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How to Recognize Arguments? A Study of Human Negotiations

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Abstract: Different kinds of negotiations and presented arguments are considered in this paper. Discussions in the Parliament of Estonia as well as negotiation in telemarketing calls, travel, and everyday conversations are studied. In the Parliament, negotiation involves many participants while the other conversations take place between two participants. In the analyzed texts, argument components (premises and claims), argument structures (basic, linked, etc.), and relations (support, attack, and rebuttal) are annotated manually. For annotating dialogue acts (DAs), a customized typology and custom-made software is used. This preliminary study aims to find cues for recognizing arguments in Estonian texts automatically. It turns out that some DAs and language features contribute to the recognition of arguments and inter-argument relations.

Keywords: argument, negotiation, argument structure, inter-argument relations, dialogue act, automatic recognition

An argument includes premises, i.e., statements in a natural language, that determine the degree of truth of another statement – the claim. Three types of inter-argument relations can be observed – support, attack, and rebuttal. An argument can *support* a claim or a premise of another argument, *attack* another argument or its premise, or *rebut* another argument. Argument diagramming makes it possible to represent the structure of a natural language argument. An argument diagram is a *graph* where nodes correspond to the components of an argument and links represent relations.

1. Introduction

Negotiation is an interaction where a group of agents, who want to cooperate but have potentially conflicting interests, try to come to a mutually acceptable division of the insufficient resources [1]. In argumentation-based negotiation, arguments are exchanged between the participants and a decision will be made [2]. An argument consists of a statement (i.e., claim, or conclusion) that can be supported by a premise or premises. The claim is an assertion that presents a result, which can be derived from certain premises. For example, in the argument *The dinosaurs existed because scientists have identified remains from dinosaurs*, the claim is *the dinosaurs existed* and the premise is *scientists have identified remains from dinosaurs*.

This paper studies argument-based negotiations in Estonian texts. The current aim is to contribute to the automatic recognition of arguments. The further aim is to model negotiation on the computer. We start the paper with the analysis of discussions held in the Parliament of Estonia [3]. A corpus of verbatim records (in Estonian) is used[1]. In the second part, human–human negotiation dialogues

from the Estonian dialogue corpus are studied. In the texts, premises and claims of arguments, the structure of arguments (basic, linked, convergent, etc.), and relations (support, attack, and rebuttal) are manually annotated. Dialogue acts (DAs, e.g., proposal, question, opinion, giving information, etc.) are annotated by using a customized typology and custom-made software.

This paper has the following structure. Section 2 gives an overview of related work. In Section 3, we study discussions in the Parliament of Estonia by using a corpus. We consider the arguments of members of the Parliament (MPs) and are looking for the features that will support recognizing the components and the structure of arguments as well as inter-argument relations. In Section 4, we examine negotiations in the Estonian dialogue corpus. Section 5 considers the similarities and differences between the arguments in different negotiations. Section 6 draws conclusions, also figuring out future work. Our further aim is to create software for automatic recognition of arguments in Estonian texts.

2. Literature Review

Modeling negotiation on the computer has been considered in many papers. Let us bring out some influential papers of the past decade. Hadjinikolis et al. [4] study persuasion dialogues and consider opponent modeling based on an agent's experience obtained through dialogues. NegoChat is the first negotiation agent that uses a natural chat interface and analyzes its impact on the agent's negotiation strategy [5].

Thimm [6] gives an overview of strategies in multi-agent argumentation. Hunter [7] introduces a probabilistic user model in negotiation dialogue. He investigates how the system updates the model during the dialogue, how it chooses moves by using the model, and how it asks the user to improve the model. His conclusion is that it is necessary to further develop persuasion strategies.

Kang et al. [8] propose a framework of persuasion strategies, presenting a model of persuasion for virtual agents.

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[1]https://www.riigikogu.ee/en/

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Amgoud et al. [9] consider representing arguments of a natural language and introduce a formal language for this. It is possible to represent relations between arguments as formulas of the same language.

Lippi and Torroni [10] study how vocal features of speech can improve the automatic extraction of arguments from a natural language text. They introduce a classifier using machine learning and train it on data of UK political elections debate.

