# Communicative Strategy in a Formal Model of Dispute

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Abstract: We study human-human dialogues in a natural language where the communicative goal of the initiator of dialogue is to bring the partner to a decision to do a certain action. If the partner does not accept the goal then dispute will start. Arguments for and against of doing the action will be presented by the participants and finally, one of them wins and another loses the dispute. We present a formal model of dispute which includes a model of argument. We discuss involvement of the notion of communicative strategy in the model. A communicative strategy is considered as an algorithm used by a participant for achieving his or her communicative goal. A communicative strategy determines also how a participant is moving in 'communicative space' during interaction. Communicative space is characterized by a number of coordinates (e.g. social distance between participants, intensity of communication, etc.). A limited version of the model of dispute is implemented on the computer.



## 1 INTRODUCTION

There are two kinds of dialogues which deal with argumentation: disputes and negotiations (Walton and Krabbe, 1995). Each dialogue consists of a sequence of dialogue acts that follow certain patterns of interaction. When initiating dispute, "a speaker asserts a proposition expecting to be asked for reasons/arguments in support of it and being prepared to present and defend them" (Wagner, 1998). The initiator of dispute (the proponent) wins the dispute if the opponent has to accept the initial assertion. On the contrary, the opponent wins if the proponent has to withdraw.

When making a proposal or assertion in negotiation, the proponent, differently as compared with dispute, has to be prepared to receive critiques or counterproposals and react to them. "Negotiation is a form of interaction in which a group of agents with conflicting interests and a desire to cooperate try to come to a mutually acceptable agreement on the division of scarce resources" (Rahwan et al., 2004). Each party tries to gain an advantage for themselves. Negotiation is intended to aim at compromise.

Many researchers have been modelling negotiation on the computer and investigating formalization of argument. Good overviews of the area can be found e.g. in (Chesñevar et al., 2000; Prakken and Vreeswijk, 2002; Besnard and Hunter, 2008).

We study human-human dialogues in a natural language between two participants where the initiator (*A*) makes a proposal to the partner (*B*) to do an action (*D*) and argues for positive outcomes of doing *D*. If *B* refuses to do *D* then the participants have been involved into dispute. Both parties can present their arguments and counterarguments and finally, whether *A* wins, i.e. achieves *B*'s decision "do *D*", or *A* loses, i.e. has to withdraw.

We have worked out and implemented on the computer a formal model of dispute (Koit and Õim, 2014a). In the current paper, we will further develop the model and concentrate on the ways how participants can achieve their communicative goals – communicative strategies. We also introduce the notion of communicative space. When communicating, the participants are 'moving' in a communicative space from one 'point' to another and depending on their locations, they choose their communicative strategies.

The paper has the following structure. In section 2 we introduce our model of dispute including the notions of communicative strategy and communicative space. In section 3 we apply the model to human-human disputes in a natural language. We investigate a dispute between a sales clerk of an educational company and a customer who is supposed to take a training course offered by the clerk. We study the strategies that the

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participants implement for achieving their opposite communicative goals and their movement in communicative space. Section 4 discusses the analysed dispute and proposes a communicative strategy that can be effective in a computer system for argumentation. In section 5 we draw conclusions.

# 2 A MODEL OF DISPUTE

## 2.1 Components of the Model

Let us consider a dialogue between two participants *A* and *B* (humans or artificial agents) in a natural language (Koit and Õim, 2013; 2014b). Let the communicative goal of *A* be "*B* decides to do the action *D*". *A* has a *partner model* at his disposal – an image about *B* – which gives him an opportunity to believe that *B* will agree to do the action. In constructing his first turn, *A* plans the dialogue acts (e.g. proposal, request, etc. depending on his partner model) and determines their verbal form (i.e. the utterances). The partner *B* interprets *A*'s turn and generating her response, she triggers a reasoning procedure in her mind in order to make a decision – to do *D* or not. In the reasoning process, *B* weighs her resources, positive and negative outcomes of doing *D* and finally, she makes a decision. Then she in her turn plans the dialogue acts (e.g. agreement, refusal, refusal with argument, etc.) and their verbal form in order to inform *A* about her decision. If *B* agrees to do *D* then the dialogue finishes (*A* has reached his communicative goal). If *B*'s response is refusal then *A* must change his partner model (which did not correspond to the reality because *A* supposed that *B* will agree to do *D*) and he has to find out new arguments to convince *B* to make the decision.

