Analysing Bids in Dialogue Macrogame Theory using Discourse Obligations

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Abstract

We focus on a class of utterances that can be analysed as 'explicit game bids' in Dialogue Macrogame Theory (DMT). We propose an update-semantics analysis that uses discourse obligations to model the observable behaviour of dialogue participants and that is able to generate the intentional structure of interactions assumed in DMT. We also claim that our analysis provides the base for reformulating some key aspects of ILLOCUTIONARY FORCE in terms of BIDDING.

1 Overview

In recent years, research in the field of dialogue theory has been concerned with providing formal analyses of a wide range of phenomena. These range from elaborating the basic functioning of questions and answers in dialogue (see (Ginzburg, 1997), (Asher and Lascarides, 1998), (Larsson, 1998), (Bos and Gabsdil, 2000)) to investigations of indirect language use (e.g. (Asher and Lascarides, 2001)). Among the analytic frameworks, two have been highly influential. They are the extension of discourse representation theory known as SDRT (Asher and Lascarides, 2003), and the INFORMATION STATE UPDATE APPROACH proposed by the members of the TRINDI consortium (Traum et al., 1999). Both approaches can be seen as employing a notion of SPEECH ACT (see (Austin, 1962), (Searle, 1969)) for analysing the contributions of dialogue participants (DPs). SDRT focuses on the fact that speech acts in a dialogue context can be seen as expressing RHETORICAL RELATIONS. The TRINDI approach, on the other hand, decomposes speech acts into DIALOGUE ACTS of a higher granularity that may operate on various levels of information structure (Poesio and Traum, 1997).

Even though both frameworks have worked out an abundant repertoire of rhetorical relations and an extensive taxonomy of dialogue acts (Poesio and Traum, 1998), respectively, there is a whole class of utterances which has not been given sufficient attention by the respective theories – in spite of the fact that their analyses allow for insightful generalisations. This class is exemplified by the initial utterances in the following interactions:[1]

(1)	I[1]:	Do you know what happened at last night's party?
	R[2]:	Sorry, I am not interested in gossip.
(2)	I[1]:	Have a recommended roll rate for this PTC, if you could copy.
	R[2]:	All right. Go ahead.
(3)	I[1]:	I have a question about the patient in room 101.
	R[2]:	Please ask the doctor.
(4)	I[1]:	May I suggest something to you for solving your money problems?
	R[2]:	Ok. What do you think?

What is common to these dialogue fragments is that the utterances I[1] in (1)-(4), rather than being 'full-fledged' assertions, questions or suggestions, actually are 'preparatory moves' for these kinds of speech acts. What they *do* – in Austin's terms – is express a *proposal* directed at their addressees to engage in a (sub)dialogue that deals with an assertion, question, or suggestion, the content of which is left partially unspecified. Whether the content will be presented – and whether thus the actual speech act that was meant to be prepared for will be performed or not – will depend on the acceptance or rejection of the proposal on the part of the addressee.

On the other hand, once a proposal has been accepted, both the initiator of the proposal and the addressee will be committed to act accordingly, e.g. in

[1] see http://www-rcf.usc.edu/~billmann/dialogue/ap13d2-view.pdf for (2)

the case of (4) to make a suggestion and to respond to it, respectively. Hence, the following dialogues do not constitute consistent continuations of (4):[2]

(4′)

	I[1]:	May I suggest something to you for solving your money problems?
(4′)	R[2]:	Ok. What do you think?
	I[3]:	Sorry, let's talk about something else.

	I[1]:	May I suggest something to you for solving your money problems?
	R[2]:	Ok. What do you think?
(4″)	I[3]:	How about a smaller flat?
	R[4]:	Sorry, I don't want to talk about that stuff now.