Rosenfeld and Kraus [11] propose a methodology of persuading people in argumentative dialogues. They combine modeling of argumentation, Markovian optimization techniques, and machine learning in argumentation.

Stab and Gurevych [12] introduce an annotated corpus of 402 essays that include persuasion. Their annotation scheme makes it possible to represent the argumentation structure of a document (essay) as a graph.

Petukhova et al. [13] describe the Metalogue Debate Trainee Corpus. When communicating, the participants argue for and against a position that is proposed for the debate. Each debate is motivated by a motion – new law proposal or changes to an existing law. The training session is started by the Proponent who presents the motion and an argument in favor of it. Then the Opponent will present counter-arguments.

Menini et al. [14] study political speeches that do not include interaction between opponents. They apply argument mining techniques and use OVA+ – an on-line tool for the manual analysis of arguments in a natural language text [15].

Lawrence and Reed [16] and Stab and Gurevych [12] consider the problem of transferring natural language arguments into a structured representation, i.e., argument diagramming. An argument diagram is a graph where nodes represent components of an argument and links represent directed relations between them. There are various types of argument diagrams [12]. A *basic* argument consists of a single premise and a claim. In a *linked* argument, there are multiple premises that support a claim (i.e., conclusion). All premises work together, each premise requires the others. In a *convergent* argument, there are multiple premises like in a linked argument but each of them independently supports the conclusion. In a *divergent* argument, a single premise supports different conclusions. In a *sequential* (or serial) argument, one premise leads to another and this, in turn, leads to the conclusion. *Hybrid* arguments are more complicated, including several combinations of other argument structures.

Ruiz-Dolz et al. [17] present a richly annotated corpus consisting of the transcripts of 29 debates in Catalan. The annotation of the corpus marks propositions, relations between arguments, debate interactions, and evaluations of the argumentation.

Twenty-seven parliamentary corpora can be accessed through the CLARIN ERIC infrastructure [18]. Freely available comparable and interoperable corpora of 17 European parliaments have been produced on the first stage of the ParlaMint project, financed by CLARIN ERIC [19]. The second stage of the project (December 2021–May 2023) will extend the existing corpora, add corpora for new languages (incl. Estonian), and improve their usability.

Among others, Lawrence and Reed [16], Rosenfeld and Kraus [11], Amgoud et al. [9], and Thimm [6] provide overviews of the area.

To the best understanding of the author of this paper, argumentation in negotiations and discussions within the Parliament of Estonia as well as automatic methods for recognizing arguments in Estonian texts have not be studied

before. From the papers mentioned above, Amgoud et al. [9], Stab and Gurevych [12], and Lawrence and Reed [16] have most of all influenced the current study.

3. Negotiations and Arguments in Parliament of Estonia

Let us start with the analysis of discussions about law-making held in the Parliament of Estonia, in order to study how the arguments are presented in multi-party negotiation.

When considering persuading essays, Stab and Gurevych [20] distinguish the *main claim* and a claim of an arbitrary argument. Similarly considering discussions in the Parliament, we determine the main claim as *to accept the proposed bill* that is given in the report of Minister in the beginning of the discussion. A set of the statements supporting the main claim (i.e., *main premises*) together with the main claim can be considered as *the main argument*.

3.1. Empirical material

Texts of seven occasionally chosen discussions in the Parliament of Estonia, belonging to 1995–2018, form empirical material of this section (total amount 75,160 tokens). All the records and texts can be accessed on the web (the Parliament of Estonia). However, it is not quite clear how representative the material is and whether the findings can be generalized to other contexts.

One of the tasks of the Parliament is the passing of acts. After drafting a bill, it passes along three readings in the Parliament. All the readings have similar structure. First, the Minister (and/or a representative of the leading committee) makes a presentation about the bill (and/or its amendments, respectively). After every presentation, MPs have the opportunity to ask questions and get answers from the presenter. In the following negotiation, arguments are given for/against the bill and/or the amendments. The 2nd reading also includes voting on amendments, and the 3rd reading ends with the final voting where the decision about accepting the bill as law will be made.

