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Formalising Ordinary Legal Disputes: a Case Study

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Abstract This paper presents a formal reconstruction of a Dutch civil legal case in Prakken's formal model of adjudication dialogues. The object of formalisation is the argumentative speech acts exchanged during the dispute by the adversaries and the judge. The goal of this formalisation is twofold: to test whether AI & law models of legal dialogues in general, and Prakken's model in particular, are suitable for modelling particular legal procedures; and to learn about the process of formalising an actual legal dispute.

1 Introduction

In this paper a Dutch civil case is formalised within Prakken (2008)'s formal dialogue model of adjudication. The object of formalisation is the argumentative speech acts exchanged during the dispute by the adversaries and the judge. The goal of this formalisation is twofold: to test whether AI & law models of legal dialogues in general, and my model in particular, are suitable for modelling particular legal procedures; and to learn about the process of formalising an actual legal dispute. These issues are of theoretical interest but they may also have practical relevance. Lauritsen (2005) and Sombekke et al. (2007) have proposed the idea of 'legal argument management systems', supporting the user in structuring a collection of case-related documents in terms of the argumentation structure of a case. The structure would capture the main issues, the main positions and arguments taken by the parties with respect to the issues, the available evidence related to them, and so on. Incoming documents could be indexed according to this structure and new documents could be drafted according to the same structure and linked to other documents. The present study may yield insights into how such systems should be designed.

The analysed case is about ownership of a large camping tent. Its case files were published as (Leclerq; 1990), to be used in legal teaching. These files were previously used by Leenes (1998) to illustrate Hage et al. (1994)'s and Lodder (1999)'s theoretical models of legal disputes. Leenes did not attempt to give a full formalisation of the case, and he did not

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analyse the evidence phase at all. The present paper gives such a full formalisation, and does so of (almost) the entire case, including the evidence phase.

As a legal dispute, there is not much remarkable about this case. Both the solicitors and the judge reason in rather mundane ways, and the better solicitor loses simply because his evidence is not good enough. Therefore, those interested in the modelling of the intricate details of skilled legal argument might be disappointed. However, the routine nature of this case is precisely why its modelling is important. If we want to build computer systems that support legal discourse in practice, it seems more useful to build such systems for the average case instead of for the exception. Despite its mundane legal character, the case still contains some interesting argumentative features. It contains two examples of legal rules with exceptions. One of them induces a shift in the burden of proof, explicitly expressed by the judge in an allocation of the burden of proof. The case also contains an argument on the priority of legal rules, and it contains a dispute on the reliability of witnesses; the latter dispute highlights the distinction between rebutting and undercutting arguments. The evidential arguments also raise the issue of accrual of arguments. On the other hand, the case does not contain sophisticated case-based reasoning or theory formation.

This paper is organised as follows. In Section 2 the case is described and the relevant substantive and procedural law are sketched. In Sections 3 and 4, respectively, the formalisms used to represent the case and the representation methods used within these formalisms are summarised, after which the full representation is given in Section 5. Finally, some lessons learned are discussed in Section 6.

2 The case and the relevant law

The case concerns a civil dispute concerning ownership of a movable good. Plaintiff (Nieborg) and his wife were friends of van der Velde, who owned a large tent at a camp site. At some point van der Velde mentioned that the tent was for sale for fl. 850 (approximately 380 Euro). Nieborg replied that he was interested but could not afford the price. Van der Velde still made his tent available to Nieborg, who in return helped van der Velde to paint his house, while Mrs. Nieborg for some period assisted Mrs. van der Velde with her domestic work. At some stage, Nieborg claimed that he and his wife had done enough work to pay the sales price for the tent. This made van der Velde very angry and he demanded the tent back since, so he argued, he had never sold the tent but only made it available to Nieborg for the period that van der Velde did not need it. He had done so since Nieborg had told him that he and his his wife had never had enough money to go on holiday. When Nieborg refused to return the tent, van der Velde, assisted by a group of people, threw Nieborg's son (who at that point was the only person present) out of the tent and took it away. A few months later, van der Velde sold the tent to defendant (van der Weg) and his wife. Remarkably, the sales price (fl. 850) was paid with domestic work by Mrs. van der Weg in assistance of Mrs. van der Velde; this was the same arrangement that Nieborg had claimed he had agreed with van der Velde and which van der Velde had denied.

In court, Nieborg (plaintiff) claims return of the tent to him on the basis of his ownership. van der Weg (defendant) disputes Nieborg's claim on the grounds that van der Velde had not sold the tent to Nieborg but only given it on loan, and that the work done by Mr. and Mrs. Nieborg was not done to pay the sales price but out of gratitude.

The relevant law is quite intricate[1]. The main legal rule governing the case is Section 2014 of the (former) Dutch Civil code (BW), which contains both a general rule and an exception on ownership of movable goods. The rule both has legal-substantive relevance (who is the owner) and legal-procedural relevance (who must prove ownership?). As for substantive issues, the general rule of 2014 BW says that "possession" of a good "in good faith" makes a person owner of the good. The exception says that if some other person was the owner of the good less than three years ago and involuntarily lost possession (e.g. by theft), that other person is still the owner. As for the burden of proof, these rules imply that possession of a good creates a presumption in favour of ownership, so that anyone who claims ownership on the basis of the exception must prove both that they involuntarily lost possession of the good less than three years ago, and that at that time they owned the good.

In the present case (less than three years after the violent events) van der Weg only pro forma disputed that Nieborg involuntarily lost possession of the tent, and Nieborg easily proved this with witnesses. The main issue of the case was whether van der Velde had sold the tent to Nieborg, so that Nieborg was owner at the time of the violent events, or whether van der Velde had just given the tent on loan, so that van der Velde had remained the owner.

Besides this factual issue, the case also contained a main legal issue, which was dealt with in an intermediate two-stage appeal phase. To meet her burden of proof, Nieborg's solicitor followed an intricate line of reasoning, using a cascade of three legal presumptions to prove ownership of Nieborg at the time of the violent events from the mere fact that Nieborg's son occupied the tent at that time. Firstly, plaintiff made retrospective use of the general rule of 2014 BW that possession in good faith of a good creates a presumption of ownership, claiming that at the time of the violent removal of Nieborg's son from the tent, Nieborg was in possession of the tent in good faith. This move raised the main legal issue of the case, viz. whether such retrospective use of 2014 BW is allowed or whether 2014 BW can only be used by the current owner of a good (in this case defendant). In an intermediate decision on the burden of proof the district court ruled that the latter was the case, but this decision was overturned by the Dutch Court of Cassation.

Plaintiff had to pursue his intricate line of reasoning with two further steps to prove that at the time of the violent events Nieborg had possession in good faith of the tent. Firstly, in Dutch law "possession" does not just mean "holding" (in the physical sense); it means "holding as if one were the owner". Here plaintiff could use another legal presumption, viz. Section 590 BW, which says that holding a good creates a presumption in favour of possessing it. Secondly, plaintiff needed to prove that Nieborg's possession was 'in good faith'; here plaintiff could use a third legal presumption, viz. the one of Section 589 BW that possession is presumed to be in good faith.

Was this line of reasoning sufficient for plaintiff to win the case? No it was not, since Section 590 BW states an explicit exception to the presumption in case the holding started as "holding for someone else". Clearly, being given a tent on loan is an instance of this exception. Accordingly, while plaintiff was allocated the (easy) burden of proving that he involuntarily lost possession of the tent, defendant was allocated the (tougher) burden to prove that van der Velde had not sold the tent to Nieborg but had given it on loan. Now the outcome of the case was that both parties succeeded in meeting their burden of proof, so that defendant, who had proved the exception, won the case.

I next briefly describe Dutch civil procedure at the time of the case (1974-1978) as far as relevant for present purposes. A procedure is divided into a 'pleadings phase', where the adversaries plead their case before the judge and provide evidence when assigned the

[1] The numbering of the statute sections below is as it was at the time of the case, in 1974-1978.

burden of proof by the judge, and a 'decision phase', where the judge withdraws to decide the case. The pleadings phase is separated into a written and an (optional) oral part. In the written part the parties exchange at least two and usually four documents (recently the law was changed to make this "usually two"). The first is plaintiff's *Statement of Claim*, which has to contain plaintiff's claim plus his grounds for the claim. These grounds may be purely factual: plaintiff may leave out the legal 'warrant' connecting grounds and claim, as may both parties in all their other arguments. Also, parties do not need to explicitly state common-sense knowledge, and if they state such knowledge, they do not need to prove it; however, the judge decides what is common-sense knowledge. Defendant replies with her *Defence*, which has to contain defendant's defences, i.e., her attacks against plaintiff's claim and grounds. The adversaries may then exchange further documents as long as allowed by the judge, on whose content the procedural rules state no conditions. The documents of the second turn are called *Reply* and *Rejoinder*. In these documents, both adversaries may adduce further grounds and defences (except procedural defences, which must all be stated in the *Defence*). Each party may also ask to provide oral pleading. During the pleadings phase the judge assigns the burden of proof to a party whenever appropriate, after which that party must provide evidence. After the pleadings phase has ended, the judge gives his/her verdict. An important principle here is that the judge is passive with respect to the factual basis of the dispute. For instance, the judge must accept undisputed claims of the adversaries, and s/he must evaluate the evidence and give the verdict on the basis of the evidence adduced by the parties (but s/he may add generally known facts and the relevant rules of law). On the other hand, the judge is (with a few exceptions) free to assess the relevance and strength of the evidence adduced by the adversaries, and s/he has no obligation to respond to the adversaries' arguments on these matters. For the present case study it is particularly relevant that the judge does not have to justify why s/he believes a witness and does not have to respond the adversaries' arguments on the credibility of witnesses.