In this paper, we will propose an analysis of these examples along the lines of DIALOGUE MACROGAME THEORY (DMT, see (Mann, 2002)), in which the initial utterances of the fragments can be classified as 'explicit game bids'. We will provide an account of the DMT notion of BID in an update-semantics framework that employs DISCOURSE OBLIGATIONS (Traum and Allen, 1994) to express predictions and constraints with respect to the expectable behaviour of dialogue participants at each stage of an interaction. This way, we will show that instances of the interactional patterns ('macrogames') that DMT defines in terms of intentional structure can be seen as being the result of a successfully completed bidding process. On the other hand, we will argue that our analysis provides an alternative perspective on the class of examples that is most prominent in speech act related research, i.e. assertions, questions, requests and other types of speech or dialogue acts. We will see below that if we view these actions as bids, we may be able to refine the widely used idea of ILLOCUTIONARY FORCE (see (Austin, 1962)) in a way close to the one proposed in (Habermas, 1981).

2 Explicit Game Bids

Here, we will provide an analysis of the initial utterances in the above examples as explicit game bids in DMT. We will first give a very brief overview of DMT's basic assumptions and will then show how bidding and its effects can be modelled by means of information state update rules using discourse obligations.

2.1 Dialogue Macrogame Theory

Dialogue Macrogame Theory (Mann, 2002)[3] is a descriptive framework for dialogue analysis and annotation. In contrast to other approaches to dialogue that involve the notion of 'game'[4], be it 'language game' or 'conversational game' (e.g. (Eklundh, 1983), (Levinson, 1983), (Lewin, 1998)), DMT does not make any prescriptions with respect to how the MOVEs that constitute a game are actually realised and whether there are 'preferred' or 'dispreferred' sequences of moves for certain games. Instead, DMT defines different types of MACROGAMES exclusively in terms of conditions on the participants' intentions. DMT assumes that each macrogame can be defined by a set of three intentions that consists of an intention of the initiator of the game, an intention of the responder[5] and a joint intention. DMT regards macrogames as conventions of the language of the dialogue, and therefore allows the possibility of cultural variations. As two of the original DMT game definitions in figure 1 show, a game[6] consists of a TYPE, e.g. IS, IR, etc., and a content , the PARAMETER, which is referred to with expressions like 'the information'.

DMT further assumes that both the initialisation and the termination of a macrogame in an actual conversation can be described – metaphorically – in terms of a 'negotiation' process that involves a BID on the part of one DP[7] and a POSITION TAKING on the bid on the part of its responder, which may result in either an ACCEPTANCE or a REJECTION of the bid. As far as game initialisation is concerned, the result of an acceptance of a game bid is, in DMT's terms, the COMMITMENT by each DP to their assigned portions of the intentions that define the game that has been bid.[8] DMT thus provides the distinctions needed to model the consistency of a sequence of utterances in an interaction by means of the DPs' commitments to the intentions that are expressed and accepted. Hence the example (4″) above would be classified as inconsistent because of a mismatch between the intention to which R is committed due to their acceptance of I's game bid in R[2] and their behaviour in R[4].

[2] An inconsistency of this kind may, however, not result in a complete breakdown of the interaction, but will rather trigger repair.

[3] see also http://www-rcf.usc.edu/~billmann/dialogue/dtsite.htm

[4] see (Wittgenstein, 1953) for the origins of the use of this term in language related research

[5] We will use the DMT term 'responder' rather than 'addressee' in the remainder of this paper

[6] we use 'game' as a synonym for 'macrogame'

[7] As far as bids for initialising a game are concerned, the bidder will be the initiator from the game definitions. Bids for termination can be made by any of the DPs.

[8] In addition to macrogames, DMT introduces the notion of UNILATERALS, which are actions on the part of one DP that do not involve collaboration or joint goals, e.g. acknowledgements, exclamations and several kinds of politeness acts. Note that recognition of whether a bid of a macrogame has been made or whether an action was actually a unilateral is sometimes complex. This paper uses simplifying assumptions that all bids are recognised as bids, that all bids are correctly identified with macrogames, and that no unilaterals are present.

