On Structure and Naturalness in Dialogical Models of Argumentation

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Abstract

It is recognized by researches from various disciplines (e.g.: informal logic, artificial intelligence & law, legal theory, computational dialectics) that argumentation is a process and that this process can adequately be modeled by means of a dialog. This paper evaluates three of these dialogical models: the best-known in general (MacKenzie's DC), the best-known in AI & Law (The Pleadings Game), and a recently fully worked out AI & Law model (DiaLaw).

The three dialogical models of this paper are discussed to provide a setting to elaborate on structure in dialogical models. The degree of structure is related to the often mentioned but yet never worked out notion of naturalness of the dialogs as they are represented in models of argumentation. The reason it is important to address the naturalness of dialogical models is because such models can and have to be introduced into legal practice. For this introduction to be successful it is necessary that the dialogs are natural, fitting in with the ideas and working method of lawyers.

1 Introduction

The dialectical style of studying argumentation is old, very old. Already Aristotle and Protagoras did recognize the dialectical nature of argumentation. A few millennia later, from the beginning of the 1990s onwards to be exact, researchers involved in the field of AI & Law became interested in dialogical models of argumentation (e.g., Gordon 1993; Loui *et al.* 1993; Farley & Freeman 1995; Lodder & Herczog 1995; Prakken & Sartor 1996; Kowalski & Toni 1996). By approaching argumentation dialogically the research on AI & Law followed in the footsteps of prominent researchers from various fields, like philosophy (e.g., Perelman & Olbrechts-Tyteca 1971; Habermas 1973; Rescher 1977), logic (e.g., Lorenz 1961; Barth & Krabbe 1982), legal theory (e.g., Aarnio, Alexy & Peczenik 1981), and argumentation (e.g., Hamblin 1970; Van Eemeren & Grootendorst 1982; Woods & Walton 1982).

Last year (Lodder 1997) I concentrated on the type of arguments that can be used in dialogical models of argumentation and made a distinction between structural and procedural arguments. The reason the former are called arguments is due to their structure. For instance, if a player claims that 'B' because of 'A' and 'A implies B', what he claims is an argument by structure, viz. the Modus Ponens argument. Dialogical AI & Law models mostly model the exchange of structural arguments that basically have the

following structure: a set of formulas (condition) supports a formula (conclusion). The fact that structural arguments are arguments is independent from these arguments being adduced in a dialog.

Procedural arguments, on the other hand, are arguments *because* they are adduced in the dialog. One may wonder how it is possible that a claim is made that is not by its structure an argument, but nevertheless is considered an argument. That is because the particular sequence of claims can make a claim an argument for a previous one. In other words, a claim can become an argument in a procedure if the *structure of the procedure* makes it an argument. Assume that in DiaLaw (Lodder & Herczog 1995; Lodder 1998a) the player Bert questions Ernie's claim about the Festina cycling team having used doping, and that in reaction to that Ernie claims that doping was found in one of the team's cars. In that case this latter claim is an argument[1] because of the structure of the procedure, namely an *argument* supporting the former claim.

This paper elaborates on the structure of dialogs. Not only the structure by which a statement can become a (procedural) argument, but also other aspects of structure within dialog games are addressed. The degree of structure is related to the often mentioned but yet never worked out notion of the naturalness of dialogs. It is important to address the naturalness of dialogical models because such models can and have to be introduced into legal practice. For this introduction to be successful it is necessary that the dialogs are natural, fitting in with the ideas and working method of lawyers. If naturalness is related to structure, basically the following relation seems to exist: the more structure put into a dialogical model, the less natural it becomes. It should be noted this paper does not deliver a final study on the naturalness of dialogical models of argumentation. Rather, the paper is meant to initiate a discussion on this topic.

Three dialogical models are discussed to provide a setting to elaborate on structure and naturalness in dialogical models. One, probably the best known dialogical model of argumentation, stems from the field of argumentation: MacKenzie's DC (MacKenzie 1979). The other two are AI & Law models: Gordon's (1995) Pleadings Game and my own DiaLaw (Lodder 1998a).[2] Especially by concentrating on the possible moves of the game and the way in which commitment is used, these models will be characterized. Moreover, differences are illustrated by showing the same sample dialog represented in the three models.

The paper is structured as follows. The legal sample dialog is introduced and subsequently the three models (DC, Pleadings Game, DiaLaw) are discussed. Next the paper focuses on two aspects of structure in dialogical models, and afterwards on the naturalness of dialogical models.

