

# Cooperation Attitude in Negotiation Dialogs

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## Abstract

We propose an annotation scheme for a corpus of negotiation dialogs that was collected in the scope of a study about the effect of negotiation attitudes and time pressure on dialog patterns.

## 1. Introduction

Affect has been shown to play an important role in negotiation dynamics: Kumar (1997) analyzed the role of positive and negative affect in bargaining; van Kleef et al. (2004) investigated the interpersonal effects of anger and happiness on computer-mediated negotiation. In particular, they considered the social consequences of emotions and their impact on the negotiators' strategic choices and their reaction to the opponent's affective state; Carnevale (2008) investigated the role of positive affect in simulated bilateral negotiation, with respect to the decision frame ("gain" vs. "loss").

Affective states widely vary in their duration, ranging from long-lasting features, such as personality traits, to short-term ones, such as emotions. Interpersonal stances are in the middle of this scale: at the beginning of the interaction they may be triggered by personality traits and they can stay unvaried over the whole duration of the interaction, unless significant events occur. This is especially true when the referred scenario is short-timed human-human interaction, such as negotiation dialogs in time pressure condition. Rather than considering individual emotions, we focused the research described in this paper on recognizing a particular aspect of interpersonal stance that influences the negotiators' behavior during interaction: cooperative vs competitive attitude. As we will see, this refers to the goals of the two parties involved in negotiation and how they behave to achieve them.

The final goal of this ongoing research is to investigate whether and how the cooperation attitude of the participants to negotiation dialogs, induced in an experimental study, can be recognized. The envisaged method for this recognition purpose is a combination of language analysis (at the individual move level) and dialog pattern classification techniques (Hidden Markov Models, HMM) (Charniak, 1993). In this short paper, we describe the corpus that will be used in this analysis and its annotation criteria and problems.

## 2. Conceptual Framework

A negotiation is a '*a discussion between two or more parties with the apparent aim of resolving a divergence of interests*' (Pruitt and Carnevale, 1993). It occurs whenever an economic transaction takes place or a dispute between goals is settled (Walton, 2005); a typical example is the labour negotiation scenario (Sycara 1989). Some recent studies (Carnevale and De Dreu, 2006; Carnevale and Pruitt, 1992) provide a deep insight on this phenomenon, from the *goals* and *motives* point of view. Schelling (1960) refers to negotiation as '*mixed motive*' interaction, meaning that the parties involved simultaneously experience the motivation to cooperate and compete with each other. In the basic types of dialog classification proposed by Walton (2005), negotiation dialogs are seen as originated by a conflict of interests of the parties involved. However, discrepancies on interests and goals do not necessarily produce a strictly competitive attitude in negotiators. Importance of goals with respect to the specific situation each party is in, together with their system of priorities or other factors as time pressure, might determine different kinds of attitudes and suggest negotiators to adopt different strategies (Carnevale and Lawler, 1986).

### 2.1 Cooperative vs competitive attitude

*Competitive* behavior occurs when parties assume a "win-lose" attitude, with strongly opposing interests. As a consequence, they could adopt a tough behavior (by highlighting unfairness of other's offers, putdowns) and coercive negotiation tactics aimed at forcing an advantage (e.g., threats), while excluding prenegotiation binding agreements (with exchange of priority information). To enhance the desired results, tactics which involve emotional ploys could be used, consistently with a strategic-choice perspective (van Kleef et al., 2004). On the contrary, in *cooperative* behavior a win-win situation is assumed, with the final goal to increase the joint gain. The resulting communication will be based on the hypothesis of

existence of common interests, benefits and needs, and will aim at building trust.

The features of competitive and cooperative attitudes we have described may be taken as cues for identifying this kind of behavior in negotiation dialogs. Typical *signs of cooperative attitude* are the accurate and honest exchange of information about own priorities and the spontaneous formulation of cooperative statements. To be successful, cooperative negotiators need to be skilled in clarifying similarities and differences in their individual goals and priorities and in trading, by proposing creative alternatives and selecting the best one, based on mutual acceptability. They will highlight consequences of a proposal for the other party which means showing understanding or interest for the other party's priorities (*'I know I can get more than that, but it cuts you down'*) or evaluating the consequences for both (*'We are both maximizing our benefits'*). They will use 'positive' argumentation such as highlighting consequences of a proposal for the other party and will provide justification when making/rejecting a proposal. Skilled negotiators could also make use of humor as a technique of social influence (O'Quin and Aronoff, 1981), that is make a joke which does not involve a putdown of the other party (*'Think of my poor people! They aren't making any money here'*).

