a <u>liberal Republican</u>* [Label E+]

Given that in this particular context of the democratic Preliminary Debate, the fact of being Republican can be typically perceived as an accusation and constitute an attack on the candidate's ethos, Chafee's response can be interpreted as an ethos support (being a 'liberal Republican' helped Chafee to defend his position as being closer to Democrats even back then). This example can be thus discussed in terms of using rephrase to turn an alleged ethotic attack done in (5-a) towards an ethotic support in (5-b), and so be an instance of dynamical role of rephrase that makes a shift from positive to negative ethos (we called this dialogical move a *pejorativisation*).

A clear instance of ethos dynamics as carried by rephrase is illustrated with Example (6):

(6) a. pletentious_asshore: *He's* (Donald Trump's) *not answering the question about how to bring jobs back* [Label E-]
     b. Pokemongotrainer: *he* (Donald Trump) *never did* [Label E-]

In (6-b), the Reddit user, Pokemongotrainer, makes an ethotic attack on Donald Trump, introduced in the input (6-a), stronger, as claiming that Trump has never answered the question about bringing jobs back. Hence, the *intensification* of the attack on Trump's ethos can be identified with the use of the general quantifier 'never'.

Another rhetorical device used in rephrase is to bring into an output either not present or more intense emotional load than in the case of an input (see Example (7)). We say that rephrase in such cases serve speakers as a positive or negative sentiment carrier, depending on specific rhetorical gains that are to be achieved.

(7) a. Ebonic_Plague: *It's kind of lazy to claim you can't see a difference in the frequency and degree of lies* [Label S0]
     b. Ebonic_Plague: *There is a big damn difference here and it's pretty clear* [Label S-]

Sentiment, added in rephrase output, quite typically overlaps with either adding or intensifying the previous attack on or support of ethos. The issue of the overlap between ethos and sentiment on the one hand constitutes an additional challenge for designing the mining tasks (see Section 4.1), but on the other hand, may serve as a promising research field to explore e.g. how rephrased arguments convey ethotic attacks or supports done by means of emotionally loaded words and phrases. In Example (8), Sanders, by elaborating on Kang's view on the relations between Obama and the Republicans, conveys in (8-b) a clear negative sentiment carried with the word 'terrible' (used twice), and the phrase 'total obstructionists'.

(8) a. Kang: *President Obama has had a difficult time getting Republicans to compromise on just about every agenda* [Label S0]
     b. Sanders: *The Republican party, since I've been in the Senate, and since President Obama has been in office, has played a terrible, terrible role of being total obstructionists* [Label S-]

This move, being at the same time an ethotic attack on the Republicans, relies on conveying sentiment by adding a lot more linguistic material than the one used in (8-b). Even a greater elaboration on the content of an input can be observed in example (9):

(9) a. Cooper: *You don't consider yourself a capitalist, though?* [Label S0]
     b. Sanders: *Do I consider myself part of the casino capitalist process by which so few have so much and so many have so little by which Wall Street's greed and recklessness wrecked this economy?* [Label S-]

In (9-b), Sanders, by elaborating on the content of Cooper's assertive question (9-a) (which can be reconstructed as: "Sanders does not consider himself capitalist"), adds his, rich in emotionally loaded words, assessment of capitalist's practices. Such a dialogical move of adding negative sentiment is typical for the US 2016 Presidential Debates record.

4. Language of ethos and emotions in rephrased arguments

In this section, we explore the linguistic features of rephrases, which contain ethos and sentiment elements, that can be accounted for on the basis of relatively simple language factors with available linguistic resources. Still, their number is significant and involve pragmatic factors or complex linguistic constructs, thus their modelling is beyond the scope of this paper.

4.1. Language challenges

Let us briefly evoke the underlying challenges to rephrase modelling and automatic analysis. These are important to understand how rephrase in conjunction with emotion and ethos can be characterised. First, rephrase may be quite difficult to identify. There is indeed a kind of continuum between cases where, e.g. the rephrase content is rather weak or shallow w.r.t. the original statement. Annotator decisions are therefore prone to subjectivity.

Next, the speaker profile or the context must be considered to tune rephrase characteristics. In a political debate for example, even if positions are similar, the language used by politicians may significantly vary which pose a challenge to the identification of their position and attacks on other participants.

Third, even simple rephrases may lead to complex forms of analysis, consider: *The campaign was aggressive* rephrased as: *the campaign was very aggressive but with no systematic obstructions.* Does the contrast (after 'but') introduce a negative ethotic dimension to the rephrase and if so, how is the rephrase oriented?