Name of Game	Joint Intention	Intention of Initiator (I)	Intention of Responder(R)
Information Seeking (IS)	I knows the information that is sought	I identifies the information that is sought	R provides the information that is sought
Information Offering (IO)	R comes to know the information that is offered	I provides the information that is offered	R identifies the information that I has provided

Figure 1: examples of macrogames

It is evident that the DMT notion of BIDDING provides quite an intuitive account of the examples referred to in the introduction, particularly because it allows us to classify the initial utterances of the dialogue fragments (1)-(4) as EXPLICIT GAME BIDS, which are a subclass of PARTIAL GAME BIDS, i.e. bids that leave either the type of game or its content (the 'parameter') partially unspecified. In DMT, however, all details about the bidding process are left informal, in particular the issue of how to model the notion of the DPs' commitment to an intention and the way it is brought about. The following sections will therefore provide an account of DMT bidding that draws on – and at the same time further refines – established ideas about the functioning of DISCOURSE OBLIGATIONS in dialogue. It further uses Raimo Tuomela's model of JOINT INTENTION FORMATION (Tuomela, 1998).

2.2 Discourse Obligations

The idea to use discourse obligations in dialogue modelling was first raised by David Traum and James Allen in (Traum and Allen, 1994) and was meant to provide an intuitive analysis of examples like the following ones:

	I[1]:	Did Pete drive here?
(5)	R[2a]:	I don't know.
	R[2b]:	I don't want to talk about that.

Here, a purely intention-based account of interactions cannot explain why dialogue participants respond in situations where they are *unwilling* or *unable* to adopt the speaker's intentions. An obligation-driven approach, in contrast, predicts R's behaviour in R[2a/b] appropriately by assuming that participants in a dialogue are socially *obliged* to respond in some manner, even if their own intentions are not advanced by responding. This does not mean, however, that intentions are discarded as action triggers. What is modified in contrast to standard intention-based approaches is only the process by which an intention is brought about. Instead of assuming that a responder's intention is created by cooperative adoption of an equivalent intention of a speaker, an obligation-driven model makes the following assumption:

OBLS-INTS

An *intention to respond in a particular way* is the result of trading off the fact that there is an *obligation to respond* against one's private intentions, goals, preferences and capabilities. What kind of response will be given in the end clearly depends on this trade-off.

Based on this starting point given in (Traum and Allen, 1994) and subsequent work (e.g. (Poesio and Traum, 1997)) the following sections will provide an analysis of explicit bids that assumes obligations at various levels of information structure in dialogue.

2.3 An obligation-based Model for Explicit Bids

Here, we will provide an analysis of explicit game bids that is based on the use of discourse obligations in a simple information state update model. We will first give an informal outline of how DMT's assumptions about the intentions of I and R can be expressed in this framework and will then discuss the issue of modelling the joint intention distinctive for the macrogames.

2.3.1 Obligations and the Intentions of I and R

As for the effect an explicit game bid has at a given stage of an interaction, we assume, first of all, that the fact that a game bid has been made can be decomposed in the following way:

UPDATE.BASE

1. I has bid a game γ of a certain type
2. I has partially specified the content[9] of γ
3. R is obliged to take a position on I's bidding γ

A bid thus results in both I and R changing their view of the discourse situation such that it records the above events. Leaving aside problems of misunderstanding at any level of linguistic structure, we assume that 1.-3. above can be considered part of the COMMON GROUND of the participants. The leftmost discourse representation structure (DRS)[10] in Figure 2 shows the effect of applying **UPDATE.BASE** for I[1] in example

[9] As this paper provides an 'outsider view' on DMT, we keep on using common terms like 'content' instead of the DMT terms like 'parameter'. In a longer version of the paper, which will be available on a website, we will further define these and other key terms and clarify their scope compared with other people's use of the same or related terms.

[10] see (Kamp and Reyle, 1993) for the basics of DISCOURSE REPRESENTATION THEORY

