

On the role of discourse particles for mining arguments in German dialogs

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Abstract. Argument mining in dialogs or multilog necessarily must take into account the pragmatic relations that hold between dialog participants, their arguments and the ongoing discourse. This paper analyzes the role of German discourse particles and the illocutionary force contributed by the particles. We investigate a set of highly frequent discourse particles in German and propose a categorization that complements those levels of analysis that are pursued in opinion mining and dialog act annotation. Incorporating the subtle pragmatic information encoded by the discourse particles into Argument Mining offers a new way of pragmatically underpinning the propositional content of arguments in German dialog data.

Keywords. discourse particles, argument mining, dialogical data

1. Introduction

Argument Mining of dialogical data involves the analysis of different levels of information: On the one hand there is the propositional, i.e. the at-issue content of the discourse; on the other hand, there is a level of pragmatic information which enriches the propositional content. This pragmatic level provides information on how participants steer the discourse, how they relate to it and why some information is important to the other participants at a particular stage. This information is highly relevant to interpreting arguments in dialogical data and becomes crucial when analyzing the exchange of arguments and the kinds of conversational moves that trigger succeeding moves.

In German natural speech, pragmatic information is conveyed, among other means, by discourse or modal particles, a linguistic category that is frequently used in spoken language, but is not confined to it. In this paper we show that discourse particles in German are so frequent in natural speech arguments that they are indeed worth exploring in more detail. We then put forward a first proposal to categorize the pragmatic information that a set of highly frequent German discourse particles contributes to the propositional content of the dialog. We further discuss how this information can enrich the interpretation of argumentative structures in this type of data.

The paper proceeds as follows: We first lay out the necessary background concerning the linguistic information on discourse particles and argumentation mining in dialogical

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data (Section 2) and then provide quantitative evidence as to the relevance of discourse particles in German natural speech arguments (Section 3). We then go on to provide an initial classification of pragmatic information that is contributed by German discourse particles (Section 4). Section 5 discusses how this information can enrich argumentation mining in dialogical data and concludes the paper.

2. Discourse particles and their pragmatic contribution

In linguistic theory, German modal or discourse particles have been a long-standing issue [1,2,3,4,5]. Overall, they are considered to not contribute to the propositional, i.e. at-issue, content of an utterance, but to its expressive content ([6], [7], [8], among many others). Due to their elusive pragmatic nature, there is no generally agreed-upon treatment of discourse particles. Analyses range from considering them as contributing conventional implicatures [9], adding felicity conditions [6], being modifiers of illocutionary operators [3,10] or being a modifier of sentence types [8]. Despite the breadth of analyses, discourse particles are generally considered as conveying a speaker's stance towards an utterance and situating the utterance in the web of information that comprises the discourse, including the Common Ground held by the discourse participants [11,12]. It is this property that we claim can be capitalized on for mining arguments in dialogical data.

Discourse particles are found across languages, as shown in (1) for English. Here, the particle *like* does not change the descriptive content of the utterance, i.e. it does not change the fact that the process took twenty minutes. Instead, *like* indicates that the speaker is not quite sure of how to say what they mean [13]. In contrast, (2) illustrates the verbal usage of *like* where it contributes to the proposition of the utterance.

(1) They're, *like*, representatives of their clan.

(2) I *like* chocolate very much.

For German, consider (3), where the conclusion phrase ('the tunnels are crucially important') precedes the premise phrase ('because they drastically reduce travel times'). Without the particles triggering the conventional implicatures in the premise, the argument itself does not contain information on how it relates to the previous discourse. However, taking this information into account enriches the analysis of the argument: The discourse particle *ja* 'yes' either establishes or reconfirms the reason for tunnels as part of the common ground between the discussion partners. In contrast, *halt* 'stop' expresses a (resigned) acceptance of an immutable constraint, i.e. the speaker accepts the reason that travel times are reduced, although he or she might not like the fact.

(3) Die Tunnel sind existentiell wichtig,
 the tunnels are existential important
 weil sie (∅ / *ja* / *halt*) die Fahrzeiten drastisch verkürzen.
 because they (∅ / *yes* / *stop*) the travel times drastically shorten

'The tunnels are crucially important, because they drastically reduce travel times, (∅ / as you know / *regrettably*, but *indisputably so*).'