An expert (manually) annotated arguments and inter-argument relations in the seven discussions under consideration. Guidelines from Stab and Gurevich [21] and Amgoud et al. [9] have been used. The annotation scheme is introduced in Koit [3].

DAs (like question, opinion, giving information, etc.) were annotated by using the typology presented in Hennoste and Rääbis [22] and custom-made software. The typology departs from the conversation analysis (CA). According to CA, a communication participant always must react to the previous turn [23]. In this way, relations between two turns are central. Some DAs form adjacency pairs (APs) where producing the first pair part makes the second one relevant (like a question expects answer). Therefore, in the used typology, the acts are divided into AP (like question or answer) and non-AP (or single) acts (like continuer *uh huh*). Every AP act consists of the first pair part and the second pair part (like forward-looking and backward-looking functions in the well-known DA typology DAMSL). Names of DAs in the typology consist of two parts that are separated by a colon. The first two letters form an abbreviation of the name of an act-group, e.g., QU – questions, OP – opinions, PS – primary single acts, and AI – additional information acts. The third letter is used only for AP acts – the first (F) or the second (S) pair part of the act. The second part of a DA name is its proper name. Therefore, full names of acts are, e.g., QUF: open yes/no question, QUS: giving information, OPF: opinion,

OPS: accept, and AI: justification (cf. examples 1-7). Overview of the typology can be found in the Appendix.

The analysis starts with extracting arguments from the annotated texts. Following Stab and Gurevych [12], three steps are performed: (1) component identification where argumentative from non-argumentative text units are separated and the argument component boundaries are identified, (2) component classification where argument components are classified into claims and premises, and (3) structure identification where different types of argumentative relations (support, attack, or rebuttal) are recognized. Then frequencies of DAs expressing, respectively, claims and premises are calculated. After that, frequencies of different structures of arguments (basic, linked, etc.) and inter-argument relations (support, attack, or rebuttal) are found.

3.2. Argument structures and relations

In the analyzed negotiations, 46 MPs had the floor (some of them, more than once). In total, 96 arguments were presented.

Argument in example 1 has the simplest structure *basic* (consisting of one premise and a claim) and it *supports* the main claim (accept the bill). Example 2 has more complicated, *convergent* structure – here multiple premises independently support a single conclusion. The argument *attacks a premise* of the main argument. In addition, DAs are annotated in the examples.

(1) <argument>
– structure: **basic**
– relation: **supports** the main claim
<premise>
See, et me oma siseriikliku seadusega keelustame diskrimineerimise ja inimeste ebavõrdse kohtlemise tulenevalt nende soost, on kahtlemata oluline samm edasi. The law will prohibit to discriminate people and to treat them unequally what definitely is a step forward. **PS: giving information**
</premise>
<claim>*Sotsiaaldemokraadid ühe eelnõu algatajana loomulikult toetavad sellise eelnõu põhimõttelist vastuvõtmist Eestis.* Social democrats as initiators of the law definitely support its adopting **OPF: assertion**
</claim>
</argument>

(2) <argument>
– structure: **convergent**
– relation: **attacks** a premise of the main argument
<claim>
[...] *Milleks valada olemasolev raha süsteemi, milles olevaid andmeid võib-olla ei saagi kasutada* [...] It is unhelpful to use money for building a purposeless system [...] **OPS: reject**
</claim>
<premise>
iga lapsevanem võib ju öelda, et ta ei soovi, et tema lapse andmeid kasutatakse [...] every parent can prohibit the usage of data of his/her child [...] **PS: giving information**
</premise>
<premise>
Andmed on meil olemas. [...] We already have the data. [...] **PS: giving information**
</premise>
</argument>

Our analysis has demonstrated that the annotation of DAs contributes to recognizing components of arguments. Specifically, claims of arguments are often (in 77% of cases) annotated as opinion acts

(OPF: opinion/statement, OPS: accept/reject, OPF+OPS). The last annotation (OPF+OPS) means that one utterance has two DA tags. In such a case, the utterance at the same time is both the second pair part of a previous AP and the first pair part of the next AP, e.g., OPS: reject + OPF: assertion. Seventeen percent of claims are annotated as directives (DIF: proposal) and the remaining 6% have different annotation (Figure 1). Premises of arguments are often annotated as primary single acts (PS: giving information in 64% of cases) or additional information acts (AI: specification/ justification/ inference, in 28% of cases, Figure 2). The analysis also has discovered a lot of linguistic cues, e.g., *sest/ sellepärast et* (because, in that) for claims and *kuna* (whereas/ while) for premises [12].