*B* can add arguments to her refusal. These (counter)arguments give information to *A* about the reasoning process that brought *B* to the (negative) decision.

Then *A* has to find a new argument for doing *D* by *B* and the process continues in a similar way.

### 2.1.1 Reasoning Model

Our reasoning model consists of two parts: (1) a model of human motivational sphere; (2) reasoning procedures (Koit and Õim, 2014b). In the motivational sphere of a reasoning person some basic factors can be found that regulate reasoning about doing an action *D*. We call these factors WISH-, NEEDED- and MUST-determinants, respectively. First, a subject has a *wish* to do *D* if the pleasant aspects of *D* outweigh the unpleasant ones; second, doing *D* is *needed* for the subject if the useful aspects of *D* outweigh the harmful ones; and third, a subject *must* to do *D* if not doing implies some punishment.

We represent the model of motivational sphere of a subject by the following vector of 'weights' (with numerical values of its components):

**w** = (w(resources), w(pleasant), w(unpleasant), w(useful), w(harmful), w(obligatory), w(prohibited), w(punishment-do), w(punishment-not)).

In the description, w(pleasant), etc. mean the weight of pleasant, etc. aspects of *D*; w(punishment-do) – weight of punishment for doing *D* if it is prohibited, and w(punishment-not) – weight of punishment for not doing *D* if it is obligatory. Here w(resources) = 1, if subject has the resources necessary to do *D* (otherwise 0, i.e. we suppose that all the needed resources either exist or not); w(obligatory) = 1, if *D* is obligatory for the reasoning subject (otherwise 0); w(prohibited) = 1, if *D* is prohibited (otherwise 0). The values of other weights can be non-negative natural numbers. Although in reality people do not operate with numbers but use words for characterising different aspects of an action (e.g. *extremely useful, not much useful, neither useful nor harmful*, etc.), the existence of certain scales also in human everyday reasoning is apparent.

The second part of the reasoning model consists of reasoning procedures that supposedly regulate human action-oriented reasoning. A reasoning procedure depends on the determinant which triggers it (in our model, WISH, NEEDED or MUST). Every reasoning procedure represents steps that the subject goes through in his/her reasoning process; these consist in computing and comparing the summarized weights of different aspects of *D*; and the result is the decision: to do *D* or not (Koit and Õim, 2013).

We use two different vectors of weights in our model of dispute: $\mathbf{w}^{B}$ (*B*'s idiosyncratic model which represents *B*'s actual evaluations of *D*'s aspects) and $\mathbf{w}^{AB}$ (the partner model – *A*'s beliefs concerning *B*'s evaluations).

### 2.1.2 Communicative Space

Communication between two participants can be different: collaborative or confrontational, polite or impolite, friendly or unfriendly, etc. Moreover, a dialogue which has started violently can finish peacefully if the participants achieve a compromise,

therefore, the character of communication can change.

Healey et al. (2008) declare that "there are important differences in the quality of human interaction – in degrees of interpersonal, as opposed to physical, closeness – that are important for the organization of human activities and, consequently, for design". They suppose that the concept of communication space provides a useful approach to thinking about the basic organization of human interaction (see also Brown and Levinson, 1999).