3 The representation technique: Prakken (2008)'s formal model of adjudication

The object of formalisation is the argumentative speech acts exchanged during the dispute by the adversaries and the judge. Therefore, a system is needed for so-called adjudication dialogues, i.e., for dialogues between two adversaries, plaintiff (π) and defendant (δ), and a neutral third party. As such the system of Prakken (2008) is used, which extends Prakken (2005a)'s system for two-party dialogues with an adjudicator (in this case study called 'judge', (ι)). It takes a game-theoretic approach to dialogues in that speech acts are viewed as moves in a game and rules for when these moves are allowed are formulated as rules of the game. The system has a *topic language* with a *logic*, and a *communication language* with a *protocol*. The protocol specifies the allowed moves at each point in a dialogue and determines turntaking and dialogue termination. The system also has *effect rules*, which specify the effects of utterances on the state of the dialogue, and *outcome rules*. Below these elements are briefly described.

3.1 The topic language and logic

The topic language and logic used in this paper is Prakken and Sartor (1996)'s argument-based version of extended logic programming with defeasible priorities, as adapted by Prakken (2001) to shifting dialectical roles. (However, the representation will be such that

similar systems could be used as well.) The logic can deal with contradictory rules, rules with assumptions, inapplicability statements and priority rules. Information is expressed as a set of rules in the language of extended logic programming, which has both negation as failure ($\sim$) and classical, or strong negation ($\neg$). Each rule is preceded by a term, its name. Rules are *strict*, represented with $\rightarrow$, or else *defeasible*, represented with $\Rightarrow$. Facts are represented as strict rules with empty antecedents.

To give an example, the legal rules 2014,1 and 2014,2 BW discussed in Section 2 above could be formalised as follows:

$r_1(x,y,t)$: $\quad \texttt{PossessesInGoodFaith}(x,y,t) \Rightarrow \texttt{Owner}(x,y,t)$

$r_2(x,y,z,t,t')$: $\quad \texttt{PossessesInGoodFaith}(x,y,t) \wedge \texttt{Owner}(z,y,t') \wedge (t-t') < 3\mathit{years} \wedge \texttt{InvoluntaryLoss}(z,y,t') \Rightarrow \neg\texttt{Owner}(x,y,t)$

Arguments can be formed by chaining rules into trees[2], ignoring weakly negated antecedents. Conflicts between arguments are decided according to a binary relation of *defeat* among arguments, which is partly induced by rule priorities, which can be reasoned about as any other legal issue. For example, the following is a priority rule (the legal *Lex Specialis* principle) that could be used to adjudicate a conflict between 2014,1 and 2014,2 BW.

$p_1(x,y)$: $\quad \texttt{Exception}(x,y) \Rightarrow x \succ y.$

If also the fact

f_1: $\quad \rightarrow \texttt{Exception}(r_2,r_1)$

is added, then a priority argument can be constructed that gives precedence to r_2 over r_1.

There are three ways in which an argument A_2 can defeat an argument A_1. The first is *assumption* defeat (in Prakken and Sartor (1996) called "undercutting" defeat), which occurs if a rule in A_1 contains $\sim L$ in its body, while A_2 has a conclusion L (note that $\sim L$ reads as 'L cannot be derived'). For example, the legal presumption 590 BW that holding an object presumes possession unless the holding started for someone else and its exception in case the object was obtained on loan, both discussed in Section 2, can be formalised as follows:

$r_3(x,y,t)$: $\quad \texttt{Holds}(x,y,t) \wedge \sim \texttt{StartedHoldingForSomeoneElse}(x,y) \Rightarrow \texttt{Possesses}(x,y,t)$

$r_4(x,y)$: $\quad \texttt{ObtainedOnLoan}(x,y) \Rightarrow \texttt{StartedHoldingForSomeoneElse}(x,y)$

Then an argument using r_4 assumption-defeats an argument based on r_3.

The other two forms of defeat are only possible if A_1 does not assumption-defeat A_2. One way is by *excluding* an argument, which happens when A_2 concludes for some rule r in A_1 that r is not applicable (formalised as $\neg\texttt{Appl}(r)$). The other is by *rebutting* an argument, which happens when A_1 and A_2 contain rules that are in a head-to-head conflict (as rules r_1 and r_2 above) and A_2's rule is not worse than the conflicting rule in A_1 (according to p_1 and f_1 this holds for r_2 compared to r_1 but not vice versa). Note that all these attacks can be targeted at the final rule or conclusion of an argument but also at each intermediate rule or conclusion. Also, an argument A_1 is said to *strictly* defeat an argument A_2 if A_1 defeats A_2 and not vice-versa.

Arguments are assigned a dialectical status in terms of three classes: the 'winning' or *justified* arguments, the 'losing' or *overruled* arguments, and the 'ties', i.e., the *defensible* arguments. Accordingly, a proposition is *justified* if there exists a justified argument for it, and it is *defensible* if it is not justified but there exists a defensible argument for it.

Whether an argument is justified can be tested in a so-called argument game between a proponent and an opponent for the argument. Proponent starts with an argument that he

[2] Strictly speaking arguments in this logic are deductions instead of proof trees, but the conversion between these formats is straightforward.

wants to prove justified and then each player must either defeat the other player's previous argument or move a priority argument that stops the previous argument from defeating its target. Moreover, proponent's defeating arguments must be such that they strictly defeat opponent's arguments. A player wins if the other player has run out of moves. The initial argument is *justified* if the proponent has a winning strategy in this game. Non-justified arguments are *overruled* if they are defeated by a justified argument, otherwise they are *defensible*. This argument game is sound and complete with respect to grounded semantics.

In Prakken (2001) this argument game was extended with the possibility of switching dialectical roles, to allow for the modelling of distributions of the burden of proof over the two sides in a dispute. The proof burden at stake here is the 'burden of persuasion', that is, the burden to prove a statement to a specified degree (the standard of proof) on the penalty of losing on the issue (cf. Prakken and Sartor 2007). The new game is between two players, called plaintiff (π) and defendant (δ), who at any time can have either proponent role (P) or opponent role (O), depending on the context. The input of the new logic is not just a set of rules but also an allocation of proof burdens for some literals to both parties. Plaintiff starts each game as proponent but then these roles are reversed each time the player currently having opponent role moves an argument for a conclusion for which the burden of proof is allocated to him: the player then becomes the proponent with regard to that conclusion and thus he has to strictly defeat the other player's arguments.

3.2 The communication language

The communication language of the dialogue system, summarised in Table 1[3], is a set of speech acts ordered by a binary reply relation, where each reply is either an attack on or surrender to its target. A dialogue is a sequence of moves, where a dialogue move is a speech act moved by one of the participants, indicating to which preceding move in the dialogue it replies. Each speech act has a locution part and a content part; the former indicates the type of speech act while the latter, if not empty, is either a statement from the topic language or an argument from its logic. The language allows the participants to claim, dispute, concede and retract propositions, to move arguments in support of propositions (whether claimed or moved as a premise of another argument), to attack arguments with counterarguments and to move priority arguments. Furthermore, a party can try to put the burden of proof onto another party by replying to a disputing of φ (i.e., to a *why* φ move) with disputing the opposite of φ (i.e., with a *why* $-\varphi$ move). The language also contains three speech acts to be only used by the adjudicator, namely, for terminating a dialogue, for ruling a move legal-procedurally illegal and for determining the burden of proof concerning statements disputed by the adversaries. Note that when the adjudicator rules a move procedurally illegal, this does not mean that the move violates the rules of our formal dialogue game but that it violates the rules of the applicable legal procedure (in our case study Dutch civil procedure). Finally, a turn is a maximal sequence of dialogue moves moved by the same participant; each turn is ended by moving the *pass* speech act.

[3] In this table he complement of a formula φ, denoted by $-\varphi$, is $\neg\varphi$ if φ does not start with a negation and φ' if $\varphi = \neg\varphi'$.