2 The sample dialog

Dialogical models are examples of procedural models of argumentation as opposed to product models. If the product of argumentation is studied, general structures of support between sets of premises and a conclusion are defined. In a product-approach of argumentation a statement is justified if the premises are justified, and if by valid inference the conclusion can be

1 It is, however, not an argument because of its own structure, so not a structural argument.

2 These three models are examples of what I like to call statement-based models (DC), argument-based models (Pleadings Game), and mixed models (DiaLaw) (cf. Lodder, 1998b).

derived from the premises. The product of argumentation is static. Conversely, the process of argumentation is dynamic. If the process of argumentation is studied, procedural rules are defined that determine for each stage of the process whether a statement is justified. In a process approach of argumentation a statement is justified if after a sequence of one or more steps, the statement is justified according to the rules of the procedure.

In a dialog game, statements are justified if they are successfully defended in the dialog, that is, if a player (the proponent of the statement) succeeded in convincing his opponent. A commonly accepted starting point in dialogical models is that a player who claims a sentence must be willing to defend it, or, in other words, on the claiming players rests the burden of proof. The various ways in which this defense can be modeled is illustrated while discussing the three models. The discussion is meant to illustrate the models in main lines (for a detailed discussion of each of these models see Lodder (1998a) or the original work).

In all models, that is MacKenzie's DC, Gordon's Pleadings Game, and DiaLaw, there are two parties. In the representations of the sample dialog in the following sections, the parties of the dialog are named as in the original work. The dialog is based on the following case.

> On October 3, 1991, Tyrell attends a football game with two fellow gang members. The week before there had been a shooting incident at a game. The police is afraid that it will happen again and is therefore very vigilant. One of Tyrell's gang members attracts the attention of the police officers, because he is wearing a heavy, quilted coat – although the temperature is in the eighties. They are all searched, and marihuana is found on Tyrell. So far it seems a clear case of illegally obtained evidence, but there is a complicating factor. Namely, Tyrell had been placed on probation subject to, amongst others the condition: "to submit to a search of his person and property, with or without a warrant, by any law enforcement officer...". The searching officer, however, is unaware of the probation condition.

The question that arises is the following. Is evidence concerning the possession of marihuana obtained illegally, because the search was without probable cause, or was the evidence obtained legally given the probation condition? In the example dialog we concentrate on two arguments:

- Only suspects may be searched, and Tyrell was not a suspect;
- One of Tyrell's probation conditions was that he had to allow search any time.

Bert: It was not allowed to search Tyrell.
Ernie: Why do you think so?
Bert: Only if someone is a suspect he may be searched, and Tyrell was not a suspect.
Ernie: I agree, but Tyrell was on probation and had to allow a search at any time.
Bert: You are right, search was allowed.

In subsequent sections each game is briefly introduced and demonstrated by a representation of this dialog. The following abbreviations are used:

sa = search was allowed;

s = suspect;
pc = probation condition.

3 MacKenzie's DC

To investigate fallacies, Hamblin (1970, p. 265f.) developed the dialog game 'Why-Because system with questions', often abbreviated as 'H'. To my knowledge, the game H was the first to use the notion of commitment in dialogs and the possibility to retract moves. A well-known elaboration of the game H is the game DC by MacKenzie (1979).

3.1 Moves

The players perform moves in turn, and are only allowed to make one locution at each turn. There are five different locutions or move types.

Move type	Representation
1. Statement	'P', 'Q', etc. (and 'Not P', 'If P then Q', and 'Both P and Q')
2 .Withdrawal	'No commitment P'
3. Challenge	'Why P?'
4. Resolution demand	'Resolve whether P'
5. Question	'Is it the case that P?'

The move Statement is used for the introduction of statements. In addition to normal statements, also the ordinary compounds of statements may be claimed. After the move statement, both players are committed to the statement. The principle *silence implies consent* is applied in the game, because it saves time (not every statement a player agrees to has to be conceded) and it fits in with daily life discussions (normally someone will let it be known if he disagrees).

The move Withdrawal is used for the retraction of statements. The Challenge is a demand for evidence for a particular statement. The Resolution demand is meant to confront the opponent with an inconsistency in his commitment store. A question (is it the case that P?) forces the opponent to make clear his position about the statement P.

3.2 Commitment

The commitment stores in DC are empty at the beginning of the dialog. Each player has his own commitment store containing the statements he is committed to.