We can imagine 'communicative space' where the participants are 'moving' from one 'point' to another. Communicative space can be represented as an *n*-dimensional space ($n > 0$) where the different coordinates characterize the different features of communication. We are able to specify at least the following features: social distance between participants (on the scale from near to far, or, in other words, from familiar to remote), cooperation (from collaborative to confrontational), politeness (from polite to impolite), personality (from personal to impersonal), modality (from friendly to hostile), intensity (from peaceful to vehement). We suppose that just as in the case of human motivational sphere, people have an intuitive 'theory' of these coordinates.

The values of the coordinates can be expressed by specific words like in case of pleasant, useful, etc. aspects of an action *D*. Instead, we use numerical values as approximations in our model and represent the values of coordinates of the communicative space as -1, 0 or +1. For example, the value -1 on the scale of social distance means that the participant is "far" from his/her partner. The value 0 marks "neutral" and the value +1 "near" social distance. In the same time, the partner when communicating can express a different social distance (e.g. "neutral" instead of "far"), i.e. it is asymmetrical.

A feature vector can be assigned to each utterance of a dialogue that determines the point in the communicative space where the author of the utterance is just located. In the following example (start of a phone call), the friends Siiri and Marju are located in the same communication point which can be represented by the vector (+1,+1,+1,+1,+1,+1), i.e. the social distance is "near", interaction is "cooperative", "polite", "personal", "friendly", and "peaceful":

```
Siiri: Marju?
Marju: Ciao.
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### 2.1.3 Communicative Strategies and Tactics

A communicative strategy is an algorithm used by a participant for achieving his/her goal in the interaction (Fig.1; Koit and Õim, 2014b).

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1) Choose an initial communication point in the communicative space.
2) Choose communicative tactics.
3) Implement the tactics to generate an utterance: inform the partner of the communicative goal (agreeing to do an action D).
4) Did the partner agree to do D? If yes then finish (the communicative goal has been achieved).
5) Did the partner postpone the decision? If yes then finish (the communicative goal has not been achieved but can be achieved in the future).
6) Give up? If yes then finish (the communicative goal has not been achieved).
7) Change the point in the communicative space? If yes then choose a new point.
8) Change the communicative tactics? If yes then choose new tactics.
9) Implement the tactics to generate an utterance (argument).
10)Go to 4.
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Figure 1: Communicative strategy of the initiator of dialogue.

The initiator *A* can realize his communicative strategy in different ways: *entice, persuade* or *threaten* the partner *B* to do *D* (respectively, stress pleasantness or usefulness of *D* or punishment for not doing *D* if it is obligatory). We call these ways of realization of a communicative strategy *communicative tactics*.