On the contrary, in non-collaborative negotiation (Sycara, 1989; Carnevale and Lawler, 1986), it will be likely to see complaints about other's unfair offer (*'This is really lopsided'*), highlights of the other's contradiction (*'But you agreed with the other too'*), putdowns (*'Your workers are so stubborn!'*), self supporting statements (*'How about my proposal: 4c, 6/10ths and 40%? I think this is quite generous'*), threats (*'You don't want to be out of work...'*) and warnings (*'If you don't agree with my proposal we will strike'*).

## 2.2 The role of persuasion

Negotiation, persuasion and argumentation are close but not overlapping concepts. It is out of the scope of this paper to provide a clear definition of what are and what are not negotiation tactics, argument techniques and persuasion strategies: we are rather interested in defining a set of signs which can be used to detect the attitude displayed by the parties involved in negotiation processes. However, some preliminary clarification about the interrelationships among the three concepts is needed to justify our choice to introduce persuasion tags in our mark-up language. In analyzing agents' behavior in collaborative negotiation, Chu-Carroll and Carberry (1995) claim that *'argument is often taken to deal with conflicting opinions or beliefs, while negotiation deals with conflicting goals or interests'*. If negotiation is seen as a process aimed at defining an agreement on the two parties' conflicting goals (Walton,

2005), persuasion phases are easily embedded in these processes (Walton, 2005). The inverse is also possible: Wells and Reed (2006) show how people decide to embed negotiation sub-dialogs in persuasion ones, when they realize they are unable to change the goals of their opponent. Distinguishing between bargaining and argumentation can be difficult (Chu-Carroll and Carberry, 1995) and some authors claim about the existence of mixed types of dialogs (Walton, 2005).

## 3. The corpus

The corpus we used for this study was collected in the scope of a study about the effects of time pressure (Carnevale and Lawler, 1986). The experimental setting was designed to be a 2x2x2 study where the variables involved were time pressure (high or low), attitude of the negotiators (cooperative vs competitive) and their gender. The subjects involved in the experiment were asked to play the roles of union and management representatives, in a labor negotiation scenario. They were asked to negotiate on wages, medical plan and vacation and were given an issue schedule where their priorities were expressed in points assigned to each configuration of the three parameters. The subjects were told that the final value of the agreement reached would have been converted into real money. Subjects were privately provided of instructions about time pressure and orientation. The time pressure condition was simulated by giving a temporal deadline of five minutes while, to manipulate their orientation, subjects were explicitly instructed to behave as to reach an integrative agreement (cooperative attitude) or to maximize their own gain (competitive attitude). Therefore, people involved in the study modified their attitude according to spontaneous adaptation to the environment condition (high vs low time pressure) but also because they were instructed by the experimenter on how to simulate either a cooperative or competitive attitude. From this point of view, the corpus is half way in between spontaneous emotion corpora and acted ones.

	Number of dialogs available		Average number of moves	
	High time pressure	Low time pressure	High time pressure	Low time pressure
Cooperative attitude	12	12	32	66
Competitive attitude	11	11	29	86

Table 1: The time pressure corpus.

Same-gender subjects (24 male vs 24 female) were distributed equally and randomly through the four

combination of the two modalities. Table 1 summarizes the distribution of dialogs in the four modalities.

Dialogs analysed in this study are the transcripts of audio recording of the negotiation experiments. We annotated, overall, 2433 moves. By ‘move’ we refer to the single turn performed by each party in the scope of a dialog exchange. Our final goal, in fact, is to model the attitude of both parties involved in the negotiation. For this reason, we think the annotation should be done at the single move level rather than at the level of coupled pairs composing the dialog exchange (tab. 2)

Speaker	Transcript	Possible unit of annotation	
1	<i>You want wages at what?</i>	Speaker move	Dialog exchange (complete turn)
2	<i>At 7, the original</i>	Speaker move	

Table 2: Possible annotation units.