Fourth, a standard statement often has several facets, due to the lexical semantics of the different terms it contains. Some facets may be more crucial than others in argumentation in general. A rephrase often concerns one of these facets. Facets can be implemented, by example, by the Qualia structures of the head terms of the original utterance. Facets may describe, for each head term, their uses and functions (telicity), how they came into being (agentivity), their components, etc. Consider for example:

(10) a. Nordic_bloke: *vaccination was successful in spite of some difficulties*
      b. DifferentAllTheTime: *vaccination was a big success but vaccines are really costly for some communities*

Here, (10-b) elaborates (10-a) by supporting the statement 'but' with the introduction a consideration on an agentive feature 'the cost' with a negative orientation. The other facets of vaccination are not addressed. Another rephrase could concentrate on e.g. the toxicity of the adjuvant (vaccine component), or on some political aspects (making vaccination compulsory for adults). These examples illustrate the difficulty to identify rephrases and to categorise them (orientation and strength) and their associated ethos with some accuracy. The examples given in this paper outline the impact of language factors as well as of domain knowledge. This would be extremely difficult to handle for an automatic system.

From a more technical perspective, the extreme diversity of language uses found in our corpora makes it difficult to foresee the development of large repositories of annotated rephrases to be used as entries of automatic learning algorithms (confirmed in Table 1 in Section 4.3 below, where we show a rephrase rate of 15.2%). This is true even in hybrid contexts where corpus

data is paired with language analysis. Our approach in this research is first to observe how the different types of rephrases are realised in different types of corpora, to annotate them, and then to develop tools which would allow humans to develop the linguistic characteristic of rephrase in various utterance contexts. Rephrase mining remains our ultimate goal, in conjunction with ethos and sentiment, but in the long term, when abstract models are established and tested.

4.2. An approach to modelling rephrase in analytics

Given the above considerations, our strategy is twofold: (i) to develop relatively abstract principles which account for the relation between an initial statement and subsequent statements identified as potential rephrases with their ethotic or sentiment features; and (ii) to use already existing or develop additional linguistic elements (lexical, syntactic) which could serve as indices of rephrase situations and as the basis of a future automatic recognition of rephrase.

The first point is realised by human analysts on the basis of quite large corpus annotation. A theoretical framework could be developed based on principles describing how rephrase is linguistically (and probably cognitively) elaborated in conjunction with ethos and sentiment. However, these principles will probably never be comprehensive (necessary and sufficient) and more concrete considerations such as those advocated in point (ii) must be considered, leading to a kind of hybrid system pairing abstract principles with linguistic considerations. Statistical data will need to be introduced to indicate preferences observed in corpora.

An exploratory analysis of these linguistic considerations shows that most of the linguistic levels are concerned in rephrase, the main ones being lexical semantics and pragmatics. Syntax probably plays a more marginal role, due, for example, to poor language uses, ellipsis, gaps of various sorts, etc. To identify and organise the linguistic aspects which are crucial to identify rephrases and ethos and sentiment, a DynRephAn tool has been developed [7].

4.3. Corpus

Our analytic method requires annotated texts. So far, we work on five corpora, manually annotated with rephrase (according to Inference Anchoring Theory, IAT [2]) and ethos [14], as well as automatically annotated with emotions [15]: PolarIs1, Polaris4, US2016tv, US2016reddit and Hansard (see Table 1). In contrast to rephrase and ethos, sentiment was mined fully automatically using 'cardiffnlp/twitter-roberta-base-sentiment-latest' language model and Python library transformers[sentencepiece] in google coolab environment. The library returns three classes: positive and negative sentiment as well as no emotions (S+, S-, S0). All corpora are available at https://newethos.org/resources.

The first three datasets comprise online discussions on X – Twitter on COVID-19 vaccines (PolarIs1); on X – Twitter on Climate Change (PolarIs4); and reactions on Reddit to televised presidential debates in the US in 2016 (US2016reddit). The US2016tv dataset comprises transcripts of 3 televised presidential debates in the US from 2016 [16]: 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.

Corpus	Words #	ADUs #	Rephrases #	Ethos struct. #	Sentiment expr. #
Polaris1	30,014	2,706	639	499	986
Polaris4	34,859	3,300	694	586	850
US2016tv	58,900	4,277	328	770	463
US2016reddit	30,099	3,827	281	1,339	360
Hansard	90,000	2,117	527	639	902
Total	**24,3872**	**16,227**	**2,469**	**3,833**	**3,561**

Table 1: Corpus properties and structure.

The observed rephrase rate is 15.2%, that is, among the ADUs (Argumentative Discourse Units) 15.2% are identified as rephrases of others. Now, if we consider the total number or pro- and con- arguments, rephrases represent 29% of this total, which underlines their importance. Similarly, if we consider the total number of ethotic supports and attacks, these are present in 55% of the total number of rephrases (therefore 45% are present in other statements). The confidence level for annotator judgements (how certain they feel about their decision) is about 0.57, this is in particular due to numerous borderline cases. However, the average inter-annotator agreement over these corpora is 0.77 which is quite high for such a task.