The partner *B* uses a similar communicative strategy. The only difference is that *B* does not have initiative at the beginning of the dialogue and her communicative goal is opposite as compared with *A*'s one: "do not do *D*". Similarly, *B* can use various communicative tactics realizing her communicative strategy, e.g. *defence* or *attack*. In the last case, she takes the initiative and proposes arguments against doing *D* trying to turn off *A*'s arguments for doing the action.

## 2.2 The Structure of Dispute

As we suppose, *A* and *B* have contradictory goals when starting interaction (dispute). *A*'s communicative goal is "*B* will do *D*", *B*'s goal is "*B* will not do *D*". We suppose in our model that both *A* and *B* can use a common set of reasoning

algorithms. We also suppose that both *A* and *B* have fixed sets of dialogue acts and corresponding utterances which are classified semantically, for example, $P_{increasing\_pleasantness}$ for stressing pleasantness of *D*, $P_{decreasing\_harmfulness}$ for downgrading harmfulness, etc. for *A* and $P_{decreasing\_pleasantness}$, $P_{increasing\_harmfulness}$, etc. for *B*.

Starting a dispute, *A* fixes a partner model $\mathbf{w}^{AB}$ and determines the communicative tactics T which he will use, i.e. he accordingly fixes a reasoning algorithm R which he will try to trigger in *B*'s mind. *B* has her own model of motivational sphere – $\mathbf{w}^{B}$. She determines a reasoning procedure $R^{B}$ which she will use in order to make a decision about doing *D*.

The general structure of *A*'s argument is as follows (cf. Besnard and Hunter, 2008; Koit and Õim, 2014a):

$<\{R, T, w^{AB}_i, proposition^{A}\}, claim^{A}>$,

where

- R is the reasoning algorithm which *A* is trying to trigger in *B*,
- T is the communicative tactics used,
- $\mathbf{w}^{AB}_i$ = ($w^{AB}_i$(resources), $w^{AB}_i$(pleasant), $w^{AB}_i$(unpleasant), $w^{AB}_i$(useful), $w^{AB}_i$(harmful), $w^{AB}_i$(obligatory), $w^{AB}_i$(prohibited), $w^{AB}_i$(punishment-do), $w^{AB}_i$(punishment-not)) is the current partner model (at time i),
- $proposition^{A}$ denotes the utterance chosen by *A* in order to influence one of the weights in the partner model, after what R will supposedly give *B*'s positive decision (do *D*) on the changed model $\mathbf{w}^{AB}_{i+1}$ (at time i+1); its weight is w($proposition^{A}$),
- $claim^{A}$ = "*B* decides to do *D*" (*A*'s communicative goal).

The structure of *B*'s (counter)argument is analogous, with the difference that $\mathbf{w}^{B}$ is used instead of $\mathbf{w}^{AB}$ and $claim^{B}$ is "*B* does not do *D*" (i.e. *B*'s communicative goal).

In dispute, only propositions incorporated in arguments are explicitely presented by participants, the other components of arguments are implicit.

The general structure of dispute is given in Fig. 2 (the dialogue acts in parentheses can be missed).

Both *A* and *B* can indicate that the finishing conditions are fulfilled: (1) the communicative goal is already achieved, (2) give up regardless of having new arguments, (3) there are no arguments to continue the fixed tactics but no new tactics will be chosen regardless of having some tactics not implemented so far, (4) all the tactics are already implemented and all the possible arguments are used without achieving the communicative goal.