#### 4. Markup language

The first question to be answered when deciding to annotate a new corpus is whether to define an ad hoc scheme or to use an existing one. Several schemes have been proposed for coding bargaining processes (Goering, 1997): the main advantage of using an existing coding system is the possibility of comparative analysis with previous studies in the same domain. However, Weingart et al (2004) argue in favour of defining ad hoc annotation schemes according to goals researchers want to achieve and to the intrinsic features of the corpus to be annotated.

The first issue to be addressed when approaching the definition of a coding scheme is what are the relevant features of the phenomenon to be annotated (Craggs, 2003). Theoretical background and domain knowledge help in formulating a first sketch of the annotation language; inspection of the corpus (with computation of the frequency of labels in the dataset) should be addressed in further iterative revision steps, towards the definition of the final language. In negotiation dialogs, in particular, it must be decided what types of behaviour are theoretically relevant in the study and what are the cues through which this behaviour is shown. Also, the collection modality affects the kind of signs that may be looked for: spoken corpora provide information about prosody and other acoustic features; audio-visual data make possible the usage of body measures; transcribed or written corpora (as in our case) only allow linguistic analysis. Another critical issue to be addressed is the definition of the unit of annotation. It is very important to have a clear idea, since the beginning, of what the long-term goal of the research will be, so as to avoid loss of relevant information (too large units of annotation). This is particularly true when attempting to annotate a subjective phenomenon such as

affective states. The general approach is to allow redundancy (e.g. by annotating single word units as in Batliner et al. 2003) and overlapping among tags: aggregation is always possible, a posteriori, while with further specification of tags researchers would introduce a subjective bias in the annotation results.

##### 4.1 Definition of codes

The annotation language we defined extends the coding scheme used in a related study (Carnevale and Lawler, 1986). The core of this language includes *domain* tags: making/accepting/rejecting a proposal, bargaining and soliciting a reaction). Some of the existing tags were grouped into the category of those denoting, in particular, *cooperative attitude*: cooperative statement and exchange of priority information; finally, the language is extended with tags denoting *persuasion attempts*.

When dealing with the annotation of our corpus, we had to consider that consequences of time pressure condition in negotiator's attitude were quite natural since they had to spontaneously adapt to the high/low time pressure condition, which was simulated by adopting a time deadline. On the contrary, subjects were explicitly instructed to simulate a cooperative or competitive attitude by using written guidelines provided just before the experiment started. In this sense, our corpus is half way between spontaneous and acted data and this should be considered when summarizing results of the annotation experiment and approaching the attitude model learning. To this aim, *faithfulness to role* tags were added to evaluate how much the subject involved in the experiment behaved in a way which is close to ‘real’ negotiation interaction. This tag is used whenever a subject makes a comment drawn from the context (*‘My constituents have been hard workers and deserve a higher salary’*) or related to the experimental setting (*‘We can get more points by doing this way’*). In the first case, the tag value indicates that the subject is behaving according to the role assigned, while the second one shows a situation in which the subject does not seem to be really involved in the negotiation task, as he explicitly refers to the experimental settings or to the instruction received, while interacting with the other party. This tag can be used to assess the validity of conclusions drawn from the analysis of this corpus and to assess the quality of data collected by asking people to ‘act’ as they were adopting a particular attitude (cooperative vs. conflicting). The complete set of codes, with definitions and examples, is provided in table 3. Please note that the level of generality of the four groups of tags is not necessarily the same, in order to allow, in the next future, several approaches of analysis at both linguistic (single dialogue turns as units of analysis) and pragmatic level (overall dialogue pattern). In particular, domain tags are

useful because they enable us to describe the actual evolution of the negotiation proposal, regardless of the behaviour subjects involved in the negotiation experiment are showing. It is reasonable to assume, in fact,

discrepancies between the shown attitude (that we can recognize by looking at linguistic features of dialog turns) and the actual one (that we might analyze by looking at the evolution of the negotiation dynamics).