Figure 1
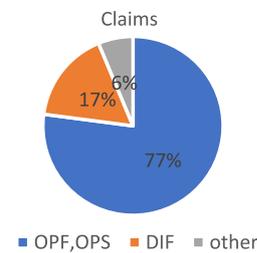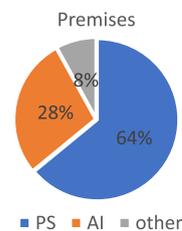**Distribution of different dialogue acts expressing claims of arguments (Appendix)**

Claims

OPF,OPS 77%
DIF 17%
other 6%

Figure 2
Distribution of different dialogue acts expressing premises of arguments (Appendix)

Premises

PS 64%
AI 28%
other 8%

To recognize inter-argument relations, the second pair parts of opinion acts OPS: accept/reject can be used to differentiate supporting and attacking (or rebutting) arguments.

4. Negotiations and Arguments Elsewhere

For comparison, let us consider negotiations and arguments in the human–human dialogues taken from the Estonian dialogue corpus. All the dialogues are recorded in authentic situations and after that, transliterated. Transcription of CA is used [24]. The analysis passes similar steps as in the case of parliamentary discussions.

4.1. Empirical material

We study the following three sub-corpora. The first one consists of 51 telemarketing calls where agents of an educational company are offering training courses to their customers (33,052 tokens). The second sub-corpus includes 24 phone calls and four face-to-face conversations between a customer and a clerk of a travel agency

(13,583 tokens). The third sub-corpus consists of 44 everyday negotiations about doing an action (22 calls and 22 face-to-face conversations, 20,653 tokens). DAs and arguments are annotated in the dialogues.

4.2. Argument structures and relations

Telemarketing calls. Here a sales clerk calls to a possible customer, who can be the manager or a personnel officer of another institution, and offers courses for employees of the institution (marketing, management, etc.). It typically takes more than one call, before a customer makes her final decision – to take the offered course or not. Still, the considered calls belong to the earlier stage of negotiation and therefore, most of them only end with the agreement of the participants to continue negotiation afterward.

Several phases can be differentiated in a telemarketing call. Among them are (a) mapping of the customer (where the clerk asks questions, this way collecting new information about the customer) and (b) argumentation for taking a course (where the clerk attempts to convince the customer about the offered course is necessary and useful for her institution). The argumentation phase will be more and more important in ongoing calls between the same participants.

Some examples demonstrate the usage of arguments. Example 3 presents a *linked* argument of the clerk *supporting* the main claim (which is here *order the course*). Example 4 is a *convergent* argument of the customer *rebutting* the main argument (its claim is implicit). In the examples, transcription of CA is used. DAs are annotated as well.

(3) <argument>
   – structure: **linked**
   – relation: **supports** the main claim
   <premise>
   [üks valdkond on siss see ´teeninduse valdkond ´mille millest me praegu rääkisime,.hh ja ´teine valdkond millega ´Tiritamm=vel ´tegeleb on siis ´juhtimise valdkond. One of the domains of our company Tiritamm is service and another is management. **QUS: giving information**
   </premise>
   <premise>
   (.).hh ee inimeste ´juhtimine siis ´firmades üks´kõik mis ´virmad on, kas müb Bee=em=´veesid või ta müüb inglise ´mööblit. management of people in different enterprises, no difference, is it selling of BMWs or selling of exclusive furniture. **QUS: giving information**
   </premise>
   <claim>
   =et ilmselt kas ´teie virmas on? and my question was: do you need the development of your people in these domains **QUF: open yes/no question**
   </claim>
   </argument>