4.4. Evaluating the lexical level to characterise ethos and emotions in rephrase

Let us concentrate in this contribution on the lexical level used to produce rephrases and ethotic and emotive structures in our corpora. As already indicated in [6], lexical factors play quite an important role in the formulation of relatively direct and simple rephrases. The platform we have developed [7] is used to investigate lexical distribution and behaviour, it is based on the SpaCy's tagger. This tagger allows the description of the different word categories via their lemmas. It also makes explicit their frequency and the dependency relations which hold between words in a statement. Lexical semantic factors can be introduced either manually from corpus analysis or on the basis of external resources such as WordNet or SentiNet. These resources are relatively stable and easy to use.

Rephrase is basically characterised by two dimensions: (i) the context: an original statement shares quite a lot with its rephrase, in particular verbs and nouns are frequently similar, or in a synonymy relation; and (ii) the lexical essence of the rephrase, which characterises what has evolved and how, in a positive or a negative direction and along what semantic dimension (or facet). This is, in simple cases, relatively frequently accounted for by the use of scalar adjectives of various types or intensity adverbs modifying verbs or possibly adjectives. It is also possible to observe, in more limited cases, nouns and verbs, which, while preserving the context advocated in (i), worsen or improve the original statement.

From an implementation perspective, in lexical semantics, scalar adjectives and intensity adverbs are structured on the basis of non-branching proportional series [17], which structure these items along a specific property. This property qualifies the rephrase (which facet is modified) and gives its orientation. Concerning verbs, it is of much interest to consider their antonyms since they modify the orientation of the original statement. Concerning nouns, since antonyms are very infrequent, we consider in our experiment those words which have

the same hyperonym (e.g. novel has book as hyperonym, and can be contrasted with roman, technical book, proceedings, dictionary, etc.). These are in general sufficiently contrasted to entail the identification of a rephrase. For example, a simple non-branching series for adjectives is structured along the property 'temperature', with the following partial order of terms (from the lowest to the highest):

frozen - cold - mild - hot, warm - torrid.

Other adjective series are more subtle to structure, they may depend on context or on the speakers, e.g. for a political discourse (or a research project):

awful - terrible - bad - drab - average , acceptable - good - excellent.

The position of terms on a given series has an impact on the rephrase orientation and on ethos. For adverbs, *very, dramatically, etc.* increase the initial intensity of the verb whatever its orientation. This data is well-known and accessible on several platform, most notably WordNet and Sentinet. Results produced by our platform include these data repositories and more specific data collected from our corpora [7]. Besides rephrase analysis, these lexical resources are also frequently used in sentiment analysis, and reused as such here. This is useful when a rephrase contains a lexicalization different from the original statement (e.g. adjective - adverbial).

4.5. Elaborating the lexical level to characterise rephrases and ethos

In order to avoid additional difficulties which have no relation with studied phenomena, rephrases which are relatively well-written have been selected, with, e.g. no ellipsis, gaps of various sorts, icons, etc. An experiment to evaluate *a priori* the role and impact of lexical items in rephrase analytics is under development. If we consider adjective and adverb phrases, it consists in:

- collecting annotated corpus pairs (initial statement, rephrase), and tagging words,
- identifying the changes advocated above (lexical essence of rephrase), tagging the differences between original utterance and rephrase,
- characterising, given the non-branching proportional series advocated above, what has been modified, how and how much. Specific tags can be developed for that purpose.

From this experiment, additional or revised lexical resources can be expected.

For those rephrases which do not enter into the above scenario, the following experiments are being carried out:

- consider pairs where the rephrase is a form of negation of the initial statement, with the use of an explicit negation,
- similarly, consider pairs where the rephrase contains a verb which is an antonym of the head verb in the initial statement,
- consider pairs where the original statement remains unchanged but a restriction (e.g. a contrast) has been adjoined via a dedicated connector (e.g. *but, nevertheless* or a comma),
- consider those pairs where the rephrase contains a noun which is in the same hyperonymy class of a noun in the initial statement instead of the initial noun.