The commitment store is not closed under logical consequence. It is for instance possible to be committed to $P \rightarrow Q$, P and ~Q. The idea behind this way of modeling commitment is that a player is not omniscient and cannot be aware of all consequences of his commitments, especially not when these consequences are remote. In one of the systems discussed in Hamblin (1971) commitment is closed under logical consequence, and it appears that such strict commitment is not very useful in modeling discussions.

3.3 The example dialog

	Wilma	Bob
1.	~sa	
2.		Why ~sa?
3.	~s	
4.		If pc then sa
5.	sa	
6.		Resolve whether sa & ~sa
7.	No commitment ~sa	

The game starts with Wilma's statement that search was not allowed. In the second move Bob challenges this statement. In defense Wilma puts forward the statement that there was not a suspect. Bob replies with the statement that if there exists this probation condition, search is allowed. On the basis of this information Wilma decides that search was allowed after all. Bob is not quite sure which of the conflicting statements, viz. that the search was allowed and that it was not, Wilma prefers. Therefore Bob continues with a resolution demand. In the last move Wilma is forced to withdraw one of the contradicting statements; she withdraws her initial statement.

4 The Pleadings Game

After nonmonotonic logics were introduced in a special issue of *Artificial Intelligence* in 1980, many new nonmonotonic logics have been developed. Generally characterized, these logics aim to model human reasoning by using theories of defeasible knowledge. From more recent date are the argument-based approaches, known as formal argumentation (e.g., Vreeswijk 1993; Pollock 1994; Gordon 1995; Verheij 1996). In these approaches the notions of argument and counterargument are central. Put simply, in the argument-based theories a conclusion is justified only if it is supported by an undefeated argument. Gordon's Pleadings Game (1995) is an argument-based model.

4.1 Moves

Rules are central in the Pleadings Game and can be declared by the players. If a player declares a rule, he claims that the way he represents the rule is accurate. A rule expresses a general relation between a condition and a conclusion. A rule is not necessarily based on legislation, but can be based on a legal principle as well, or on whatever other general relation the player likes to express. Arguments are based on rules, namely arguments are constructed by applying rules. This brings us to the move in which arguments are introduced.

An argument is introduced as a request to the opponent to defend his statement against the argument. So, an argument only indirectly supports one's own standpoint, and directly attacks the statement of the opponent.[3]

Statements are only introduced indirectly: the consequence of a move can be that a statement is added. For instance, if an argument is introduced, the condition of the argument becomes a statement in the game. So, if a player introduces an argument in which A is meant to support p, his opponent can

3 An argument asserted as defend((denial (claim p)) A) is stored as (argument A p).

react to the – indirectly introduced – statement A. He can either concede A, deny A, question A, or adduce an argument against A. Questioning, conceding, and denying completes, besides claiming rules and arguments, all possible moves.

4.2 Commitment

Gordon's way of handling commitment is rather complicated. Each player is committed to statements in four different sets. The statements of a player are stored in the triple <*O*, *D*, *C*>. The proponent (p) is in the first place committed to all statements he claimed and the opponent denied (D_p), conceded (C_p), or did not respond to (O_p). Furthermore, he is committed to statements claimed by his opponent (o) he did concede: C_o. The commitment of the opponent (o) is similar, and also stored in four different sets: O_o, D_o, C_o and C_p.

4.3 The example dialog

	Plaintiff	Defendant
1.		Deny(claim(~sa ty))
2.	declare(rule, 1, (X) if (~s X) then (~sa X)) defend(denial(claim(~sa ty)) (~s ty backing 1 ap(inst 1(parms ty))))	
3.		concede(claim (backing 1)) concede(claim (~s ty)) declare(rule, 2, (X) if (pc X) then (sa X)) defend((argument(~s ty) backing 1 ap(inst 1(parms ty)) ~sa ty) (pc ty backing 2 ap(inst 2(parms ty))))
4.	concede(claim (backing 2)) concede(claim (pc ty)) concede(rebuttal (pc ty) (sa ty) (~s ty))	

In addition to the set of statements belonging to each player, there is also the background of the game ⟨ϕ, *S*, *R*⟩, where *S* is the set of formulas and *R* the set of rules the players agreed upon. If a statement is an element of either C_o or C_p, the corresponding formula is an element of *S*. For instance, if the statement (claim p) is in C_o, then the formula p is an element of *S*. Since a declared rule is conceded automatically, all declared rules are an element of *R*.