(4) <argument>
   – structure: **convergent**
   – relation: **rebuts** the main argument
   <claim>
   – **default**: reject the clerk's offer to take the course
   </claim>
   <premise>
   m:a olen ´nii palju ´ära öelnud ja ´edasi ´lükanud ja [. . .] on ´vähe ´kokkupuute´punkte siiski. I time and again have postponed my decision but [. . .] there are too few common grounds with our institution **AI: justification**

</premise>
<premise>
emm noh me oleme ´tõsine ´tootmis ´ettevõte ´ehitusettevõte kellel on ´oopis teine spe´tsiifika.h ee müügiorganisatsi´oonidest, our enterprise has different speciality **AI: justification**
</premise>
</argument>

The analysis demonstrates that a sales clerk often constructs his arguments with help of the first pair parts of APs (OPF: assertion in 58% of cases, OPF: opinion in 33% of cases, as well as a question QUF: open yes/no question, like in example 3); therefore, a customer has a chance to dispute (choosing the second pair part of the corresponding AP). Still, a customer as a rule represents her counter-arguments (if any) by using non-AP acts (like AI: justification in example 4). Argumentation takes place in 32 dialogues (out of 51), the total number of given arguments is 79.

Travel dialogues. Here a customer starts conversation requesting information about a trip. That is the reason why our analyzed travel conversations are foremost question-answering dialogues. However, the agent sometimes argues for the pleasantness and/or usefulness of a trip. Still, such an argumentation has only been found in five dialogues (out of 28), the total number of arguments is 9. There are no customer arguments in the analyzed sub-corpus. Example 5 presents the main argument of the travel agent (proposing a trip).

(5) <(main) argument>
   – structure: **basic**
   <(main) claim>
   aga=no ´tasub täitsa ´vaadata ka seda ´Niiluse kru´iisi I'd propose one-day trip on Nile to you **DIF: proposal**
   </(main) claim>
   <premise>
   tal on küll ´tempo on ´peal aga (0.5) aga ´näeb palju rohkem ja seal on laeva (.) noh laeva ´teki peal saab nagu ´päevitada ´ka. it is still fast but you can see much more and also sunbathe on the deck of the ship **AI: justification**

   </premise>
     </(main) argument>

Premises of arguments are constructed by using information acts (the second pair part of an AP act QUS: giving information, but also a non-AP act AI: justification like in example 5). Claims are represented as the first pair parts of AP acts (e.g., DIF: proposal in example 5) or the second pair parts of directive or question AP acts – usually the answers to the customers' information requests.

Everyday conversations. Here the participants are not strangers as in the telemarketing or travel dialogues but acquainted or even friends. A conversation begins with a proposal of one participant to the partner to perform an action. Negotiation ends with a positive decision of the partner in 25 cases and with a negative decision in one case. In the remaining 18 dialogues, the decision is postponed.

Argument in example 6 *rebuts* the preceding argument of the communication partner.

(6) <argument>
   – structure: **basic**
   – relation: **rebuts** a previous argument
   <claim>
   > *ära ´tule mu juurest läbi* do not come to me **DIS: disagreeing**
   </claim>
   <premise>

nii ˈvastik see ˈkoer akkab aukuma. < so horrible, the dog will bark
AI: justification
    </premise>
    </argument>

In everyday negotiations, some arguments are constructed jointly by both participants. That is different as compared with other analyzed dialogues (example 7; the participants are *A* and *B*; here, *B*'s utterance has two DA tags).

(7) <(main) argument>
    – structure: **basic**
    <claim>
    A: *kule aga tead ˈärme sis ˈtäna seda Santa ˈBarbarat ˈüldse ˈvaatagi.* look here, let us leave out Santa Barbara today
DIF: proposal
    </claim>
    <premise>
    B: *väikekodanlik.* it is banal **AI: justification OPF: assertion**
    </premise>
    </argument>

In the dialogues, one participant is convincing another to do an action. He mostly (in 89% of cases) uses AP acts for claims and non-AP acts for premises (like in example 6). If the partner is opposite, then she presents the claims of her counter-arguments as the first pair parts of the opinion APs (opinion/ assertion) expecting a response of the partner (accept/ reject). The total number of arguments is 102.