Table 1 A communication language for adjudication dialogues

Acts	Attacks	Surrenders
claim φ	*why* φ *illegal m*	*concede* φ
why φ	*argue A* $(conc(A) = \varphi)$ *why* $-\varphi$ *burden*$(-\varphi, a)$ *illegal m*	*retract* φ
argue A	*why* φ $(\varphi \in prem(A))$, *argue B* *illegal m*	*concede* φ $(\varphi \in prem(A)$ or $\varphi = conc(A))$
concede φ	*illegal m*	
retract φ	*illegal m*	
illegal m		
burden(φ, p)		
pass		
terminate		

3.3 The protocol

The protocol divides each dialogue into a *pleadings phase*, in which the parties plead the case and the adjudicator merely regulates the dispute, and a *decision* phase, in which the adjudicator is the only player and has to decide the dispute.

Each dialogue starts with an initial claim or argument by the plaintiff, which initiates the pleadings phase. In this phase each further move must reply to a move of the other party in an earlier turn, where each reply must be licensed by the reply structure of the communication language. In the pleadings phase the adjudicator may only rule a move legal-procedurally illegal, determine the burden of proof concerning statements disputed by the adversaries and terminate the pleadings phase; these moves cannot be made by the adversaries. As for *turntaking*, in the pleadings phase an adversary may in each turn make as many moves as he wants. He may also move alternative replies to the same move, whether in the same turn or later. When an adversary has ended his turn, the turn shifts to the adjudicator. She first decides on the procedural correctness of the moves made in the previous turn, by deciding whether or not to move an *illegal* move. Then she can allocate the burden of proof of propositions that have been disputed with a *why* φ move by replying with a *burden*$(-\varphi, a)$ reply to that move or with a *burden*(φ, a') reply to the target of the disputation (where a and a' are the two adversaries). Finally she decides whether to terminate the pleadings phase. If she does not terminate it, then the turn shifts to the current loser (to be defined below) at the end of the adjudicator's turn.

In the decision phase only the adjudicator can move and until termination she can only move arguments, including counterarguments and priority arguments. She must still respect the reply structure of the communication language but she may reply to her own moves; the latter allows 'internal dialectic', in which the adjudicator considers and rejects possible counterarguments to her arguments.

Finally, in both the pleadings and decision phase *argue* moves must respect the rules of the argument game of the underlying logic. This can be verified in terms of the so-called 'associated argument graph' of a dialogue, to be described below.

3.4 Outcome rules

When the adjudicator terminates the decision phase, the winner is determined by the so-called dialogical status of plaintiff's main claim, as follows. Since each non-initial dialogue move (except a *pass* and *terminate* move) replies to precisely one earlier dialogue move, and since alternative replies to a move are allowed, a dialogue can be viewed as a tree of dialogue moves linked by reply relations of two kinds. This tree structure is exploited by the definition of *dialogical status* of a move. Briefly, a move is *in* if either it has a surrendering reply or else all its attacking replies are *out*. And an attacking move is *out* if it has an attacking reply that is *in*. Note that this makes the attacking leaves of the dialogue tree trivially *in*.

Dialogical status is used for determining both the 'current' and 'final' winner and loser of a dispute (the current winner is the winner at any given nonterminated dialogue stage, while the final winner is the winner at termination of the decision phase). If at a certain intermediate (or final) stage the initial claim is *in*, plaintiff currently (finally) wins, otherwise defendant currently (finally) wins. As noted above, the notion of a current winner can be used to define turntaking. It can also be used to impose a relevance criterion on moves. Briefly, this criterion says that each move must reply to a target such that, if that target were attacked, the mover of the attack would become the new current winner. In effect, this means that in a protocol requiring that moves are relevant the adversaries' turns must consist of zero or more surrenders followed by zero or one attacker, after which the turn shifts. However, in the formalisation below I will not require that each move be relevant, since in legal disputes of this kind the adversaries often exchange lengthy documents with various alternative attacks and defences, so that the turn cannot shift as soon as the dialogical status of the main claim has changed. In terms of Prakken (2005a) the protocol used is that for so-called *liberal dialogues*.

3.5 Effect rules

The most immediate effect of a move is that it is appended to the dialogue so far. Furthermore, *argue* moves have an effect on the so-called 'associated argument graph' of the dialogue, which contains all arguments and counterarguments that were stepwise built during a dialogue and their dialectical relations. This graph can be used to verify whether an *argue* move respects the rule of the argument game of the underlying logic. Moreover, the so-called *defended part* of the argument graph can be obtained by omitting all arguments that have disputed premises for which no further argument was moved. Ideally, the outcome of the dialogue corresponds with its argument graph in that the initial move of a dialogue is *in* just in case the defended part of the argument graph makes an argument for the initial claim justified. In Prakken (2005a) it is proven that this holds on two conditions: that no surrenders are moved (since a player can, for instance, concede or retract a claim even if he logically does not have to) and that the dialogue is 'logically completed', i.e., no new relevant arguments can be moved in the dialogue without stating new premises.

4 Formalisation method

Within the formalisms of Section 3 some modelling choices must be made. Firstly, although a formal logic is assumed, the various arguments and propositions will be semiformally para-

phrased. In particular, the elementary propositions will not be written as formal predicate-logic expressions and rule premises will be left implicit or only named.

An important representation issue is that of unexpressed premises. As explained above, Dutch civil procedure allows the adversaries to leave the applicable law and commonsense knowledge implicit, and requires the judge to complete such incomplete arguments. However, the present combination of dialogue system and logic does not allow for logically incomplete arguments, and therefore this feature of the dispute cannot be modelled. I assume that each argument is complete according to the logic, but in presenting arguments I will leave common-sense and legal classification rules implicit and mention legal rules by their name only, assuming that the logical form of all these rule premises is that of a defeasible rule in the above-sketched logic of Prakken and Sartor (1996).

A related issue here is that of defeasible inference rules. In (Prakken and Sartor; 1996) the only possible inference steps within an argument are standard-logical reasoning as well as defeasible modus ponens applied to rules. However, we will see below that several rule premises are in fact based on general defeasible argument schemes (Walton; 1996), such as temporal persistence and reasoning from witness evidence. Argument schemes are stereotypical forms of reasoning and critical questions are pointers to counterarguments of arguments formed with these schemes. In the logic of Prakken and Sartor (1996) argument schemes must be formalised as defeasible rules and negative answers to critical questions as arguments against the applicability of a rule. In the present case this is only relevant for rule premises based on the witness testimony scheme. I will assume that this scheme has the following semi-formal nature:

Witness W says that φ, therefore (presumably) φ

and has the following critical questions:

1. Was W in the position to know about φ?
2. Is W sincere?
3. Did W's senses function properly when observing φ?
4. Did W's memory function properly when testifying that φ?

Questions 2,3 and 4 are based on David Schum's work on witness reliability (e.g. Schum (1994)) while the positive answer to (1) is regarded by Walton (1996) as a premise of the scheme; I have instead made it into a critical question, since all arguments in this case using witness testimonies leave it implicit so that a positive answer is arguably assumed. In the present logic the scheme translates to a rule

r_w: $\texttt{Witness}(x,\overline{\varphi}) \wedge \texttt{Says}(x,\overline{\varphi}) \Rightarrow \varphi$

Here $\overline{\varphi}$ is a term denoting the literal φ. Furthermore, the second critical question induces the inapplicability rule

q_{w1}: $\neg\, \texttt{Sincere}(x,\overline{\varphi}) \Rightarrow \neg\, \texttt{Appl}(r_w(x,\overline{\varphi}))$

Since the other critical questions play no role in the present case, they will not be formalised.

Another issue is the proper formalisation of priority arguments. As explained above in Section 3.1, in (Prakken and Sartor; 1996) this is modelled directly as arguments about the relative priority of conflicting rules. For example, in the present case plaintiff argues that Section 2014,2 BW prevails over Section 2014,1 BW since the second is an exception to the first. In the present logic this argument can be formalised as explained above. However, others, e.g. Hage (1997) and Kowalski and Toni (1996), have argued that it is better to formalise priority arguments as arguments on the applicability of rules. If this method is applied in the present logic, then rule p_1 in Section 3.1 must be changed to:

p_1': $\texttt{Exception}(r,r') \wedge \texttt{Conflict}(r,r') \wedge \texttt{Appl}(r) \Rightarrow \neg\texttt{Appl}(r')$

Moreover, the predicate `Conflict` must be defined in further rules. My formalisation will not crucially depend on which method is chosen. Although it will contain a direct priority argument, the formalisation can easily be adapted to the other method.

The next issue is that of accrual of arguments, or whether a logic should formalise the principle that having more arguments for the same conclusion improves one's position. In (Prakken; 2005b) I proposed a method for extending argument-based logics with this principle but a discussion of this method is beyond the scope of this paper. (Note that the 'reason-based logic' of Hage (1997) already has an accrual mechanism.)

As for the dialogue structure, the formalisation will not reflect the actual order in which the dispute evolved; rather it will reflect the structural-dialogical relations between the various procedural acts. (In fact, in one case a reply to a certain statement was made before the statement itself! Such moves are possible since the parties already discussed the case with each other before it was brought to court, so they more or less know each other's positions.) The reasons for this choice will be explained in more detail in Section 6.