After the plaintiff has filed that the search was illegal, the dialog starts with the denial of that claim. In the second move the plaintiff declares a

rule, and puts forward an argument based on this rule, that defeats the denial. In his reaction the defendant concedes the validity of the rule, also concedes that the condition of the rule is satisfied, and declares a new rule. He applies this new rule to defeat the argument of the plaintiff by a rebuttal that is based on the application of this new rule. In the last move the plaintiff concedes all moves left open, including the rebuttal, so he loses the debate.[4]

5 DiaLaw

5.1 Moves

The players make moves alternately. These moves contain two elements: 1) an illocutionary act with 2) a propositional content. The illocutionary act is one of the following four: a. claim; b. question; c. accept; d. withdraw. The propositional content of these illocutionary acts is formed by the sentences that the acts are about. The illocutionary act and the propositional content are separately modeled.

If a player claims a sentence, he expresses that he believes that this sentence is justified. In principle, a player may claim any sentence. Only in some cases the claim of a particular sentence is forbidden by the dialog rules. For instance, a player cannot claim a sentence if he just claimed the opposite. If a player denies a sentence claimed by his opponent, this is also modeled as a claim. The propositional content of this claim is the negation of the sentence claimed by the opponent.

If a player questions a sentence, he asks a justification of the sentence claimed by the other. Question is neither an acceptance, nor a denial, but lies just in between these two acts. A player usually questions a sentence if he is not yet convinced.

If a player accepts a sentence, he agrees with the sentence claimed by the other. Accepting a sentence is comparable to claiming a sentence. Both the player who accepts and the player who claims, believe that the particular sentence is justified. The difference is that a claim initiates a discussion, and an acceptance ends it. Acceptance is a reaction to a claim of the other player.

If a player withdraws a sentence, he retracts a sentence claimed by himself. The player will withdraw a sentence if he is no longer willing to defend it. Withdraw is the opposite of a claim: withdrawal of a sentence undoes a previous claim of that sentence. Withdraw is also similar to accept: just like after an acceptance the discussion ends. A player can withdraw a sentence immediately after it is questioned, but almost always there will be several moves between a claim and a withdrawal. Moves during which the player became convinced by counterarguments, made him realize the weakness of his own position, etc.

4 An important feature of the Pleadings Game is determining the legal and factual issues that exist between two parties. In the example agreement is reached (so there are no issues), but a game can also end if on some points no agreement is reached. An issue between the parties arises if, for example, the plaintiff would not have conceded the backing of the second rule in the last move, but instead would have denied it and the defendant on its turn would have denied this denial. In that case a legal issue would have been determined, namely whether the second rule is a valid one, and this issue had to be decided by the court.

5.2 Commitment

Commitment originates when a sentence is claimed or accepted. In the commitment store it is exactly indicated which player is committed to what sentences. Commitment starts when a sentence is claimed or accepted. Commitment terminates when a sentence is withdrawn. The consequence of withdrawing a sentence is that the related element of the commitment store is deleted.

Commitment of a player limits him in subsequent moves. An example of such a limitation is that a player may neither claim, nor accept a sentence, when he is committed to the negation of that sentence.

To avoid that the dialog remains an informal talk, a player has means to force his opponent to accept a sentence. This is what is called forced commitment. Forced commitment is comparable to derivation in a monological logic, and occurs when a player is forced to accept a sentence, due to the sentences he is already committed to. Assume a player is committed to a reason that supports a sentence, and there are no reasons against this sentence. In case this player is not able to put forward a reason against this sentence, he is forced to accept it.

5.3 The example dialog

The dialog starts when Bert claims that it was not allowed to search Tyrell. Ernie questions this sentence. Bert claims that the fact that Tyrell was not a suspect is a reason for the conclusion that the search was not allowed. Ernie admits this. Next Bert claims that this single reason outweighs the empty set of reasons. This claim of Bert is decisive (Ernie may not question), unless Ernie knows a reason against the conclusion. In the sixth move Ernie claims as a reason against that Tyrell was subject to a probation condition. Bert is convinced by this counter-reason, so he withdraws his sentence claimed in the first move.[5]

	Bert	Ernie
1.	claim, ~sa(ty)	
2.		question, ~sa(ty)
3.	claim, reason(~s(ty), ~sa(ty))	
4.		accept, reason(~s(ty), ~sa(ty))
5.	claim, outweighs({~s(ty)}, {}, ~sa(ty))	
6.		claim, reason(pc(ty), sa(ty))
7.	withdraw, ~sa(ty)	

5 An important feature of DiaLaw is that reasons can be weighed and that argumentation is possible regarding which set of reasons (pro or con) has to be preferred. For example, the dialog would continue if Bert was not convinced by the reason adduced in the last but one move. In that case the dialog could continue with discussing the weighing of both the reason pro and con. If Ernie would question this new claim (outweighs({~s(ty)}, {pc(ty)}, ~sa(ty))), Bert could adduce arguments in favor. For instance, that the protection of the community against persons on probation is to be given preference to protection of the suspect.