For some particles, multiple interpretations exist depending on the intonation. In (4), the stressed *doch* ‘indeed’ signals the rejection of the common ground, i.e. the speaker rejects an opinion which has been uttered in the previous discourse that implies that the tunnels do not reduce travel times. The unstressed *doch* ‘indeed’ reminds the hearer of a fact that was uttered in the previous discourse, thereby activating the common ground between the discussion partners.

- (4) Die Tunnel sind existentiell wichtig,
the tunnels are existential important
weil sie (*DOCH / doch*) die Fahrzeiten drastisch verkürzen.
because they (*indeed / indeed*) the travel times drastically shorten

‘The tunnels are crucially important, because they drastically reduce travel times,
(*in contrast to what was said before/if I may remind you*).

The examples illustrate that discourse particles make subtle pragmatic contributions that structure the discourse, relate participants to it or help the hearer to understand why some information is important at a particular stage. This information is highly relevant for argument mining in dialogical data and while a number of previous approaches take into account pragmatic information [14,15,16,17,18,19,20], these particles offer additional information by signaling propositional boundaries and inter-propositional relationships: two key aspects of argumentation mining. By incorporating them in argument analysis, we cannot only tie arguments to the context of a dialog, we can also more closely analyze the relation between speakers and the discourse.

In the following we briefly show that discourse particles in German are highly frequent in natural language arguments and are therefore worth exploiting for argumentation mining purposes.

3. Quantitative investigation

For the investigation we employ three different corpora: We first use the transcripts of Stuttgart 21 (S21), a public arbitration in the German city of Stuttgart, where a new railway and urban development plan caused a massive public conflict in 2010 (10.000 utterances, ~ 500.000 tokens).² We further use the transcripts of experimentally controlled discussions on whether or not to allow fracking in Germany (2.000 utterances, ~ 282.000 tokens) and on establishing a hypothetical African government (3670 utterances, ~ 363.000 tokens).³

For the investigation we take the 20 most frequent particles (and their combinations) in the three corpora (among them *ja* ‘yes’, *halt* ‘halt’, *doch* ‘indeed’, *eben* ‘even’, *wohl* ‘probably’) and calculate their relative frequency in discourse relations like premises, conclusions, contrasts and concessions that are part of argumentative structures and are

²Until October 2014 the transcripts were publicly available for download at <http://stuttgart21.wikiwam.de/Schlichtungsprotokolle>. A new, edited version of the minutes can be found here: <http://www.schlichtung-s21.de/dokumente.html>

³These experimentally controlled discussions were done as part of our eHumanities VisArgue project, which represented a collaboration between computer science, linguistics and political science at the University of Konstanz. The experiments were conducted by our political science partners.

marked by explicit discourse connectives. These discourse relations span sentences but are not related to each other and therefore do not form chains of arguments.

To extract the information from the dialogs, we use the VisArgue pipeline [14,21], a linguistically motivated, high-quality parsing pipeline that automatically identifies, disambiguates and annotates discourse information in transcribed natural speech, among them the spans triggered by discourse connectives. The number of discourse relations that contain one or more particles are shown in Table 1.⁴

	Premise	Conclusion	Contrast	Concession	Condition
Stuttgart21	0.28	0.32	0.20	0.08	0.23
Fracking	0.39	0.46	0.30	0.10	0.34
Africa	0.40	0.43	0.23	0.15	0.29

Table 1. Relative frequencies of explicit argument relations containing discourse particles

Overall, Table 1 shows that particles are frequently used across corpora and across those discourse relations that signal argumentative structures: Conclusion relations rate highest across corpora, with particles contained in 32% to 46% of cases, followed by premise relations where particles occur in 28 to 40% of cases. Contrast and condition relations range in the middle, concessions contain the least number of particles (8% to 15% of cases).

The results indicate that particles are worth taking into account when mining arguments in German dialogs: They are frequently employed in spoken natural language arguments and carry pragmatic information that conveys important information on how arguments and speakers relate to the discourse. In the following we offer a first categorization of the pragmatics contributed by individual discourse particles and their combinations.

4. Categorization

While the long-term goal is to create a language-independent scheme of pragmatic facets that are relevant in relating arguments to natural language discourse, this paper puts a particular focus on the contribution of highly frequent discourse particles in German. One challenge is to make the chosen categories general enough to allow for a meaningful comparison, but also fine-grained enough to allow for detailed interpretation. The second challenge resides in the nature of the discourse particles: The pragmatic information they carry is subtle and therefore hard to pin down. Moreover, the majority of them can be used as “regular” lexical items. The particles *halt* ‘stop’, *ja* ‘yes’ and *doch* ‘indeed’, for instance are also used as verbs and/or adverbs. In the following we briefly discuss each of the dimensions of pragmatic information, summarized in Table 2.