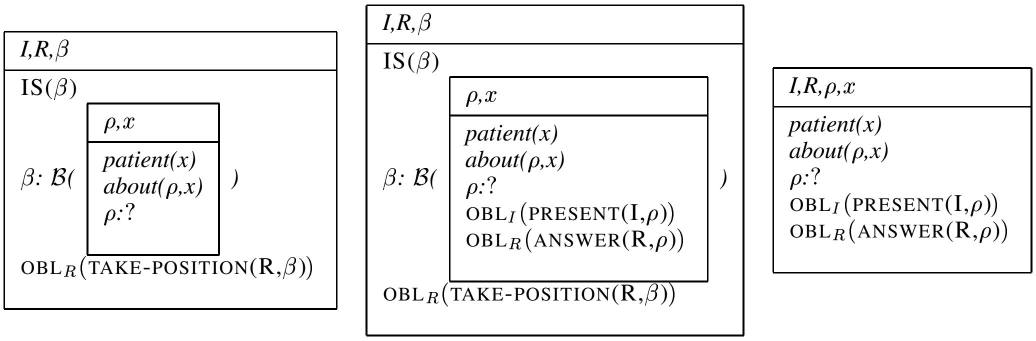

Figure 2: Effect of the Update Rules for Example 3

(3) above,[11] where the root DRS stands for the common ground and the embedded DRS (to which we will refer as K_β) stands for the DRS that holds the actual content of the bid. Note that whereas the fact that a bid has been made belongs to the DPs' common ground, K_β, which expresses *what is actually being bid*, is not grounded, but is in the scope of a modal operator, represented here as $\mathcal{B}$. Adhering to proposals in (Kreutel and Matheson, 2002), we assume that this modality can, in a first approximation, be defined as the initiator's belief that the bid may be accepted by the responder.[12]

Given the knowledge about the type of game that has been bid, the identification of the initiator and the responder, and finally about the (partial) content of the bid, it is possible to introduce obligations via applying a further set of update rules that result in the content of the bid being extended with:

UPDATE.OBLS

1. An obligation on the initiator to specify the content of the game enough so that it can be pursued by R and I.[13]
2. An obligation on the responder that specifies a response specific to the type of game that has been bid

We propose to model the obligation on the initiator as the obligation to actually *present* the content the game shall deal with. As far as the obligations on the responder (R) is concerned, we assume that for IO and IS they can be spelled out as the obligations to ADDRESS the assertive content of the information offer (e.g. by questioning or accepting the content), and to provide an ANSWER that resolves the content of the request for information, respectively.[14] As the obligations will be added to K_β, they will not be considered as belonging to the DPs' common ground, hence they will be pending until the bid has been accepted. In figure 2, the DRS in the middle shows the result of applying **UPDATE.OBLS** on top of the initial state, given these assumptions about the obligations associated with the IS macrogame.

The effect of accepting a bid can, finally, be summarised as follows and is represented by the rightmost DRS in figure 2 for a presumed positive response of R, e.g. *ok*, to the initial utterance I[1] in the example dialogue (3):[15]

ACCEPT-BID
Acceptance of a bid results in the content of the bid[16] being added to the common ground of the DPs.

Having the content of a bid, as proposed, actually include the obligations on I and R that are specific to the game that has been bid provides an intuitive account of the fact that position taking on the bid involves considering the consequences that may result from an acceptance of it on the part of R. From the judgement on R's willingness, capacity, and – as in the case of (3) their being entitled to satisfy the obligation – may then result a positive or negative response. On the other hand, as far as R's intention according to the original DMT definitions is concerned, it can be assumed to be triggered by the game's specific obligation on R following a positive outcome of trading-off the obligation against

[11] At this stage of our project, we will not commit to any of the established update-semantics frameworks for dialogue – be it SDRT (Asher and Lascarides, 2003) or the TRINDI framework (Poesio and Traum, 1997) – and will therefore not provide a spelled out truth conditional semantics for the employed constructs. Nevertheless, as we make use of established expressive means, we assume that a full formalisation will in principle be possible in either of the models mentioned.

[12] Note further that K_β contains a CATAPHORIC discourse referent, ρ, which cannot be resolved at the depicted states in the interaction, but which requires a continuation of the dialogue comprising I's specification of what it exactly is that shall be subject of the information seeking game.

[13] hence to provide a referent for the cataphoric discourse referents in the example structures

[14] The other games can be spelled out in comparable ways.

[15] the MERGING of the content of K_β with the one of the root DRS could be formally modelled following the proposals in (Poesio and Traum, 1997)

[16] i.e. K_β in the example analysis in figure 2

their private mental state, as it is assumed in the standard obligation-driven approach according to the rule **OBLS-INTS** above. In the same way we can assume that the initiator's intention to perform their part in a game is triggered by their knowledge of I's obligations associated with that game. One can assume that intention formation for I will normally take place before I starts the bidding process. However, I will be *obliged* to act accordingly only after the bid has been accepted by R.