5. Implementation for linguistic analysis of rephrase

In order to facilitate the linguistic analysis of the dynamics of ethos and emotions of rephrase, a DynRephAn_v02 tool (Dynamics of Rephrase Analytics version 02, available at https://newethos. org/technologies/) has been developed [7]. Its first version [18] enables a simple analysis of distribution of expressions of ethos and emotions in rephrased arguments (see e.g. Figure 1).
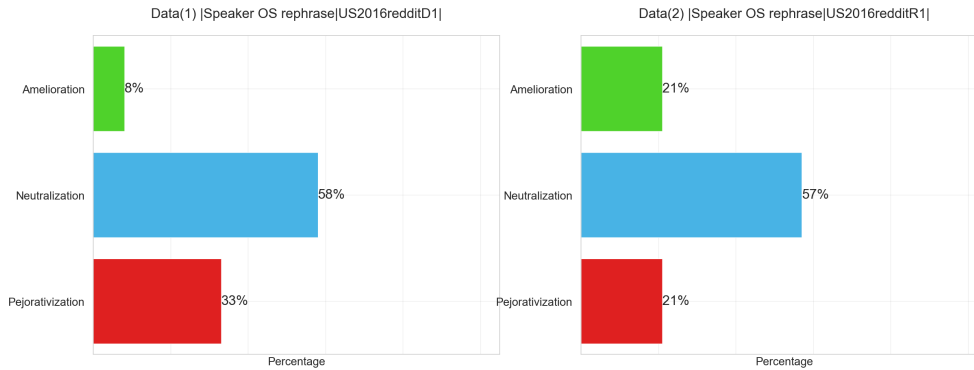
Figure 1: Simple analytic of distribution: Comparing two corpora against the frequencies of loading rephrased arguments with positive emotions (amelioration) or negative emotions (pejorativisation), and unloading rephrased arguments to no emotion (neutalisation).

The current version extends the implementation to allow for the analysis of linguistic properties of pairs of argumentative discourse units that are linked through the relation of rephrase. DynRephAn_v02 enables to search for (i) selected n-grams (unigrams, bi-grams, etc); (ii) Part-Of-Speech; or (iii) their combination (see Figure 2). This allows for understanding the rhetorical mechanism of rephrasing arguments in discourse, and at the same time gives the perspective of enhancing the automated argument detection through the exploration of the characteristics of the linguistic surface and linguistic patterns that accompany such an argumentation.

Figure 2: Language-based analytic of Part-Of-Speech and n-grams: Searching for n-grams that contain a specific pair of part of speech. In this example, the first item on the list for a PoS bi-gram **Adjective & Noun** includes *plastic pollution* in both input and output of rephrase that loads an argument with the positive ethos of a user @AliceXiaZhu. This transformation is classified as amelioration (marked with green colour), since we move from E0 in input to E+ in output, see Section 3.

6. Conclusion and future work

In this paper, we explored rephrase dynamics using five corpora with discussions on Covid-19 and climate change on X – Twitter, televised US 2016 Presidential Elections Debates, Reddit reactions to those debates, and UK Parliamentary debates from the 1979-1990 period. The study of the relational character of rephrase allowed us for developing rephrase analytics tool, DynRephAn, to capture the linguistic changes of ethos and sentiment when speakers rephrase their own or someone else's words. Whereas the ethos layer has been annotated manually, an automatic annotation was done for the sentiment dimension. The emphasis in the design of the DynRephAn tool, which has been put on the linguistic aspect of the analysis, makes it possible to automatically obtain visualisations showing which specific expressions (parts of speech or sequences of typically used words, called 'n-grams') are associated with the dynamics of the rephrase in terms of amelioration, pejorativisation and neutralisation. In this way, we have provided a tool to further study the language of rephrased arguments for the sake of the future inquiry into tendencies of modifying the meaning to achieve persuasive aims.

A possible line of future inquiry should, for instance, focus on the lexical characterisation of ethos which, despite being largely dependent on pragmatic factors, may be studied in terms of some elements at the lexical level that may play a prominent role independently of any pragmatic consideration. For example, using in a rephrase an adjective or an adverb which is very positive or negative (to the extreme right or left in a non-branching proportional series) may indicate e.g. a form of excessive support (positive), or aggressive behaviour (negative orientation probably). Also, using terms which are quite far from the original ones may be analysed as such. This may also be the case for verb antonyms. Conversely, a rephrase where the lexical variations are very limited in intensity could indicate a rather consensual behaviour or consideration for the other speakers. In that case, the terms used in the rephrase are close on the series considered. The facets considered in the rephrase may also be of importance to characterise ethos. There is a difference between facets which are central (such as those associated with the telicity) and those which are more peripheral (such as those associated with the agentivity). Then, for example, a rephrase which refers to a peripheral facet may be interpreted as more negative or aggressive, but this remains an open research problem. These and other aspects of the language of rephrasing, once implemented in the rephrase analytics tool, may turn out to be instructive in identifying and making sense of sophisticated rhetorical strategies of the use of rephrase with (un-)loading messages with ethos and sentiment, and thus complement to the pragmatic characteristics of manoeuvering with rephrased arguments.

Acknowledgements

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