Group	Signs with definition	Value	Examples
Cooperative attitude	<b>Cooperative statement:</b> speaking positively about a mutually acceptable solution or about allowing both sides to do well.	Yes	'I guess maybe we should start with where we can agree. According to this we are trying to maximize both our own and our partner's point ratings' (Cooperative statement = 'Yes')
		No	
	<b>Exchanging priority information:</b> any honest exchange/request of exchange between negotiators about their priorities, according to the information provided by experimented and present on their issue sheets.	<b>Request info</b>	'Let's exchange information about our point values'
		<b>Give info</b>	'The most important of the three issues for my point of view is the medical plan'
Domain tags	<b>Making a proposal:</b> making an offer, either by simply presenting the proposal or also by supporting it with argumentation	<b>Simple proposal:</b> (single or multi-issue focus)	-'Let's make a 5% on wages' (single focus) -'5c increase in wages 4/10 and 60%' (multi-issue)
		By using <b>persuasive information</b> and argumentation	when using this code, raters had also to specify a value for the 'Persuasion Attempts' code (refer to that code for examples)
	<b>Accepting a proposal:</b> by either demonstrating interest in an offer without accepting it ( <b>Open option</b> ) or explicitly accepting it ( <b>Offer acceptance</b> )	<b>Open option</b>	'An option that we can keep open'
		<b>Offer acceptance</b>	'Okay' (after a proposal from the other party)
	<b>Rejecting a proposal:</b> either by expressing disagreement in a <b>Polite way</b> or by expressing total unwillingness to make further concessions ( <b>with heavy or impolite commitment</b> )	<b>Polite way</b>	'I don't like that idea'
		<b>With heavy or impolite commitment</b>	'That's totally out of question'
		By using <b>persuasive information</b> and argumentation	when using this code, raters had also to specify a value for the 'Persuasion Attempts' code (refer to that code for examples)
<b>Bargaining:</b> speaker makes a proposal which suggests giving up on one issue in return for gaining on another issue	Yes	'If we go down on vacation, will you go up on something else?' (Bargaining = 'Yes')	
	No		
Persuasion tags	<b>Highlighting consequences of a proposal for the other party:</b> statements which indicate understanding/interest in knowing the other's party priorities, joint evaluation of consequences,	<b>For both</b>	'In this way we are both maximizing our benefits'
		<b>For the other</b>	'I know I can get more than that but it cuts you down'
	<b>Persuasion attempts</b>	<b>Signs of cooperative attitude/real persuasion attempts</b>	Humor
		<b>Signs of competitive attitude/making tactical use of power</b>	Highlighting the other contradiction
			Complaining about other's unfair offer
Faithfulness to role	<b>Comment drawn from context:</b> any argument referring to surrounding social or economic structure which is used by one party to gain a concession from another		My constituents have been hard workers
	<b>Argument related to the experimental setting:</b> the speaker clearly refers to his point balance, instead of using arguments drawn from the context		We can get more points this way
Other	<b>Soliciting a reaction:</b> speaker requests the other's reaction (feelings or thoughts concerning an offer or general suggestion)	Yes / No	'Let's hurry up and finish' (Soliciting a reaction = 'Yes')
	<b>Asking a question</b>		'Do you want to start with wages'
	<b>Answering</b>		'Yes, let's start with wages'

Table 3: The mark-up language.

It is possible, in fact, that parties were just pretending to be cooperative, for example by exchanging priority information. Actually, this could be a tactic adopted by skilled competitive negotiators: while collaborative agents really take into account others' beliefs, also in order to decide whether to revise their own ones and reach an agreement (Chu-Carroll and Carberry, 1995), competitive agents could do so to discover weak points in the other's system of beliefs and goals and to attack them with arguments or emotional tactics. Including these tags in the coding scheme leave us the door open to future investigation in this direction (e.g. aggressive verbal behavior as an emotional tactic, when a cooperative strategy is actually being adopted).