Note that this analysis of explicit game bids instantiates the update rule proposed for OFFER in (Poesio and Traum, 1998), in so far as the latter introduce a conditional that formulates the dependency of obligation introduction on the responder's acceptance of the offer.[17] Poesio and Traum, however, describe offering in the generic sense of 'offering an action' and only assume an obligation on the initiator of the offer. Our notion of game bid, in contrast, models the specific 'offer of a dialogue act', the update effect of which comprises not only a further obligation on the responder, but also results – as we will outline in the following section – in a joint obligation on both DPs.

2.3.2 Obligations and the Joint Intention

In the previous section, we reformulated DMT's assumptions about the private intentions of the initiator and the responder of a game drawing upon the EVOCATIVE[18] effect of a dialogue move, in which the raising of an obligation can be seen. Here, DMT's informal notion of a DP's 'commitment to an intention' could be modelled in terms of the DP being obliged to perform an action (or a course of actions) that will result in the satisfaction of the respective intention. As far as the formation of the joint intention associated with a game and the corresponding obligations on I and R are concerned, on the other hand, we will propose an analysis that is based on the EXPRESSIVE content of an utterance and that instantiates the generic model of joint intention formation developed by Raimo Tuomela (Tuomela, 1998); such joint intentions strongly resemble the ones formulated so far for macrogames.

Tuomela's model follows a 'bulletin board view' of the intention formation process, which is seen to be triggered by an initiator's public proposal to engage in joint action. Whether both DPs become committed to the appropriate joint intention will then depend on sufficient uptake on the part of the addressees of this proposal and on all participants' knowledge about each other's uptake. Tuomela remarks that this knowledge is based on 'communication', hence it is the initiator's and the responder's effectively conveying their willingness to engage in the joint action that is the base for assuming that their actions will actually be guided by a joint intention. On the other hand, from the public expression of one's agreement with a proposal for joint action there will further result the obligation on the participants to execute the joined action agreed upon, once the intention formation process has been successfully completed.

In the update framework outlined in the previous section, Tuomela's model of intention formation can be instantiated by assuming that

JOINT-INTS

1. Game bids express the initiator's intention to participate in a joint action that is meant to bring about the accomplishment of the 'joint goal' associated with a game in DMT, which may be an action, outcome, or plan
2. The acceptance of a bid by a responder R expresses the latter's intention to participate in that joint action
3. Given R's acceptance of a bid, we can infer that a joint intention exists to perform the joint action proposed in 1. And that
4. There is an obligation on I and R to adhere to the content of that joint intention

Note that the joint obligations introduced by **UPDATE.OBLS**, on the one hand, and the 'individual' ones inferred via **JOINT-INTS** as outlined in the previous section, on the other hand, can be seen as expressing different levels of COOPERATION: hypothetically, the DPs may act in a way that is compliant with the individual obligations on I and R according to the game's definitions and yet not comply with the joint obligation – even though in bidding and accepting a bid they *pretend* to do so.[19] Under this assumption, whereas only the DPs' adherence to the joint goal of a macrogame can be seen as 'full cooperation', their mere fulfilling the individual obligations of acting and responding to each other in a certain way is characterised by a lower level of cooperation. Here, even though the conversation may be driven forward in a regular and consistent manner, it may eventually not result in a successful macrogame.

We consider it as a strength of the obligation-based approach that it provides a unique expressive means in

[17](McRoy and Hirst, 1995), on the other hand, require the assumption of additional 'linguistic expectation rules for adjacency pairs' in order to motivate the actual 'telling' that normally follows a 'pre-telling' action like the ones in (1)-(4). With respect to this, the attractiveness of using obligations lies particularly in the fact that they can be intuitively associated – in our case – with the act of bidding and do not require the assumption of further expressive means to reconstruct the rule-governed behaviour of DPs.