5 The Representation

In this section the case is formalised based on the case files as published in Leclerq (1990), in particular the adversaries' Statement of Claim, Defence, Reply and Rejoinder and their conclusions after the witness interrogations, and the court's final verdict. For simplicity the appeal phase concerning the intermediate allocation of the burden of proof will be ignored, assuming that the decision after appeal was the initial one. In agreement with Prakken (2008) the formalisation is divided into a pleadings and a decision phase. The pleadings phase is further divided into the part before the witness testimonies, in which the legal issues were discussed (Claim, Defence, Reply, Rejoinder and intermediate verdict) and subsequent phase, in which it was discussed whether the evidence supports the legal claims.

In the model of Prakken (2008) each turn must end with a *pass* move. Below I will leave these moves implicit. Also, since procedural legality of moves was not at issue, I will below not say anything on this. Note that all moves are implicitly ruled legal by the judge.

The moves are specified as follows: first the move is given preceded by its name, then the target move to which it replies in the dialogue and the move's effect on the dialogical status of its target and the initial move. Figures 1, 2 and 3 below visualise the dialogical structure of the dispute. Visualisations of the arguments and their relations are available online at `http://people.cs.uu.nl/henry/tent07.html`. Several aspects of the reconstruction will be omitted for reasons of space; the full reconstruction is available as (Prakken; 2007).

5.1 Discussing the legal issues in the pleadings phase

At the start of the dispute, plaintiff is proponent and defendant is opponent in the underlying argument game. This means that plaintiff's counterarguments must strictly defeat their target, while defendant's arguments only need to defeat their target.

π_1: *argue* A_1 (1) I owned the tent at t_1, *so* (2) I own the tent now at t_3. Furthermore, (3) defendant holds the tent, (4) I involuntarily lost possession of the tent at t_1, *so* by Section 2014,2 BW (5) defendant must return the tent to me.
Plaintiff starts the dispute with an argument for his main claim. The implicit commonsense

rule that is used to infer (2) is in fact the argument scheme of temporal persistence.

δ_2: *concede* (3) I hold the tent. [Target: π_1; defendant moves a surrender, so π_1 stays in.]

δ_3: *why* (1) plaintiff was owner at t_1? [Target: π_1; move π_1 is made out.]

δ_4: *why* (4) did you involuntarily lose possession of the tent at t_1? [Target: π_1, which stays out.]
δ_3 and δ_4 are expressed in the defence as "defendant denies that plaintiff involuntarily lost possession of the tent while being the owner". Arguably, a denial is stronger than just a disputation, implying a claim to the contrary statement.

δ_5: *argue* A_2: (6) I bought the tent at t_2 from V at a price of fl. 850, (7) V delivered the tent to me at t_2. Furthermore, (8) my wife did domestic work for van der Velde valued fl. 850, *so* (9) I paid the sales price; *so* I obtained the tent in possession in good faith at t_2, *so* by 2014, 1 BW (10) I became owner of the tent at t_2, *so* (11) I now own the tent at t_3. Furthermore, (12) plaintiff has no other right to the tent, *so* (13) I do not have to return the tent. [Target: π_1, which stays out.]
Defendant's first counterargument is that by buying and obtaining the tent from van der Velde, he obtained the tent in possession in good faith and so became owner of the tent.

π_6: *why* was I not owner at t_1? [Target: δ_3, which is made out. But since defendant launched two further attacks on π_1, that move stays out.]
Plaintiff tries to shift the burden of proof onto defendant. This move can be traced back to a general statement of plaintiff in his Reply (paragraph 5) that he is of the opinion that he has no burden of proof for his claims. In the protocol of Prakken (2008) move π_6 is required to allow the judge to express an explicit burden allocation on the issue of whether (1) holds.

π_7: *why* did I not involuntarily lose possession of the tent at t_1? [Target: δ_4, made out.]
This move is also based on plaintiff's general statement in paragraph 5 of his reply.

ι_8: *burden*$(1, \pi)$ [Target: π_6, which is made out, which makes δ_3 in again.]
The judge assigns to plaintiff the burden of proving his ownership of the tent at t_1, applying the general rule that a party who makes a legal claim has to prove the 'legal-operative' facts for that claim.

ι_9: *burden*$(4, \pi)$ [Target: π_7]
On the same grounds the judge assigns to plaintiff the burden of proving that he involuntarily lost possession of the tent at t_1.

π_{10}: *argue* A_3 (14) My son occupied the tent at t_1, (15) I and my family held the tent in normal use from obtaining the tent to t_1, *so*, (16) I held the tent at t_1. *So*, by the presumption of 590 BW, (17) I had possession of the tent at t_1, *so*, by the presumption of 589 BW, (18) I had possession in good faith of the tent at t_1, *so*, by the presumption of 2014,1 BW, (1) I owned the tent at t_1. [Target: δ_3, which is is made out. However, to make π_1 in two further attacks are needed.]
Plaintiff argues for his ownership at t_1 with the cascade of three legal presumptions.

π_{11}: *argue* A_4: (19) 2014,2 BW is an exception to 2014,1 BW, *so*, by *Lex Specialis*, (20)

2014,2 BW prevails over 2014,1 BW. [Target: δ_5, which is made out.]
Plaintiff argues that, since defendant's counterargument A_2 is based on a general rule while plaintiff's argument A_1 is based on on an exception, his argument prevails. This argument is implicit in Plaintiff's remarks in his Reply (paragraph 2) that he wants to "leave open" whether he agrees that defendant bought the tent, since that is irrelevant, since he has become the owner by 2014, 2 BW.

π_{12}: *argue* A_5: (14) My son occupied the tent at t_1, (15) I and my family held the tent in normal use from obtaining the tent to t_1, (21) violent events at t_1, *so*, (4) I involuntarily lost possession of the tent at t_1. [Target: δ_4, which is also made out so now π_1 becomes in.]
Plaintiff says that he involuntarily lost possession of the tent by the violent events.

δ_{13}: *concede* (14) Plaintiff's son occupied the tent at t_1. [Target: π_{12}, which stays in.]
Defendant concedes that plaintiff's son occupied the tent at the time of the violent events. Whether defendant has actually conceded this claim is a matter of interpretation. I have based my interpretation on his statement in the Rejoinder that "I have heard people saying that plaintiff had obtained the tent on loan from van der Velde . . . ".

δ_{14}: *concede* (14) Plaintiff's son occupied the tent at t_1. [Target: π_{10}, which stays in.]
Defendant repeats his concession in reply to π_{10}, since that move used the same premise in a different argument. In reality defendant did not repeat this move: the repetition is required by the formal framework, which does not allow 'global' concessions or disputations of propositions but requires them to be targeted at specific usages of the propositions.

δ_{15}: *why* (21) Violent events at t_1 [Target: π_{12}, made out which makes δ_4 in and so π_1 out.]
That defendant disputes that the violent events occurred is my interpretation of the fact that defendant in his Rejoinder says "I deny the rest of what plaintiff has said in his *Reply* because of lack of knowledge.".

δ_{16}: *argue* A_6: (22) Nieborg obtained the tent on loan from V., *so*, (23) Nieborg started holding the tent for someone else, so (24), the assumption of 590 BW to the contrary is false. [Target: π_{10}, which is also made out.]
Nieborg argues that the exception to the presumption of 590 BW applies.

δ_{17}: *argue* A_7: (25) t_1 is in the past, (26) 2014, 1 BW does not apply to past events, *so* (27) 2014,1 BW is not applicable. [Target: π_{10}, which stays out.]
Defendant argues against plaintiff's retrospective use of 2014, 1 BW. In the case files defendant actually expressed this argument as: "An appeal to 2014, 2 BW can only be made by the owner, not by the holder. Therefore, plaintiff has to prove his ownership.". This is quite elliptic; for a further discussion see Prakken (2007).

π_{18}: *argue* A_8: (28) premises, *so* (29) 2014, 1 BW also applies to past events. [Target: δ_{17}, which is is made out.]
Plaintiff rebuts defendant's interpretation argument. The premises are not made explicit since this debate was in fact conducted in the intermediate appeal stage on the judge's initial allocations of the burden of proof, which implicitly accepted defendant's argument A_7. The High Court overturned this decision and accepted Plaintiff's argument.

π_{19}: *why* did the violent events not occur at t_1? [Target: δ_{15}, which is made out so π_{10} becomes in. But since π_{10} is still out, π_1 stays out.]
This and the next move are also based on plaintiff's general statement in paragraph 5 of his reply.

π_{20}: *why* (22) did I obtain the tent on loan from V.? [Target: δ_{16}, which is made out which makes π_{10} and so π_1 in.]

ι_{21}: *burden*$(21,\pi)$ [Target: π_{19}, which is made out so δ_{15} is made in and π_{12} out, which makes δ_4 in and and π_1 out.]
The judge assigns the burden of proving (21) to plaintiff.

δ_{22}: *why* did you not obtain the tent on loan from V.? [Target: π_{20}), which is made out so π_{10} also becomes out.]