5. Discussion

We are analyzing multi-party negotiations in the Parliament of Estonia as well as human–human dialogues. The negotiations are different. More than two MPs are negotiating in the Parliament; everyone can give arguments concerned with the bill under discussion or its amendments. According the rules of the Parliament, a talk of an MP in negotiation can last until 5 min. Turns of dialogue participants, neither in phone calls nor when communicating face-to-face, are never so long.

What is similar, the participants prefer the *basic* arguments, which have the simplest structure (one premise and one claim). Such an argument obviously is the strongest and most accessible to express the relation between a premise and a conclusion in the transferred message. In the Parliament, such arguments are used in 47% of cases and in dialogues – in 74% of cases. In the Parliament, aside of basic, also linked or convergent arguments having more than one premise are frequently used (38%).

In the verbatim records belonging to our parliamentary corpus, claims of arguments of MPs are often annotated as the first or the second pair parts of opinion APs (OPF, OPS), and premises – as non-AP acts (PS or AI, cf. overview of the DA typology in Appendix). To recognize inter-argument relations (support, attack, and rebuttal), the second pair parts of opinion DAs (OPS: accept/ reject) are useful.

In the analyzed travel dialogues, the agents similarly use mostly non-AP acts for premises (e.g., PS: giving information, to give information not directly asked by the customer). The claim usually is presented as the second pair part of an AP act (e.g., DIS/ QUS: giving information), as a reaction to the customer's request or question that was asked in the beginning of conversation.

In telemarketing calls, both the participants typically use non-AP acts for premises and directive or opinion AP acts for claims. In a few of calls, the participants are clearly opposite. Then the customer takes the initiative and presents the claims of her counter-arguments as the first pair parts of AP acts – assertions or opinions expecting a

reaction of the clerk. The clerk always accepts the customer's argument but he also presents his counter-arguments.

In everyday negotiations, similar DAs are used for premises and claims of arguments as in telemarketing calls. Still, here the initiator (who has made a proposal to the partner to perform an action) mostly does not agree with the counter-arguments of the partner. That is different as compared with telemarketing calls.

It is noteworthy that non-AP acts for additional information (e.g., AI: justification) have been used two times more in telemarketing calls than in everyday conversations. Therefore, these acts are specifically important in institutional calls. On the contrary, assertions and opinions (OPF: assertion/ opinion) appear twice more in everyday conversations than in telemarketing calls.

Like in the Parliament, arguments having *basic* (and also *linked*) structure are preferred in the analyzed dialogues (Figure 3). Arguments with the most complicated structure (*hybrid*) are only used in telemarketing calls and only by sales clerks, obviously based on their previous experience to negotiate. In travel dialogues, the agent gives information to the customer little by little, in this way supporting the proposed trip. These facts can be considered as premises of the (main) argument. The claim of the main argument is the proposal (to take a trip) made by the agent before. A similar strategy is often used by sales clerks in telemarketing calls when arguing for a training course.

Figure 3
Distribution of different structures of arguments
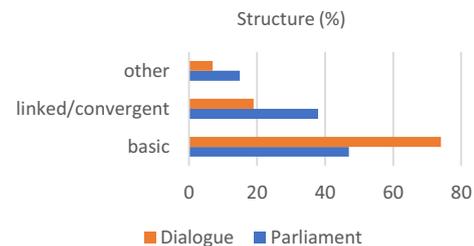
The analyzed everyday conversations contain only basic arguments. Some of the arguments are jointly constructed by both participants (example 7). Other dialogues as well as multi-agent parliamentary negotiations do not include such arguments.

Summing up, the annotation of DAs definitely contributes to the recognition of components of arguments and relations between them in all kinds of the analyzed negotiations. In addition, a lot of useful linguistic keys have been found, e.g., arguments sometimes are presented in the form of <premise> *therefore* <claim>, or <claim> *because* <premise> like *alkoholimüügi lõpetamist bensiinijaamades, tanklates, sest on selge, et auto ja alkohol ei sobi kokku* (CLAIM [*finish alcohol sale in gas stations, filling stations*] ***because*** PREMISE [*a car and alcohol do not fit together*]). However, the linguistic keys are language specific; a list of lexical indicators for English can be found in Stab and Gurevych [12].