[18]our use of the terms EVOCATIVE and EXPRESSIVE follows the proposals in (Allwood, 1995)

[19]This case shows that our framework, apart from allowing discrete degrees of cooperation, is able to touch on SINCERITY, a connection which we will not develop here.

terms of which varying degrees of cooperation, which have been described, e.g., in (Allwood et al., 2000), can be formulated. Following proposals in (Kreutel and Matheson, 2001), we further see the possibility to apply our model in an analysis of Habermas' (Habermas, 1981) concept of STRATEGIC ACTION, which can be seen as an instance of an interaction type that is characterised by a mismatch between an overt cooperation in actions and responses, on the one hand, and an underlying conflict of the DPs' intentions, on the other.

3 Towards a Generalisation: Bids and 'Speech Act Offers'

In the previous sections, we have demonstrated that the structure of interactions described by Dialogue Macrogame Theory can be formulated using update rules for information states and discourse obligations – both individual and shared ones – as expressive means. With respect to the linguistic data, our model provides an intuitive account of the class of utterances that we called 'explicit game bids' and that were exemplified by the examples (1)-(4) in the introduction. In particular, our use of obligations predicts why cases like those in (4′) and (4″) are inconsistent continuations of a dialogue initiated by an explicit bid.[20] As far as the scope of our model of bidding is concerned, we claim that our analysis covers not only explicit game bids like the ones discussed, but also the possibly much more frequent cases of utterances, for which I[1] in the following dialogue provides an example:

(3′)	I[1]:	Has the patient in room 101 recovered from the surgery?
	R[2]:	Please ask the doctor.

These cases are actually the ones which traditionally have been constituting the scope of speech act theory and subsequent dialogue research, and which have been investigated with respect to what a DP *does* when uttering something like I[1] above. Given our analyses in this paper, it seems appropriate to us is to assume that I[1] in (3′) expresses a bid directed at R to engage in an IS macrogame. At the same time, I provides the content of the game which in the case of an explicit bid as in (3) was said to be partially unspecified or not specified at all. However, both as far as the obligations on R are concerned and with respect to its consequences for the process of joint intention formation the update effect of I[1] above will be equivalent to the update effect of an explicit game bid.

[20]Given a modest effort, we believe that this development could be extended to the other five game management acts of DMT, i.e. ACCEPT-BID, REJECT-BID, BID-TERMINATION, ACCEPT-TERNINATION and REJECT-TERMINATION.

Given these findings, we see the possibility to generalise our analysis of explicit game bids towards a coverage of other types of speech acts or dialogue acts. From this extended perspective, bidding can be analysed as constituting a major part of what has been described as the ILLOCUTIONARY FORCE of those acts: the act of ASKing, for example, can be seen as the act of bidding the opening of a (sub)dialogue – or macrogame – in which the DPs deal with what is actually being asked. However, rather than being responded to with an answer, in a given context – e.g. as in (3′) above – an ASK act may equally elicit a response that makes the action of asking appear problematic in this context. It is the notion of bidding that provides the background for seeing dialogue acts, hence, as actions of a speaker directed at a responder who is required to take position on what the speaker is doing in order for the action to have an effect on the continuation of the dialogue.

This particular characteristic of actions in dialogue has been described by Jürgen Habermas(1981) as the raising of VALIDITY CLAIMS that need to be evaluated by the responder with respect to the three dimensions of propositional TRUTH, expressive TRUTHFULNESS[21] and normative RIGHTNESS. In Habermas' terms, an action like I[1] in the above example can be conceived of as a SPEECH ACT OFFER which will be either accepted or turned down by the responder, where a rejection may follow (at least) one of these dimensions for argumentation, as exemplified by R[2a]-R[2c]:

	I[1]:	Has the patient in room 101 recovered from the surgery?
(3″)	R[2a]:	He hasn't had any surgery so far.
	R[2b]:	Haven't you just seen him?
	R[2c]:	Please ask the doctor.