ι_{23}: *burden*$(22,\delta)$ [Target: δ_{22}, which is made out which makes π_{10} in and δ_3 out. However, π_1 stays out since its other attacker δ_4 is still in.]
The judge allocates the burden of proving the exception (22) to defendant. The last move has has induced a switch of the dialectical roles in the underlying logical argument game (see Prakken (2001): defendant has become proponent and plaintiff has become opponent with respect to A_6. This means that, as far as the argument game about A_6 is concerned, defendant's counterarguments have to strictly defeat their target, while plaintiff's arguments may weakly defeat their target. In more legal terms: the judge must become convinced that plaintiff obtained the tent on loan from van der Velde; it is not enough for defendant if the judge is not convinced that plaintiff did not obtain the tent on loan. On the other hand, with respect to the issue of the violent events, plaintiff is the proponent while defendant is the opponent.

The discussion in the claim phase on the legal issues has now ended. Figure 1 displays the reply structure of the dialogue so far and the dialogical status of all its moves. (In this figure grey coloured moves are in while white-coloured moves are out. The moves π_{24} and δ_{26} from the decision phase have been added to show how the dialogue will continue in that phase.) If we apply the logic of Prakken and Sartor (1996) to the set of all arguments constructed so far (in terms of Prakken (2005a, 2008) the 'associated argument graph' of the dialogue) then plaintiff's main argument, consisting of $A_1+A_3+A_5$, is overruled, since it is undercut by a non-attacked argument, viz. A_6. The 'defended part' of the argument graph is obtained by deleting all arguments with disputed premises; it consists of only A_2, A_4, A_7 and A_8, since $A_1+A_3+A_5$ has a disputed premise (21) while A_6 has a disputed premise (22). The defended part does not contain an argument for plaintiff's main argument, which agrees with the dialogical status of π_1 at this stage, which is out.

Note that π_1 is out since δ_4 is in. In the following phase, in which evidence is provided for the claims to be proven, plaintiff will try to make it in by providing an evidential argument for (21) that he lost the tent by the violent events. If this succeeds and defendant does nothing, then δ_{15} is made out so that π_{12} becomes in, which makes δ_4 out, which makes π_1 in. Defendant's strategy, on the other hand, is to make his other attack on π_1, which is δ_3, in, by providing an evidential argument for (22) that Nieborg obtained the tent on loan which, if successful, makes δ_{16} in, which makes π_{10} out, which makes δ_3 in and so π_1 out.

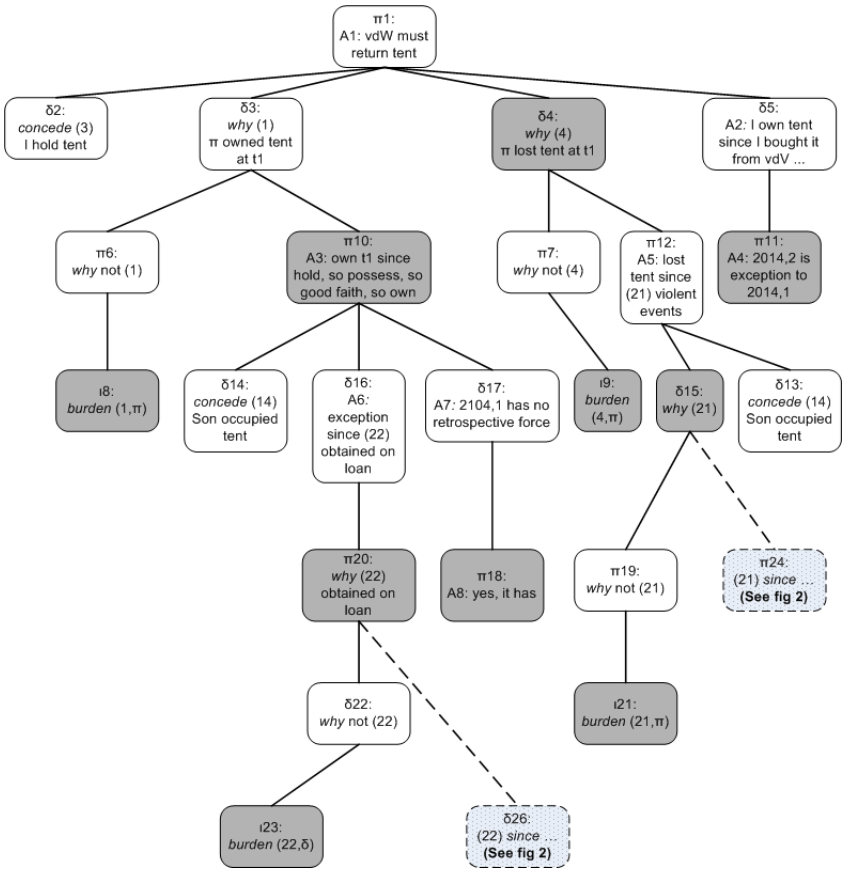

Fig. 1 Dialogue after pleadings phase (1): legal issues

5.2 Discussing the evidence in the pleadings phase

After the judge's intermediate verdict on the burden of proof, the adversaries provided their evidence by interrogating their witnesses under supervision of the judge. The witness testimonies were recorded as if they were monologues of the witnesses. Following the witness examinations, the adversaries exchanged two more documents, in which they argued that each had himself fulfilled their proof burden while the other party had not. The case was then concluded with the court's final verdict. Dutch Civil procedure leaves the judge free to assess the evidentiary relevance and force of the witness testimonies (with a few exceptions that did not arise in this case).

In this concluding phase the nature of the discussion changes. No legal claims are made any more, and the discussed facts are not 'legal operative' facts, i.e., facts such that, if proven, immediately warrant a legal conclusion (such as 'van der Velde sold the tent to Nieborg' or 'The work done by Mr. and Mrs. Nieborg for van der Velde was payment for the tent'). Instead they are 'evidentiary' facts, which are meant to prove the legal operative facts earlier claimed by the parties. The only issue in this phase is whether the evidence supports the claims of the adversaries for which they have the burden of proof. In consequence, no

claims, concessions or challenges are made any more and the discussion largely proceeds by exchanging arguments, counterarguments and priority arguments. Ideally, the premises of the adversaries' arguments in this phase should all be evidential. However, we will see that this was not always the case.

In his decision, the judge is not required to respond to the evidential arguments of the adversaries. In the present case, the judge simply puts his argument in place of that of the winner (defendant), and responds to some of plaintiff's counterarguments against defendant's argument that also attack the judge's arguments, but he ignores other counterarguments.

An important modelling decision has to be made concerning accrual of arguments. In all arguments below the various appeals to witness testimonies for the same conclusion arguably are not simply conjoined but are accrued. In other words, each individual testimony is regarded as a reason for the conclusion drawn from it, so each testimony gives rise to a separate argument based on the witness testimony scheme. These arguments, which all have the same conclusion, are then accrued into a new argument for the same conclusion, reflecting that by default it is better to have more arguments for the same conclusion. Accruals are assumed to be modelled as in Prakken (2005b). In the arguments below I will leave the accrual step implicit for the sake of brevity.

As for plaintiff's attempt to fulfill his burden of proof, it was never controversial that he had violently lost possession of the tent, and he easily proved this with three witness statements. This is $\pi_{\mathbf{24}}$ in Figure 2, which makes δ_{15} and thus π_{12} and π_1 in. Defendant then concedes plaintiff's claim with $\delta_{\mathbf{25}}$, backtracking to his earlier disputation δ_{15}. This does not change any dialogical status.

Next we must consider defendant's argument in fulfillment of his burden to prove that plaintiff obtained the tent on loan. According to the applicable law the three 'legal-operative' facts that must be established to prove this claim are that the tent was (33) given in use which was (34) free and (35) temporary. In his main argument, defendant's solicitor does not clearly distinguish these three grounds, and she neither ties her argument to specific quotes from the testimony records. Therefore, my formalisation of her argument is to a large extent a reconstruction of the actual argument. Here is a paraphrase of the argument:

$\delta_{\mathbf{26}}$: *argue* A_{10}: The tent was (33) given in use as proven by van der Velde's testimony, who says so (V1,V2), and by Gjaltema (G1) and van der Sluis's (S1,S3) testimonies, who both reported that Nieborg had told them so. The use was (34) free as proven by the following testimonies: van der Velde (V2) says so; furthermore, van der Velde (V3) says that Nieborg had expressed his gratitude towards him; both Gjaltema (G1) and van der Sluis (S1,S2) declare that Nieborg had expressed to them the same gratitude towards van der Velde; van der Sluis added to this that Nieborg had said to him that this made it possible for him and his wife to go on holiday since they had no money to go on holiday. The use was (35) temporary as proven by the following testimonies: van der Velde (V1,V2) says so; van der Sluis (S3) states that Nieborg had told him that the reason why van der Velde had given him the tent in use was that that summer van der Velde did not have time himself to use it. *So*, (22) Nieborg obtained the tent on loan from van der Velde. [Target: π_{20}, which is made out which makes δ_{16} in so π_{10} out so δ_3 in so π_1 out.]