Software is being developed to recognize arguments in Estonian texts. The preliminary experiments demonstrate that depending on the input text, 49–58% of arguments can be identified when using rules with linguistic keys, while 71% of arguments are identified if DAs are tagged in the input text. Therefore, the annotation of DAs definitely contributes to the recognition of arguments (and inter-argument relations). However, the problem is that annotation of DAs in Estonian dialogues and debates is not fully automatic at

the moment. The existing tool takes as input the transcript of a conversation, divides it into turns and utterances, assigns up to five DA tags to every utterance using Naïve Bayes classifier, and then a human annotator can confirm the right tag among the tags proposed by the tool or to assign a new tag taken from the typology to an utterance if there was no right one proposed. Although further research is required to automatize DA annotation as well as to discover and develop new rules for recognizing arguments in Estonian text, our preliminary findings suggest that the rule-based method has its potential. We aim to increase the size of our annotated argument corpus in order to implement statistical methods for recognizing arguments and then compare the results obtained by using both approaches.

6. Conclusion

Records of discussions about law-making in many parliaments, incl. the Parliament of Estonia, are available online. In the first part of the paper, multi-agent negotiations in the Parliament of Estonia are considered. Various means are studied that are used by MPs to transfer their messages when arguing. In the second part, three kinds of human–human negotiation dialogues from the Estonian dialogue corpus are analyzed. In the negotiations, components of arguments, their structure, and inter-argument relations as well as DAs are annotated. For annotating DAs, a customized typology and custom-made software is used. Arguments are annotated manually, which is a time-consuming and labor-intensive task. That is why we are looking for ways of automatic recognition of arguments in Estonian texts. The analysis demonstrates that annotation of DAs and some linguistic features can contribute to the automatic recognition of arguments and inter-argument relations. The usability of the cues will be explained in further work.

Recommendations

A lot of linguistic keys can be found for automatic recognition of premises and claims of arguments in Estonian texts. The annotation of DAs also helps to recognize argument components and inter-argument relations. Annotated argument corpus has to be extended to make it possible to implement machine learning methods for automatic recognition of arguments.

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Conflicts of Interest

The author declares that she has no conflicts of interest to this work.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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Appendix. Overview of the Dialogue Act Typology

I. Adjacency Pair (AP) Acts
DIALOGUE MANAGING ACTS
1. Conventional acts (greeting, thanking, etc.), e.g., RIF: greeting, RIS: greeting, RIF: wish, RIS: thanking.
2. Topic change acts (are used to start a new topic or sub-topic), e.g., TCF: initiation, TCS: accept.
3. Contact control acts (typically occur in phone conversations and are used as formulas which can be presented as lists), e.g., CCF: initiation, CCS: confirmation.
4. Adjusting the conditions of answer (ACF: adjusting the conditions of answer, ACS: adjusting the conditions of answer).

REPAIR ACTS
5. Repairs initiated and made by different participants, e.g., RPF: non-understanding, RPS: repair.

INFORMATION ACTS
6. Directives and grants (request, proposal, offer, etc.), e.g., DIF: request, DIS: giving information.
7. Questions and answers, e.g., QUF: closed yes/no, QUS: yes, QUS: no.
8. Opinions and responses (assertion, etc.), e.g., OPF: assertion, OPS: accept, OPS: reject.

II. Non-AP (Single) Acts
DIALOGUE MANAGING ACTS
1. Conventional (contact, call, etc.), e.g., RS: introduce.

REPAIR ACTS
2. Repairs initiated and made by the same person, e.g., RP: self-repair.

INFORMATION ACTS
3. Primary single acts (narration, promise, rhetorical question, etc.), e.g., PS: promise.
4. Additional information (specification, softening, etc.), e.g., AI: specification.
5. Responses (continuer, acknowledgement, etc. – acts that traditionally are considered as narrow feedback), e.g., VR: neutral continuer.