6 On structure in dialogical models

The discussed dialogical models vary both in the way and to what degree they are structured. Below the structure of the exchange is considered first and is followed by discussing the structure of the moves of the games.

6.1 The structure of the exchange

The MacKenzie dialogs are structured primarily by the silence implies consent principle. Players are not forced to react to a previous statement. They can always introduce new statements that are in no way related to previous statements. In that respect the exchange is almost unstructured. The players can just claim statements in turn, even if the statements of one player have nothing to do with the statements of the other player. Players do become committed to all statements claimed by their opponent automatically ('silence implies consent'), but they can at any given moment end their commitment to these statements by withdrawal.

In the game a statement can in some cases become an argument due to the structure of the exchange. Namely, a statement that is claimed directly following a challenge is supposed to support the challenged statement. This is even made explicit, because in case a statement is claimed in reaction to a challenge a material implication is added that connects both the claimed and challenged statement. For instance, when Bob challenged that the search was not allowed, and Wilma reacted by claiming that there was not a suspect, automatically the material implication 'If there is not a suspect then search is not allowed' is added. An interesting incidental circumstance is that because the silence implies consent principle, both players become committed to not only 'there was not a suspect', but also to "If there is not a suspect then search is not allowed".

In sum, depending on the moves, the exchange can be structured, e.g. in case of a challenge, or rather unstructured, e.g. in case of consecutive claims of statements.

In the Pleadings Game the players are forced to react to all open relevant statements. These statements are either arguments (rebuttals, surrebuttals, etc.), or do represent a formula of the condition part of a previously introduced argument (rebuttals, surrebuttals, etc.). The condition part of the argument contains amongst others the claim that the rule the argument is based on is valid and the instantiated conditions of this rule. In each turn a player may only react to previous statements that were directly (arguments, rebuttals, etc.) or indirectly introduced (elements of the condition part of the argument). Notably, the exchange is very structured: the history of the game defines the structure of the moves to come completely.

In DiaLaw the players are also restricted in their possible moves by the history of the game. Each statement a player claims is either supporting a statement he claimed previously himself, or is denying or attacking a previous statement claimed by his opponent. In the former case the claimed statement is an argument because of the structure of the exchange.

The game is even *very* structured in the sense that each move is a reaction to another move. Whether sentences have to be justified depends on the reaction of the other player; DiaLaw is a reaction-based game. A claim can only be guaranteed to be a reaction if there is a link with a previous move. In the current model this relation is guaranteed: a claimed sentence is

either a reaction to a demand for justification (question) or a reaction to a claimed sentence (denial).

6.2 The structure of the moves

Although natural language is structured by its grammar, all languages used in the systems are more structured than natural language is.

Closest to natural language is MacKenzie's DC. The statements in DC could even be expressed in natural language. However, especially in case of resolution demands the forced consequences could be too rigid if natural language is used. Therefore, only if the used language is formal to some extent, the game can be properly played. The statements do not have a specific structure. The reactions, of course, have, because they are responses to previous moves and therefore represent the relevant previous move.

In the Pleadings Game the moves are very structured. Actually, the game could not be properly played if they were not, because players can become committed to logical consequences of their moves. The underlying logic, conditional entailment, and Gordon's weak entailment relation used for the strengthening of commitment are subtle and cannot deal with ambiguities related to, e.g., unstructured or natural language moves.

In DiaLaw the moves are rather structured, because the language is based on first order predicate logic. The game also has a set of special language elements like rule, reason and the weighing of reasons. Because as a consequence of using these special language elements players can be forced to accept or withdraw statements, for these moves the structure is important. In case of other moves the structure of the move is not really important. Since the dialog is totally structured by the exchange rules, even natural language could have been used.[6]

7 On naturalness of dialogical models

It may be illustrative to label a dialogical model as natural, but it remains idle talk as long as the labeling is not based on underlying, explicit criteria. I consider the degree of structure of a dialog an important criterion by which can be determined whether a dialog is natural or not. Although it is definitely not the only criterion, the discussed models can be evaluated on the basis of their degree of structure.