All premises of this argument can be backed by citations from the witness testimony records (indicated by the Vs,Gs and Ss), so this is a genuine evidentiary argument. Note also that the argument combines applications of the argument scheme from witness testimony with applications of implicit legal classification rules and an implicit statutory rule.

I now turn to plaintiff's attack on defendant's proof of the loan. Plaintiff first argues that the work Mr. and Mrs. Nieborg had done for van der Velde was payment of the sales price; this attacks the subargument of A_8 that the tent was given in use for free. Plaintiff's second line of attack is to cast doubt on the sincerity of the three defence witnesses. I have reconstructed this as an undercutter of all arguments that make use of their statements.

π_{27}: *argue* A_{11}: (36) as an expression of gratitude the work of Mr. and Mrs. Nieborg is excessive, (37) van der Velde accepted the same kind of work as payment by van der Weg just a few months later, (38) even van der Velde in his testimony (V4) admits that the work is related to the giving of the tent, *so*, (39) the work of Mr. and Mrs. Nieborg was payment for the tent, *so*, (40) the tent was not given in use for free. [Target: δ_{26}), which is made out so (recursively) π_1 is in again.]

π_{28}: *argue* A_{12}: (41) this is a ticket for a Rheinfahrt of Mr. and Mrs. Nieborg in 1974, *so*, (42) Mr. and Mrs. Nieborg have been on holiday in 1974; (43) Mr. and Mrs. Nieborg have been on holiday on several other occasions, *so*, (44) Mr. and Mrs. Nieborg have been on holiday on several occasions; (V3) van der Velde testified that Nieborg had told him he and his wife could not go on holidays, *so*, (45) van der Velde has testified something that was not true; furthermore, (46) van der Velde has an interest in a win of van der Weg in this case, (47) the law declares witnesses with lesser interests than van der Velde as unfit for being a witness, *so* (by 45,46,47), (48) van der Velde is not sincere. [Target: δ_{26}, which stays out so π_1 stays in.]

π_{29}: *argue* A_{13}: (essentially repeating A_{12} for witnesses Gjaltema and van der Sluis). [Target: δ_{26}, which stays out so π_1 stays in.]

To comment on plaintiff's attacks on the witnesses' sincerity, his attempt to show that the witnesses lied in their testimonies seems clearly inconclusive, since the witnesses did not testify that Nieborg had never been on holiday, but only that Nieborg had told them so; this leaves open the possibility that Nieborg had not told them the truth. However, the judge made no use of this argument. Note also that, while premise (42) is backed by a copy of the ticket, premise (43) is not backed by any evidence.

Besides these two main lines of attack, plaintiff also made two minor comments in reply to defendant's main argument. The first is that witness Gjaltema explicitly testified that he did not know (when helping Nieborg to build the tent) whether Nieborg had obtained it on loan. I have reconstructed this as a separate undercutter of any use of Gjaltema's testimony, arguing that this witness was not in the position to know about what he testified. This may seem too strong, but in the present, logical setting this seems the only way not to ignore this attack. Note that Gjaltema's comment cannot be regarded as evidence against his sincerity. The second comment is that the true reason for van der Velde's anger when Nieborg told him he had paid enough for the tent was that van der Velde was dissatisfied with the quality of Nieborg's painting work. Note that this claim is not backed by evidence. I have reconstructed these attacks as an undercutter of defendant's use of premise V7 in A_{10} on the grounds that the witness used in this argument is not sincere (strictly speaking this accrues with the other arguments against van der Velde's sincerity but in the case documents these arguments are made in quite different places).

π_{30}: *argue* A_{14}: (54) Gjaltema testifies that that he did not know (when helping Nieborg to build the tent) whether Nieborg had obtained it on loan, *so*, (55) Gjaltema was not in the

position to know about (33). [Target: δ_{26}, which stays out so π_1 stays in]
In fact, the conclusion was not explicitly stated as such but in combination with A_{13} as "the reliability of the statements of Gjaltema and van der Sluis is therefore doubtful" I have chosen to separate the two arguments since (49-51) and (54) pertain to different critical questions of the witness testimony scheme.

π_{31}: *argue* A_{15}: (V7) Van der Velde says that he had become very angry when Nieborg had told him that he and is wife had now done enough work to pay for the tent, since van der Velde had never meant to sell the tent; (56) the true reason for van der Velde's anger was his dissatisfaction with Nieborg's work, *so*, (57) van der Velde is not sincere. [Target: δ_{26}, which stays out so π_1 stays in.]

The defence anticipated plaintiff's argument that the work of Mr. and Mrs. Nieborg was payment, and provided the following counterargument.

δ_{32}: *argue* A_{16}: the work of Mr. and Mrs. Nieborg was no payment since it was done out of gratitude, as proven by the following witness testimonies: van der Velde's testimony, who says (V3) that Nieborg expressed his gratitude, and (V4) that he offered to do the work after accepting the tent, and (V5) that he would also have offered the tent without Nieborg's counterservice, and (V7) by his anger after Nieborg had told him they had done enough to pay the tent; by Gjaltema (G1) and van der Sluis (S1,S2), who both declare that Nieborg had expressed to them his gratitude towards van der Velde. [Target: π_{27}, which is made out. However, since δ_{26} has four other attackers that are in, it stays out so π_1 stays in.]

This completes the reconstruction of the adversaries' arguments.

5.3 The decision phase

It is left to reconstruct the judge's decision. According to Prakken (2008) we now enter the decision phase, in which only the judge moves and in which he only moves arguments, replying to any move he wants. The judge starts by repeating plaintiff's argument A_9 in fulfillment of his burden to prove the violent events (22) and defendant's concession of this claim and then concludes from this that Nieborg has fulfilled his burden of proof. This can be regarded as a metalevel observation on the dialogical status of the relevant moves, so it will not be formally represented as an *argue* move. The judge's decision concerning van der Weg's burden is worth being cited in detail. After paraphrasing some of the witness testimonies, the decision continues as follows (translated by me).

> On the basis of the three witness testimonies of van der Velde, Gjaltema and van der Sluis, when considered jointly and in their mutual relations, the court regards as proven that Nieborg had at 5 July 1974 obtained the tent on loan. Although the witnesses do not use the term 'bruikleen' (the technical Dutch term for the loan of the tent, HP), this was not to be expected from legal laymen like a pub owner (van der Velde), a cattle trader (Gjaltema) and a plasterer (van der Sluis). The court regards as decisive that the witnesses speak of "to make use of" (van der Velde), "use" (Gjaltema) and "to give in use" (van der Sluis).
> That the use of the tent was temporary is proven by the testimony of van der Velde, when related to the use he speaks of "for some time", and the testimony of van der Sluis, who mentions the period "the summer of 1974".

> That the use was free is proven by the testimony of van der Velde, who in this context explicitly uses the word "free", combined with the gratitude shown by Nieborg as mentioned by all three witnesses and his remark to the witnesses Gjaltema and van der Sluis that receiving the tent made it possible for him and his wife to go on holiday that year.
> This all holds notwithstanding the fact that witness van der Velde has a considerable interest in the rejection of plaintiff's claim; witnesses more often have an interest in the outcome of a case. It should be noted that the law does not declare van der Velde inadmissible as a witness and in addition that his testimony is supported by those of witnesses Gjaltema and van der Sluis and, finally, that Nieborg has abstained from calling counterwitnesses.

In reconstructing this, the first modelling decision is whether the phrase "when considered jointly and in their mutual relations" means that the judge has conjoined or accrued the various witness testimonies. I have (implicitly) chosen the accrual interpretation since it allows for a more natural representation of the judge's treatment of the arguments against van der Velde's sincerity (see Prakken (2005b) for a detailed explanation of this claim). However, this choice is debatable.

First the judge puts his main argument in place of defendant's main argument A_{10}.

$\iota_{\mathbf{33}}$: *argue* A_{17}: (essentially repeating A_{10}). [Target: π_{20}. This move has the same effect as δ_{26}: it makes π_{20} out, which makes δ_{16} in so π_{10} out so δ_3 in so π_1 out.]

Note that plaintiff's *argue* attacks on defendant's main argument A_{10} also attack the judge's main argument, so in the reconstruction they must be repeated as such (but now moved by the judge). These are moves $\iota_{\mathbf{34}} - \iota_{\mathbf{38}}$ in Figure 2. The first of these attacks makes ι_{33} out so makes π_1 in again, and the remaining attacks do not change this.

Finally, we must reconstruct the judge's rejection of plaintiff's counterarguments. In fact, the judge responds to only some of these , viz. the attack on van der Velde's sincerity and the attack based on Gjaltema's ignorance. As for van der Velde, the judge first says that his interest in a win by defendant is not a reason for his insincerity (thus undercutting part of plaintiff's argument A_{12}). Then the judge gives some reasons for van der Velde's sincerity.