```
A: proposal (+ argument(s))
REPEAT
(
 B: question
 A: answer/giving information
)
B: refusal (+ argument(s))
(
 A: question
 B: answer/giving information
)
A: argument(s)
UNTIL finishing conditions are fulfilled
```

Figure 2: Structure of dispute.

If *B* gives up then she makes the decision to do *D* and *A* has achieved his communicative goal (*A* wins and *B* loses the dispute). If *A* gives up then he does not achieve his communicative goal and *B* will not do *D* (*A* loses and *B* wins). If *B* postpones her decision at the end of dialogue then there are neither winners nor losers.

Questions are asked by participants in order to make choices among different propositions that can be used in argumentation.

We have implemented the model of dispute as a computer program, which, as we believe, can be used for training argumentation skills (Koit and Õim, 2014b). The user who plays the role of *B* interacts with the computer (*A*) in written Estonian, either choosing ready-made sentences as counterarguments against performing the action proposed by *A* or putting in free texts. In the last case, cue words are used by the computer in order to understand user sentences. The computer has ready-made sentences for stressing or downgrading the values of different aspects of the proposed action depending on the user model. So far, we have not used communicative space in the implementation and did not consider movement of participants from one communication point to another during interaction.

## 3 HUMAN-HUMAN DISPUTE

In this section, we apply the introduced model to actual human-human disputes. Our special interest is to study communicative strategies used by participants for achieving their communicative goals and the communicative space where they are moving during interaction.

We have analysed a sub-corpus of 52 telemarketing calls of the Estonian dialogue corpus (Hennoste et al., 2008). The calls are recorded in authentic situations and transcribed using the

transcription of Conversation Analysis (Hutchby and Wooffitt, 1998). In the dialogues, sales clerks of an educational company (which changed name is Tiritamm) are calling to potential customers (who are managers or personnel officers of other institutions). Sales clerks offer training courses (language, marketing, business training, etc.) for employees of these institutions.

The communicative goal of a sales clerk (*A*) is that the customer (*B*) will decide to buy a training course (the action *D*). The communicative goal of *B* is usually opposite: do not take the course because it spends time and money (although the courses will still be useful for *B*). Therefore, the participants are involved into dispute.

Typically, a lot of calls are needed before a customer makes her final decision. In our analysed sub-corpus, the calls belong to the beginning period of negotiations. This is the reason why the customers mostly postpone their decisions and there are no winners or losers in the disputes. The final decision (to take a course or not) has been made only in seven dialogues.

A telemarketing call like all institutional calls has two conventional parts at the beginning and at the end, respectively – greeting and leave-taking. Negotiation takes place and a decision will be made in the main part of a call. Several phases can be differentiated in the main part (Koit, 2014): (1) opening – *A* introduces himself and his educational company and makes sure that *B* is the requested person who is responsible for education of the employees of her institution, (2) finding out *B*'s needs where *A* asks several questions about *B*'s institution and collects information from *B*'s answers, (3) argumentation for and against of a training course, (4) *B*'s decision. The phases (2) and (3) can alternate or (2) can miss if the participants have previously been in contact and *A* already has sufficient knowledge about *B*'s institution.

Opening a dialogue, *A* determines an initial point in communicative space: as an official person, he typically chooses a neutral social distance (value 0 on the scale [-1, +1], collaborative and polite interaction (values +1), neutral personality, modality and intensity (all values 0).

In the case if the same participants have already had previous conversations, *A* can choose a shorter social distance (+1) and greater personality (+1). In the following example, *A* moves away from the neutral, official position and is interested in *B*'s person:

A: mt (0.2) kuidas on elu ´vahepeal läinud, kõik kenad ´reisid on ´seljataha [jäänud.]
How have you been doing in the meanwhile, have you past all the nice trips?

During a dialogue, *A* typically stands in the initially fixed communication point while *B* can change the value of any coordinate of communicative space. *A* implements the communicative tactics of *persuasion* indicating and stressing usefulness of the offered course for *B*. The other possible tactics (enticement, threatening) are excluded because *A* is an official person and has to keep himself in check.