Of the models considered, the Pleadings Game is the most structured one. Both the exchange and the moves are highly structured. If one looks at how the sample dialog is represented in the Pleadings Game, it is even hard to unravel the course of the discussion. As a consequence, the dialog is very unnatural. The game DC and DiaLaw are more natural, the crux of the discussion is clear in both representations. The exchange in DC is partially structured, in DiaLaw totally. The representation of the moves is in both games similar. The special language elements of DiaLaw can be compared to the special moves in DC like, e.g., the resolution demand. All things considered, the game DC is least structured and as a consequence most natural.

What is interesting about ranking models in terms of structure and related to that in terms of naturalness? That, if a game is going to be played it should be possible to learn it. If a game is too structured it is hard to learn

6 An example of an argumentation system using natural language is the Zeno-system (Gordon & Karacapilidis, 1997).

the game. It is rather easy to play DiaLaw and even easier to play DC. On the contrary, the Pleadings Game is very hard to learn.

Although structure is an important criterion to determine whether a dialog is natural, it is definitely not the only criterion. Other criteria that are also of interest are for instance *what* is modeled and *for what purpose* it is modeled.

First, whether a dialogical model represents a dialog in a natural way depends on *what* is modeled: is the object modeled originally a dialog or not? On the one hand, legal practice knows a wide range of very diverse dialogs that are conducted in different settings: the parliament, the court room, the class room, an international conference, etc. On the other hand, the argumentation modeled can represent what originally was not a dialog: a memorandum, the grounds of a verdict, teaching material, a presentation, etc.

Second, it depends on the purpose of the model. Is the model empirical, theoretical, or normative? Firstly, empirical or descriptive models describe a phenomenon, e.g., argumentation. Secondly, analytical or theoretical models provide tools to analyze a phenomenon. An abstract language and a set of concepts, e.g., logic or an ontology, is used to analyze. By way of defined tools, more insight into and a better understanding of, e.g., argumentation can be obtained. Thirdly, normative or prescriptive models prescribe how one should act regarding a phenomenon, e.g., argumentation. The model fixes what ought and ought not to be done.

If a dialogical model is used to reconstruct a dialog, the result of the reconstruction has to be compared to the actual dialog if the model is empirical. Both the degree to which the actual and reconstructed dialog resemble each other and whether an obvious, straightforward translation is possible from the actual dialog to the reconstructed dialog can be used to determine the naturalness of the modeled dialog. If the model is normative or analytical, the naturalness is of less importance. In the former case the model must allow to evaluate the actual dialog in terms of good and bad argumentation, in the latter case the model must clearly show the argumentative elements.

If dialogical models are going to be used in practice the models will mediate a discussion that originally was either not mediated or mediated by humans. An analytical model is not very useful here. Since we are dealing with legal practice the model will be primarily normative. The participants must be monitored and guided by the model. The model must also be emperical in that it resembles the original discussion procedure or otherwise evidently improve the original procedure. Probably most important is that the exchange of statements and arguments is easy to follow, and as a conseqence that the dialog game can easily be played.

8 Concluding remarks

Nowadays legal practice is more and more automated. Judges are supported by tools, law companies are formalizing their expertise, and legal education is cautiously moving to explore the World-Wide Web.[7] Since legal practice is basically driven by procedures, e.g., drafting procedure, law applying procedure, law suits, etc., dialogical models of legal argumentation can play an important role in the automation of the legal practice.

7 Maybe we can begin a sub-field called AI & Lawww.

In the AI & Law field, many dialogical models have been developed. Since legal practice is governed by procedures these AI & Law models are suited to adapt in order to be used by legal professionals and/or paralegals. The prospects are good, regarding automation in the legal field. A necessary condition for dialogical models to be used in practice is that the resulting dialogs are natural. In this paper I addressed the way in which structure appears in dialogical models and how it influences the naturalness. There seems, however, more to say about what makes a dialog natural. The degree of structure is one thing, the object modeled and the purpose of the model are also relevant. In future research all three criteria, and most likely also additional criteria, have to be worked out in more detail. This is important both for the development of theoretical models and for the introduction of mediating dialog games in practice. In each of the two cases the sketched criteria have to be taken into account.

Future research will also concern how exactly the existing models should be adapted to serve a useful role in practice. This research is both interesting and promising. We should try to achieve that lawyers use applications in which results from AI & Law research are integrated (Verheij, Hage & Lodder 1997). Some work has already been done[8], but there is still a lot of very interesting work left.

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8 See on how to present argumentation Lodder & Verheij, 1998; Verheij & Lodder, 1998.

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