4.1. Dimensions

Our initial classification proposes three major dimensions of pragmatic information that are triggered by 20 of the most frequent discourse particles in the three German corpora discussed in Section 3. Table 2 provides an overview of the classification.

⁴The total number of discourse relations ranges from 107 concession relations in the the Fracking corpus to 3075 conclusion relations in the S21 corpus (across corpora, mean: 1746, median: 1798).

Dimension	Subdimension	Example
Common ground	Refer to common ground (CG)	<i>ja</i> ‘yes’
	Activate common ground (ACG)	<i>doch mal</i> ‘lit. indeed sometime’
	Reject common ground (RCG)	<i>doch wohl</i> ‘lit. indeed probably’
Constraint	Immutable constraint (IC)	<i>halt</i> ‘stop’
	External constraint (EC)	<i>mal</i> ‘sometime’
Consensus	Consensus (C)	<i>ja</i> ‘yes’
	Minimal consensus (MC)	<i>immerhin</i> ‘at least’
	Consensus-willing (CW)	<i>nicht wahr</i> ‘lit. not true’ = ‘right’

Table 2. Categorization of pragmatic information

Common Ground The first dimension and one in which particles have lately been analyzed as triggering conventional implicatures (CIs) is concerned with the Common Ground, i.e. the knowledge shared between discussion partners. With respect to the discourse particle *ja* ‘yes’, [22,23,8,24,25, inter alia] show that it is used to *refer to the Common Ground*, i.e. the speaker wants the hearer to know that the utterance refers to content that was previously under discussion. Other discourse particles, for instance *doch* ‘indeed’, trigger a CI that indicates an *activation of the Common Ground*. Here, the speaker deliberately puts information into the Common Ground of the hearers and expects it to be present in the continuing dialog, thereby extending the knowledge shared in the discussion. Thirdly, the *Common Ground can be rejected*, i.e. information that is shared between the hearers is objected to by the speaker. This CI is for instance triggered by the particle combination *doch wohl* ‘lit. indeed probably’, illustrated in (5).⁵

- (5) ... weil das ist *doch wohl* der Konflikt, um den es hier geht.
 ... because this is *indeed probably* the conflict about the it here go
 ‘... because (*in contrast to what you are claiming*) this is the conflict that we’re dealing with here.’

Constraint This dimension subsumes pragmatic information that either conveys an immutable or an external constraint. Concerning the latter, for instance triggered by *mal* ‘sometime’, the speaker signals that they are subjected to an external constraint, either imposed by a hearer or by a fact under discussion. With respect to the former, particles such as *eben* ‘even’ and *halt* ‘stop’ imply that the speaker resignedly accepts a fact that is immutable, be it out of their own accord or imposed from outside, shown in (6).

- (6) Wir machen das, weil das *eben* unsere Arbeit ist.
 we make this because this *even* our job is
 ‘We do this, because it’s our job (*that is how it is*).’

Consensus While full consensus is generally signaled by adverbials such as *ja* or *ja-wohl* ‘yes’, the contribution of some particles can best be described as signaling minimal consensus. Using for instance *immerhin* or *zumindest* ‘at least’, which also have concessive meaning, the speaker signals that they partly accept information that was previously under discussion, but are still concerned about some aspects of it. With respect to

⁵The particle *doch* ‘indeed’ by itself is actually ambiguous between rejection and activation of Common Ground, see [25] for more discussion.

consensus-willing, the multiword particle *nicht wahr* ‘lit. not true’ was used extensively in one of the corpora as a tag question to signal the overall aim of the speaker to reach a consensus, calling on the hearers to follow suit. An example is shown in (7).

- (7) Bei dem ICE geht es wahrscheinlich schneller, *nicht wahr*?
with the ICE go it probably faster not true
It’s probably faster with the ICE, (*don’t you agree?*)

This classification of the individual particles and the associated pragmatic information is a necessary first step in operationalizing their content for argumentation mining. The following evaluation shows that our classification is indeed valid and that the discourse particles can be reliably annotated with the proposed dimensions.