Let us consider the following example where a sales clerk *A* is calling to the chairperson *B* of a furniture salon. *A* starts collaborative and polite interaction (values +1) and fixes values 0 for other coordinates of the communicative space. The partner *B* in her turn determines her initial communication point. Similarly with *A*, she also starts collaborative and polite interaction but differently, she chooses the values +1 for cooperation and modality as indicated by the comment ((kindly and friendly)) in the following transcript:

A: õhtust.
Good aftenoon.
palun Liisi ´Harvsõlg.
I would like to speak with Liisi Harvsõlg.

B: jaa=ma ´kuulen.
Yes, I'm listening.
((kindly and friendly))

*A* continues in the same communication point:

A: .hhh ee minu nimi on ´Maanus ´Kriisa ja elistan ´Tiritamm < ´Eestist. >
My name is Maanus Kriisa and I'm calling from Tiritamm Estonia.
.hh kas > ´Tiritamme=nimi < on teile ´tuttav.
Are you acquainted with Tiritamm?

By replying, *B* suddenly jumps to another communication point changing the values of social distance, cooperation and modality (new values -1) as indicated by the comment ((unfriendly)):

B: ei ausalt=öelda ´küll ei=ole.
No, truly.
((unfriendly))

After that *A*, keeping the chosen communication point and communicative tactics, introduces his company, describes its activities and then (indirectly) proposes a training course which deals with relations between servicemen and clients and should be useful for *B*:

/---/
A: et=ee (.) .hh nimelt Tiritamme tegeleb sis ´kliendi´suhete ee ütleme ´inimeste: ´arendamisega ´kliendi´suhete > ´valdkonnas=se tähendab sis < < ´teeninduse ´müügi > .h ´turunduse=ja=´juhtimise ´valdkonnas.
Tiritamm is considering relations with clients and education of people in service and sale.

(.) .hh ja: minu ´küsimus oligi see=et kas te peate: vajalikuks just ´nendes ´valdkondades ´inimeste ´arendamist=
Is it important for you to educate your people in these fields?
/---/

*B* does not shorten the social distance nor decrease antagonism. She presents a lot of counterarguments:

B: [{-} kuulge] eeq ´te=olete=küll ´nii vähe ´valesse kohta sattund.
meil on ´kolm inimest ´tööl.
Look here! You are ever calling into a wrong place. We have only three employees.
((unfriendly))
/---/

.hhh põhjus on lihtsalt selles et minu mõlemad müüja=konsultandid nad ´väga hästi haritud.
The reason is simply that both my sellers-consultants are educated very well.
/---/

$ mul on ´topelt ´kõrgharidus. $
I myself have double higher education.

*A* explains why the course is useful for *B*:

A: /---/ hh aga kui on teil ütleme eksklu´ssiivne ´toode ta=on (.) ilmselt ´inglise ´mööbel ta on=nagu te ´ütlesite ´ka (.) väg- väga ´kalli´hinnalne.
So you have an exclusive product, obviously English furniture, it is very expensive as you said.

.hh et=ee sis on seal ilmselt ´oluline ka see ´väga:q ee ´hea ´teeninduse ´tase mis teil [ka ilmselt] ´on.
Then a very high level of service is necessary, what you obviously have.
/---/

.hhh et ´tehakse sisuliselt presentatsi´oo[ne kus siis=ee
Thus, you do presentations.

B: [´just ´nimelt.]
Exactly.
/---/

A: .hhhh ?jaa?jaa.
.h SEDA PAKUB KA ´TIRITAMM muidu ´välja: ee kuidas siis=õõ ´läbi [viia ´presentatsi´oone.]
Tiritamm also offers a course how to do presentations.

*B* gives more counterarguments and refuses to take the course:

A: /---/ nii=et=te ei pea ´vajalikuks inimeste ´arendamist nendes ´vald[kondades.]
Then you believe that education of people is not necessary in these fields.

B: [tändap=ee] ma ´kordan me saame ´ise selle teemaga ´hakkama.
I tell once more, we can make it ourselves.

In this dispute, *A* fails to achieve his communicative goal (he loses). He does not change the communication point and communicative tactics chosen by him at the beginning of conversation. *B* has changed her communication point directly after the first turn. She also keeps her new communication point and the communicative tactics during conversation. The participants do not reach an agreement. Still, at the end of conversation, *A* offers to *B* to send a catalogue with a list of training courses offered by his educational company. *B* is not against. In this way, *A* can hope that it will be possible for him to win a dispute with *B* in the future.

# 4 DISCUSSION

The corpus analysis demonstrates that the model introduced in section 2 can be used for description of actual human-human disputes. We can consider communicative strategies implemented by participants for achieving their communicative goals. We can also see how the features of communication are changing during interaction, i.e. how the participants are behaving in communicative space.

A question arises how to recognise communication points automatically? Assuming that transcripts of spoken dialogues are available, we can analyse comments (in our used transcription system, in double parentheses) as demonstrated by the examples of the previous section, e.g. ((unfriendly)). Another way is to extract information from the header of a transcript. Each transcript in our corpus is provided with a header that lists situational factors, among them relations between participants (strangers/ acquaintances/ intimates), status (equal/ lower/ higher), gender, age, etc. (Hennoste et al., 2008). But when modelling debate on the computer

and aiming to recognise a communication point where the user stands, the computer could extract opinions and emotions expressed by user utterances. In the case of spoken interaction, the features of speech can be used in addition. Still, automatic recognition of coordinates of communicative space remains for the further work.