$\iota_{\mathbf{39}}$: *argue* A_{18}: (58) witnesses more often have an interest in the outcome of a case, and (59) the law does not declare van der Velde inadmissible as a witness *so*, (60) A_{12} is inconclusive. [Target: ι_{35}, which is made out. But ι_{33} has four remaining attackers that are in.]

$\iota_{\mathbf{40}}$: *argue* A_{19}: (61) van der Velde's statements are supported by Gjaltema and van der Sluis, (62) Nieborg has abstained from calling counterwitnesses, *so*, (63) van der Velde is sincere. (And $r_{63} \succ r_{57}$) [Target: ι_{35}. It was already out so nothing changes.]

(r_n denotes the rule with as consequent the statement numbered n). The priority statement at the end of this argument says that the judge's commonsense rule for why van der Velde is sincere has priority over plaintiff's conflicting commonsense rule. According to Prakken and Sartor (1996) this is needed to make A_{19} strictly defeat A_{12}. It is arguably implicit in the judge's decision to use van der Velde's testimony. Note that here it is defendant's argument that must strictly defeat plaintiff's counterargument: this is because the judge's burden allocation in ι_{23} has switched the dialectical roles of proponent and opponent with respect to the issue of whether Nieborg obtained the tent on loan.

In fact, argument A_{19} must be repeated in attack of A_{15} as moved in ι_{38}, since that argument also concludes that van der Velde is not sincere. This is move ι_{41} in Figure 2, which makes ι_{38} out. However, ι_{33} has three remaining attackers that are in, namely, ι_{34} (that the use was not free since Nieborg and his wife had paid for it), ι_{36} (that Gjaltema and van der Sluis are insincere) and ι_{37} (that Gjaltema was not in the position to know about (33)). Note that the judge does not explicitly respond to any of these arguments. From a legal point of view this is understandable, since Dutch civil procedure does not require the judge to explicitly respond to the adversaries' evidential arguments. However, it might be argued that this omission is a rational flaw in her decision, which raises the issue to which degree legal procedures should incorporate standards of rationality.

Argument A_{11} in ι_{34} rebuts and is rebutted by the subargument for (34) of A_{17} as moved in ι_{33}. So according to the underlying logic ι_{34} can be attacked by a priority argument to the effect that A_{11} does not defeat the subargument of A_{17} for (34). Arguably, such a priority argument can be regarded as implicit in the judge's use of A_{17}'s subargument for (34). Accordingly, it has an uninteresting unconditional rule premise.

ι_{42}: *argue* A_{20}: $\Rightarrow r_{34} \succ r_{40}$, *so* $r_{34} \succ r_{40}$ [Target: ι_{34}, which is made out. But ι_{33} has two remaining attackers that are in.]

The two remaining arguments are not rebuttals but undercutters of A_{17}. Of course, we could say that the judge's use of all three witness testimonies contains an implicit rejection of these undercutters. These rejections would have to be formalised as rebuttals: the rejection of A_{13} should have a conclusion 'Gjaltema and van der Sluis are sincere' and the rejection of A_{14} should have the conclusion 'Gjaltema was in the position to know about (33)'. Moreover, these rebuttals should be combined with priority arguments to the effect that the rejections strictly defeat their target (as in A_{20} moved in ι_{42}). However, I have chosen not to interpret the judge's decision in this way, since he explicitly addresses the attacks on van der Velde's sincerity and, moreover, he argues for van der Velde's sincerity by saying that his testimony is supported by those of Gjaltema and van der Sluis. For this reason their suitability as witnesses is an essential ingredient of the cases (the more so since throughout the case dossier the plaintiff implicitly suggests that the three witnesses had conspired). Here the judge's reasoning seems clearly flawed or at least incomplete.

Finally, we must model the judge's remark concerning the fact that the witnesses do not use the legal term "bruikleen". Since defendant never explicitly said this, this is in fact, an example of 'internal dialectics' (the system of Prakken (2008) allows the judge to attack his own arguments in the decision phase). One way to model this is as follows. First the judge formulates a rebuttal of his argument A_{17} in ι_{33} and then he undercuts it.

ι_{43}: *argue* A_{21}: (64) witness van der Velde does not speak of "bruikleen", (65) witness Gjaltema does not speak of "bruikleen", (66) witness van der Sluis does not speak of "bruikleen"; *so*, (67) the tent was not given in use. [Target: ι_{33}. It was already out so nothing changes.]

ι_{44}: *argue* A_{22}: (68) van der Velde is a pub owner, (69) Gjaltema is a cattle trader, (70) van der Sluis is a plasterer, *So* (71) the witnesses are legal laymen, *so*, (72) A_{18} is inconclusive. [Target: ι_{42}, which is made out. But ι_{33} still has its two remaining attackers that are in.) The conclusion of this argument is shorthand for the conclusion that the commonsense rule used in A_{18} (which is left implicit in that argument), is not applicable to this case.

ι_{45}: *terminate*

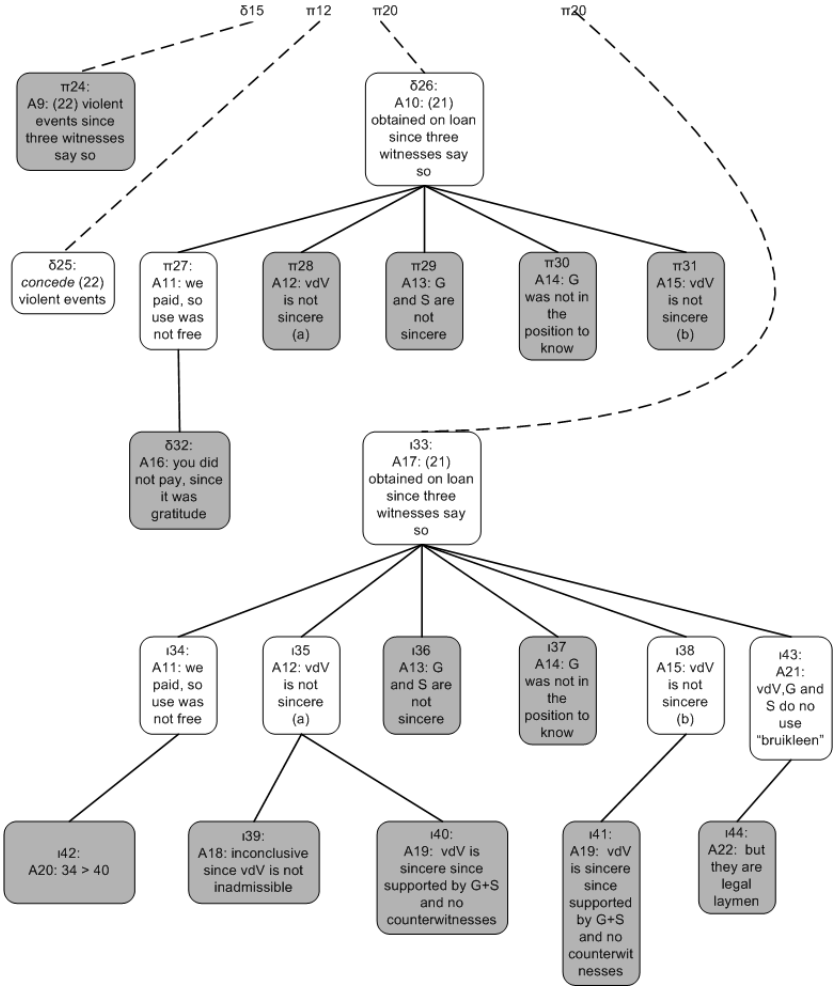

Fig. 2 Dialogue after decision phase (evidential issues)

Figure 2 displays the reply structure of the 'evidential' part of the dialogue, while Figure 3 shows the resulting changes in dialogical status of the 'legal' part of the dialogue. Plaintiff's initial claim π_1 is now in while yet in the actual case the judge has found for defendant. The reason for this discrepancy is, as explained above, that the judge has ignored attacks on two witness statements that he uses in his main argument.