4.2. Evaluation

In order to evaluate our classification scheme, we conducted an experiment on the inter-annotator agreement, using five particles that are highly frequent and that belong to one of the chosen categories. For the dimension ‘Common Ground’, we select *ja* ‘yes’, for ‘Constraint’ we select *halt* ‘stop’ and for ‘Consensus’ we use *immerhin* ‘at least’. We also include *doch* ‘yes’ as its pragmatic contribution varies with intonation and is expected to create disambiguation problems for the annotators, as well as *mal* ‘sometime’ whose particle meaning can be hard to differentiate from its literal usages depending on the context. The task for the annotators is to differentiate the particle meaning from the literal meaning, and, in the case of *ja* ‘yes’ and *doch* ‘indeed’, pick the correct pragmatic contribution.

The annotation data consists of a total of 100 sentences which are randomly chosen from the S21 corpus, each containing one of the five particles. The task for each of the four annotators (undergraduates of linguistics) was to assign one dimension to each of the sentences. Across all particles and all annotators, kappa is $\kappa = 0.66$ (“substantial agreement”). Filtering out the least accurate annotator increases κ to $\kappa = 0.85$ (“almost perfect agreement”). A closer investigation of the results shows that *doch* ‘indeed’ is the most problematic particle due to the effects of the intonation on the pragmatic contribution. Here, the agreement between annotators is significantly lower. In all other cases, the annotators were able to assign the right annotations to the data, showing that the proposed classification scheme is systematic and well-defined.

5. Discussion and conclusion

This paper presents an initial survey of German discourse particles and their pragmatic contribution, showing that this linguistic category offers potential for interpreting arguments in dialogical data. Although we see our classification scheme as an initial proposal which may yet be subject to revision, given our results so far, we claim that it is imperative to take discourse particles in account in argument mining. This particularly pertains to a key issue in argument mining, namely the detection of propositional boundaries. Using particles and the scope they have in the surrounding sentence, we believe that this support the differentiation of argumentative text units from those that are non-

argumentative. This is particularly true for the case where only a portion of a sentence coincides with an argumentative unit.

Particles also offer information on the if and how of relations between propositions and more abstract notions: For instance, they allow us to tie arguments to the Common Ground of the dialog participants, i.e. the knowledge shared between discussion partners. Using the pragmatic information contributed by the particle, we cannot only connect individual propositions (or arguments), we can also relate them to a larger set of propositions that constitute the Common Ground, as well as determine the type of the relation. For instance, if a premise contains a reference to the Common Ground, the speaker indicates that they base their conclusion on information that they believe is known among the debate participants. Conversely, if the conclusion implies a rejection of the Common Ground, the speaker signals that the inference rejects information that is known among the participants. For argument mining, this information can yield more detailed insights into how dialog settings differ in the way participants relate their arguments and themselves to the shared knowledge of the discussion – enriching the relations between arguments and the propositions that constitute them. It also opens up the possibility of devising a new set of argumentation schemes based on the notion of the Common Ground, complementing those previously proposed by [26,27] and many others.

Regarding our dimensions of constraint and consensus, the discourse particles that instantiate these dimensions rather offer information on the intention of the speaker and the stance/attitude of the speaker towards the current utterance and the arguments put forward previously. For instance if an immutable constraint particle is used in a premise, the speaker implies that the conclusion results from a constraint that cannot be avoided. Speakers can indicate that they are willing to make concessions or are seeking consensus, they can also use them to strengthen the force of their argument by invoking the idea of an immutable constraint that is governing their argumentation.

Besides discourse particles, natural language contains a variety of further strategies for structuring the discourse and for expressing pragmatic information that contributes to the overall illocutionary force [28]. A prominent example in English are tag questions. The operationalization of the pragmatic contribution of discourse particles presented here needs to be extended to other relevant natural language phenomena.

Overall, the proposed categorization of pragmatic information is a first step in analyzing the breadth of pragmatic information that structures and guides dialogical arguments. This operationalization has the potential to complement other levels of pragmatic information. Such an analysis can for instance pave the way for establishing a scheme of linguistically-motivated types of arguments, i.e. causal arguments where a conclusion is drawn based on an immutable constraint in one of the premises. By not only analyzing the pragmatic role of discourse particles, but also taking into account other rhetorical means such as tag questions and rhetorical questions, we can arrive at a much richer interpretation of the discourse and exploit information that is inherent in natural speech argumentation.

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