The most important phase of a telemarketing call is a clerk's *argumentation* for taking a training course. Arguments of sales clerks are presented as assertions and customers can accept or reject them. In our analysed dialogues, the customers typically accept the assertions of clerks – it shows that the clerks succeed to choose the 'right' arguments (Koit, 2014). Still, *B*'s accept is usually followed by a counterargument. The argumentation chain looks like

$A$: $\text{argument}_1$ – $B$: $\text{accept}_1$ + $\text{counterargument}_1$
…
$A$: $\text{argument}_n$ – $B$: $\text{accept}_n$ + $\text{counterargument}_n$.

The situation is different when *B* is driving to a negative decision (as in the example analysed in the previous section). In this case, *B* does not accept *A*'s arguments and takes the initiative starting to present assertions/counterarguments herself. *A* always accepts *B*'s assertions but he still provides his arguments as additional information. The argumentation chain looks like

$A$: $\text{argument}_1$ – $B$: $\text{reject}_1$ + $\text{counterargument}_1$
$A$: $\text{accept}_2$ + $\text{argument}_2$ – $B$: $\text{reject}_2$ + $\text{counterargument}_2$
…
$A$: $\text{accept}_n$ + $\text{argument}_n$ – $B$: $\text{reject}_n$ + $\text{counterargument}_n$.

Therefore, we can see that the general structure of actual dialogues corresponds to the model of dispute presented in section 2.

What can we learn from the analysis of human-human disputes for implementation of dispute on the computer? A good way seems to follow the sales clerks' strategies: take and hold the initiative and propose 'obvious' arguments for the requested action – the statements that do not provoke the partner's rejection but accept. In order to have such arguments at disposal, it is necessary to know as possible more about the partner in relation to the requested action. That is the reason why explanation of the customer's needs is a necessary phase in our analysed telemarketing calls. Still, both a sales clerk and a customer are restricted when communicating because both they are official persons who represent their institutions and therefore, have to play certain roles. A sales clerk who is interested in selling training courses has to keep a fixed communication point and a fixed strategy. A customer has more freedom: she may defend her negative decision or also attack the clerk's proposal. She may vary her features of communication, e.g. change the intensity from peaceful to vehement or go over to confrontation instead of collaboration.

Our dialogue corpus does not yet contain more different kinds of disputes although it would be interesting to look for communicative strategies expressed e.g. in quarrels and to study how the participants are moving in the communicative space when having a quarrel. Still, the scenario where the computer plays the role of an official person who behaves cooperatively, politely, friendly, etc. is more realistic for implementation.

# 5 CONCLUSIONS

We study dialogues in a natural language where one participant (initiator of interaction, *A*) has a communicative goal that the partner (*B*) will decide to do an action *D*. If *B*'s communicative goal is opposite ("do not do *D*") then the participants are involved into dispute. When reasoning about doing *D*, *B* considers different positive and negative aspects of *D*. If the positive aspects weigh more than negative then the decision will be "do *D*". On the contrary, if the negative aspects weigh more the decision will be "do not do *D*". Initiator *A* chooses a suitable communicative strategy in order to influence *B*'s reasoning and achieve the positive decision: he stresses positive and downgrades negative aspects of doing *D*. Different arguments for doing *D* are presented in a systematic way, e.g. *A* stresses time and again usefulness of *D*. Still, if *B* takes over the initiative then *A* can also act passively, only averting the (counter)arguments presented by *B* and not stressing any positive aspect of the action.

When interacting, the participants are moving in communicative space which can be characterized by a number of features (coordinates) such as social distance between the partners (far between adversaries, near between friends), intensity of communication (peaceful, vehement), etc. We represent values of the coordinates as -1, 0 or +1.

We analyse human-human telemarketing calls where a sales clerk of an educational company proposes training courses to a customer who typically does not want to buy any course. When starting dispute, the sales clerk determines an initial

point in communicative space and a certain way to realize the communicative strategy (tactics) and retains them during a dialogue. The customer can change her strategy and also move from one communication point to another during conversation.

We have implemented the model of dispute as a computer program where the computer plays *A*'s and the user *B*'s role. So far, the implementation does not include the formalisation of communicative space. This remains for the further work.

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