6 Discussion

The main conclusions to be drawn from our reconstruction are as follows. As for the underlying logic, all types of arguments could be formalised in an arguably natural way. The logic of Prakken and Sartor (1996) turned out to be suitable for modelling arguments using

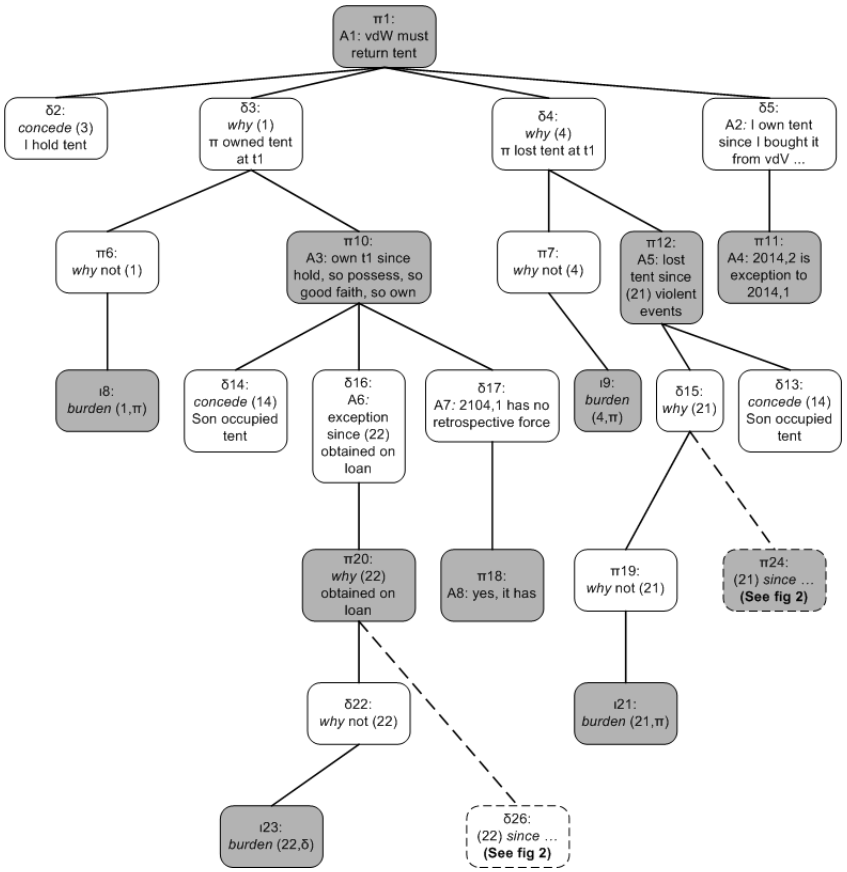

Fig. 3 Dialogue after decision phase (legal issues)

defeasible rules (whether legal or commonsense), and arguments about rule priority and applicability of rules (e.g. argument A_4 in move π_{11}). The adaptation of this logic in Prakken (2001) sufficed to model a switch in dialectical roles induced by the judge's allocation of the burden of proof (move t_{23}). The techniques of Prakken (2005b) could be used to model the accrual of arguments in the evidentiary phase (although, as said above, this requires an adaptation of the logic of Prakken and Sartor (1996)). Finally, the use of presumptions could be naturally modelled as reasoning with conditional defeasible rules in the way advocated by Prakken and Sartor (2006) (argument A_3 in move π_{10}). On the other hand, the case arguably contains one type of argument that could not be directly modelled in these logics, namely, A_{15}, which arguably is an abductive argument offering an alternative explanation for van der Velde's anger referred to in A_{10}. However, this issue did not play a role in the judge's decision. Finally, as already said in the introduction, the case does not contain sophisticated case-based reasoning or theory-formation arguments. (By contrast, Sombekke et al. (2007), who analysed a labour law dispute on compensation for work-related injuries, found many references to precedents in arguments on the classification of factual patterns of behaviour under evaluative legal concepts such as 'recklessness'.)

As for whether the dialogue system of Prakken (2008) is suitable for modelling the dispute, a distinction must be made between the *protocol* and the *reply structure* of the communication language. The protocol rules of the formal model turned out not to correspond to what Dutch civil procedure says on the allowed procedural moves. In particular, the Dutch procedure states only few conditions on the argumentative and dialogical structure of the documents, and it defines turn taking and termination without looking at the dialogical status of a dispute. Therefore, the formalism can better be seen as regulating a *rational reconstruction* of the case by an outside observer. In fact, such a rational reconstruction can also be made by a judge who accepts the formal system as a rationality standard for her decision. She can use it when she must decide the case after pleadings have ended. In the decision phase the judge ideally reconstructs the dispute of the pleadings phase into a dialectical structure from which she can determine the decision. She will identify the argumentative speech acts made by the parties in the pleadings phase, determine whether they were allowed according to Dutch civil procedure, and reconstruct how they logically and dialogically relate to each other. The judge will ideally also complete the adversaries' arguments with the applicable law, and then express her decision by adding her own arguments, counterarguments and priority arguments.

It turned out that for a 'post-hoc' application of the formal system, the protocol was less important than the reply structure on the communication language and the notion of dialogical status, which turned out to be largely adequate. As for the locutions expressed in the case files, it was by and large possible to model them in terms of the formal communication language, with the possible exception that in a few cases the adversaries spoke of "denying" a statement, which arguably is a claim of the negation of the statement. The formal dialogue system does not allow for such counterclaims if they are not combined with an argument, and therefore I have in such cases formalised the denials as just a *why* move (e.g. δ_4).

As for the structure of the dialogue, the formal reconstruction has resulted in a dialogue tree that on the whole adequately reflects the attacking and surrendering relations between the locutions expressed in the case file. Moreover, the dialogue tree has induced an associated argument graph which gives a largely adequate representation of the constructed arguments and their dialectical relations. However, in two respects the dialogue tree does not fully faithfully model the dialogue.

Firstly, what did not quite fit the formalism was the fact that the judge in his final decision simply replaced defendant's main argument by his own deciding argument. In fact, Dutch civil procedure allows the judge to disregard to a large extent the adversaries' arguments and to concentrate on their legal claims and their evidence provided in support of their claims: it is the judge's task to provide the legal and factual arguments leading from the evidence to the legal claims. In the present case the judge, after finding for defendant, responded to some but not all of plaintiff's counterarguments to defendant's main argument. Therefore, the dialogical status of the main claim in the end was *in*, which does not correspond with the fact that defendant won the dispute. This arguably illustrates a benefit of using a formal model of dialogue for reconstructing a dispute: it can reveal that the judge's decision is sometimes rationally incomplete. More generally this raises the issue to which extent legal procedures should incorporate standards of rationality.

Secondly, the requirement of the formal system that each attacking or surrendering move replies to a unique earlier move in some cases requires that the formalisation repeats moves where in the actual dialogue they were stated only once. This holds, for instance, for concessions or disputations of statements that occur in more than one argument (see δ_{13} and δ_{14}) and for counterarguments that attack premises or conclusions that occur in more than one argument (as in $\iota_{34} - \iota_{38}$). (Systems like those of Walton and Krabbe (1995) and Gordon

(1994), which model most protocol rules in terms of the participants' commitments, do not have this problem but at the expense of being unable to model obvious dialogical relations between moves.)

This leads to what is perhaps the most important general conclusion from the case study, namely, that dialogue systems like the present one seem better suited as an analysis tool than as a tool for regulating disputes. In my opinion, this also holds for all other dialogue models thus far proposed in the AI & Law literature, such as Gordon (1994); Hage et al. (1994); Lodder (1999); Bench-Capon et al. (2000). As a regulatory model, they seem suited for direct, face-to-face debates or perhaps for human-computer dialogues (e.g. in intelligent tutoring systems). Legal disputes, by contrast, (especially the written ones of civil procedure), seem closer to scholarly and investigative disputes.

As for the process of formally representing a real legal dispute, the main lesson learned is that it is not trivial to agree on what is the best formal modelling, since the case contains many ambiguities and leaves much implicit. Some specific interpretation problems were already discussed in Section 5 and in (Prakken; 2002) I already reported on the occurrence of incomplete arguments in the case and on the problem of determining their best completion. Another interpretation problem was that some arguments of the adversaries were clearly legally 'clumsy' (see in more detail Prakken (2007)). I have chosen to reconstruct them in their legally correct way; this seems justified by the above-mentioned feature of Dutch civil procedure that it is the judge's and not the adversaries' responsibility to formulate the legal arguments. A final interpretation problem was that, especially in the dispute about factual matters, it was unclear whether multiple reasons were advanced as alternative, accruing or conjunctive grounds for the factual claims (the same was found by Sombekke et al. (2007), who analysed another Dutch civil dispute on its argumentative structure).

From these experiences some tentative conclusions can be drawn on the design of legal argumentation management systems. To be useful, such systems should probably not simply offer tools for structuring the lawyers' documents as they currently write them; instead they should probably be designed such that they support lawyers in improving their formulation of arguments. This, of course, raises the issue of whether lawyers will be willing to adopt tools that force new ways of writing upon them (cf. Shipman and Marshall (1999)).

The reader may perhaps not agree that my formal reconstruction has largely been a natural representation of the dispute. Since natural-language use is often ambiguous and leaves much explicit, every formal reconstruction of a case has a subjective element and may be influenced by theoretical bias. In a few cases this was even deliberate. For instance, the arguments $A_{12} - A_{15}$, which all attack the use of a witness statement, have deliberately been given a conclusion in terms of the critical questions of the argument scheme listed in Section 4, while such a conclusion was not explicit in the natural-language versions. Likewise, certain arguments have been deliberately formalised as inapplicability or priority arguments to make them fit the logic of Prakken and Sartor (1996). However, given that the representation was aimed to be a rational reconstruction, such theoretical bias is not a problem as long as it is made explicit. I hope that this paper will inspire other researchers to model the case in their own favoured formalisms, so that the results can be compared.

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