## 4.2 Labelling units

Decision about which unit of annotation should be used must be linked to the research question to be answered and to the further analysis that researchers intend to conduct on the annotated dataset. As we said, our long term goal is to learn an Hidden Markov Model which enables us to recognize negotiators attitude (such as, in this case, cooperative vs competitive behaviour) as in Martalò et al. (2008). For this reason, we found it relevant to label the dialogs at the entire dialog turn level. Some authors claim the possibility of letting raters free to manually divide the corpus into annotation units. We believe that this would make the annotation of subjective phenomena less reliable. The state of the art on this subject (Weingart, 2004; Craggs, 2003; de Rosis et al., 2006; de Rosis et al., 2007) suggest us to use objectively defined units of annotation (as dialog turns are). This allows us to evaluate the inter-rater level of agreement by using an index such as the observed agreement or Cohen's Kappa, which is recognized as a valid measure of interpretation reliability in the computational linguistics community.

## 4.3 The labelling experiment

A labelling experiment was conducted at USC: the three raters were all English native speakers and were provided of the complete corpus of transcribed data and of an annotation manual which explained in detail the meaning of each tag, by also providing examples. After an individual short training of about ten minutes, where raters were free to ask questions about how to conduct the labelling, they were asked to rate dialog moves independently. Multiple annotations were allowed because of partial overlapping in the semantic of some of the tags.

After summarization of results, every move received one or more codes according to a majority voting criterion (at least two over three raters agreeing on the value of a code). The main problem related to this approach is the probability of having no tags for some turn, when majority agreement is not reached: on the contrary, since our final aim is to train an HMM model for predicting the overall attitude of the negotiators during interaction, we need to give a code to all turns in the training set. Sparse

data are also a relevant problem in model learning. For these reasons, we revised the corpus annotation by compacting the initial tags into fewer classes, according to the final recognition goal and to the semantic of codes (see table 4). This table shows the distribution of labels in the annotated corpus and provides values for the observed agreement and Kappa among raters (we didn't report the signs for which frequencies was zero). Which index best fits the description of the inter-rater agreement is still an open discussion in the computational linguistic community (Craggs and McGee Wood, 2004): while the observed agreement doesn't suffer from the unequal distribution of labels, Kappa provides a chance corrected measure of the agreement. Our results seem to confirm this issue: the signs for which we have the highest differences between the first measure (a percentage agreement index) and Kappa, in fact, are those with the lower frequency in the corpus (e.g. *Exchanging priority information*).

Sign	Frequency	Observed Agreement	Kappa
Cooperative statement	17 %	.79	.24
Exch. priority information	4.4 %	.83	.11
Making proposal	18 %	.81	.41
Accept proposal	5.1 %	.91	.35
Reject proposal	4.1 %	.93	.46
Bargaining	8.8 %	.83	.26
Soliciting reaction	7.9 %	.85	.27
Persuasion attempt	7.6 %	.83	.21
Faithfulness to role	5.8 %	.86	.26

Table 4: results of the annotation experiment.

## 5. Conclusion and future work

This contribution is a preliminary statement of the direction in which we are moving in our study about recognizing cooperation attitude in negotiation dialogs. By tagging our corpus, we made a first step towards preparing the dataset to be used to train our recognition model. Once again we learnt, from this experience, that the markup language is a compromise between the dimension of the corpus available, the data analysis goals, the methods that will be used in this analysis and the complexity of the problem under study, the actual features of the corpus used and how they can be described with the aim of building a model of those affective states which are relevant for the domain of application.

The limited dimension of our corpus and the unequal distribution of codes caused a low Kappa, even after aggregation of some of the tags according to their frequencies and to their semantic. This suggested us to carefully revise the results of the annotation experiment before starting any model learning phase. In particular, we must take into account the hybrid nature of the affect expressed in our corpus: on one hand, time pressure

condition and the perspective of higher money gain in case of successful integrative bargaining could promote a spontaneous adaptation of the negotiator's attitude; on the other end, the only way for inducing people to differentiate their attitude (cooperative vs. competitive) was the usage of written guidelines. Since no assessment was conducted on personality traits, we cannot be completely sure of how the same subject would behave in a real-life negotiation scenario, and how their permanent features would affect the interpersonal stance occurring in real-life situations. This suggests us to be careful in the preparation of the dataset for further analysis, also according to the information provided by the 'faithfulness to the role' code.

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