As these dialogues show, the claims for truth and truthfulness include the claim of satisfaction of semantic presuppositions and the claim that I's primary interest is finding out something about the state of health of some patient, respectively. R[2a] and R[2b] then demonstrate how these claims can be rejected, given an appropriate context. R[2c], on the other hand, provides an example for a rejection of the rightness claim involved in the performance of I[1]. In the proposed formalisation of DMT bidding outlined in the previous sections of this paper, a response like R[2c] can be modelled by assuming that R will reason over the obligations on I and R that would result from an acceptance of I[1]. Here, R would be obliged to provide an answer to I's question, which may result in a conflict with the rights and obligations R actually has towards I in the given circumstances, hence with R's and I's social ROLES. In consequence, R's reasoning provides

[21]which resembles SINCERITY mentioned in a footnote in section 2.3.2

the grounds for rejecting I[1] by questioning the rightness of I's question.

Our analysis of ($3''$) is meant to demonstrate that Habermas' notion of speech act offers and the DMT concept of bidding are based on a highly similar view of the nature of actions in dialogue, the adequate description of which requires an interactive model involving an 'initiator' and a 'responder' – rather than an 'agent' and a 'patient'. In particular, a reformulation of bidding in terms of obligations can be considered a promising approach towards a more formal account of Habermas' intuitions about the rightness claim, which (Habermas, 1981) exemplifies using a dialogue initiated by a request.[22] We acknowledge that for an informal notion of 'rightness' the universality of this claim seems to be difficult to grasp,[23] particularly for actions like assertions or questions. Following our model of DMT, however, the introduction of specific obligations on the participants in a dialogue can be seen as a universal property of a wide range of actions[24]. On this base, 'rightness' can be formalised as a matching between the obligations associated with an action and the actual roles of the DPs. [25] How 'roles' need to be conceived of and how the nature of this matching needs to be thought of – e.g. whether it can be described along the lines of formal accounts of PRESUPPOSITION (e.g. (van der Sandt, 1992)) – is an important subject for further research.

4 Conclusions

In this paper, we have proposed a set of update rules that allow us to generate the structure of interactions described by Dialogue Macrogame Theory. A central role in our model is given to the use of discourse obligations, which are claimed to have a determinant effect on the DPs' acting in several respects. On the one hand, any game bid introduces an obligation on the responder to take position on the bid, hence to express either their acceptance or rejection of the bid. The content of a bid, on the other hand, can be seen as comprising further obligations on the initiator and responder of the game that depend on what type of game is being bid. Once a bid has been accepted, these obligations will be added to the common ground of the discourse participants and are prescriptive for their subsequent actions.[26] Any way of acting that is not compliant with these obligations will result in an inconsistent dialogue flow. Further, we have shown that a joint obligation on the DPs to contribute to the achievement of the goal of a macrogame can be introduced via an augmented variant of Tuomela's model of joint intention formation in our update framework. The different types of obligations could further be interpreted as being associated with different levels of cooperation in dialogue.

Finally, we have demonstrated that our account of bidding not only covers explicit game bids, exemplified by the dialogues (1)-(4), but can be generalised and applied to those instances of speech acts or dialogue acts which have formed a main focus of investigation, so far. We could argue that our notion of game bid and Habermas' concept of speech act offer can be seen as closely related to each other and that, hence, our formalisation of bidding could serve as a starting point for clarifying unresolved issues in Habermas' model of validity claims. The proposed analysis of bidding thus provides the base of a universal account that allows us to reformulate some key aspects of illocutionary force in terms of the framework provided by Dialogue Macrogame Theory.

[22] *Please bring me a glass of water* directed by a Professor towards one of their students

[23] (Goldkuhl, 2000), e.g., remarks that a definition of 'rightness' in terms of 'adherence to social norms' has difficulties in capturing other aspects like 'appropriateness', and he therefore proposes to extend Habermas' original repertoire of three validity claims.

[24] In DMT terms, all actions apart from unilaterals

[25] This amounts to seeing 'concordance to social norms' as a moral conformity to what a society regards as appropriate, clean, holy, noble, etc. Roles can be seen as the objectivation of these ideas at various levels of social organisation. It is, hence, conceivable that role-based and moral-based attributions of rightness use all and only the same axioms, and only differ in the starting points

[26] These obligations thus can be seen as giving rise to what in the framework of (Habermas, 1981) is called 'commitments relevant for the continuation of an interaction' which result from accepting a 'speech act offer'.

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