

## A DIALOGICAL THEORY OF PRESUMPTION

### Abstract

The notions of burden of proof and presumption are central to law, but as noted in *McCormick on Evidence*, they are also the slipperiest of any of the family of legal terms employed in legal reasoning. However, recent studies of burden of proof and presumption (Prakken, Reed and Walton, 2005; Prakken and Sartor, 2006; Gordon, Prakken and Walton, 2007; Prakken and Sartor, 2007) offer formal models that can render them into precise tools useful for legal reasoning. In this paper, the various theories and formal models are comparatively evaluated with the aim of working out a more comprehensive theory that can integrate the components of the argumentation structure on which they are based. It is shown that the notion of presumption has both a logical component and a dialectical component, and the new theory of presumption developed in the paper, called the dialogical theory, combines these two components.

Some of the leading theories in the argumentation and artificial intelligence literature base their analyses of presumption by linking it to the notion burden of proof as defined in a dialogical model of argumentation that has several stages as a structured, rule-governed dialog proceeds (Prakken and Sartor, 2006, 2007). It is shown in this paper that the notion of presumption has a logical component and a dialogical component, and the new theory of presumption developed in the paper, called the dialogical theory, combines these two components. According to the new dialogical theory, in any dialog there is a burden of proof on either side set at the opening stage of a dialog. During the argumentation stage an arguer has an obligation to support any claim made with evidence if she wants the other side to be bound to reasonably accept it. This obligation will be called an evidential burden. Unlike the initial burden of persuasion, an evidential burden can shift back and forth during the argumentation stage. Once the argumentation stage is finished, which side won or lost the dialog is determined by which side put forward a chain of argumentation that met the requirements for its burden of persuasion.

On the new dialogical theory, presumptive reasoning is defined as a special kind of inferential structure in which there is a premise, a conclusion, and an inference leading from the premise to the conclusion. On this theory, presumptive inference is generally taken to be defeasible. However, room is left for the possibility that there can be so-called necessary presumptions based on deductive reasoning, a kind of reasoning that is not defeasible. In presumptive reasoning, there is a general premise typically taking the form of a conditional statement or generalization, called a rule in artificial intelligence, and the rule is applied to a so-called fact. The fact is a particular statement that is taken to be true in a given case. The rule is applied to the fact generating a conclusion by a defeasible form of inference. The application of the rule to the fact gives rise to another particular statement called the presumption. The basic inferential structure of presumptive reasoning is simply displayed in figure 1.

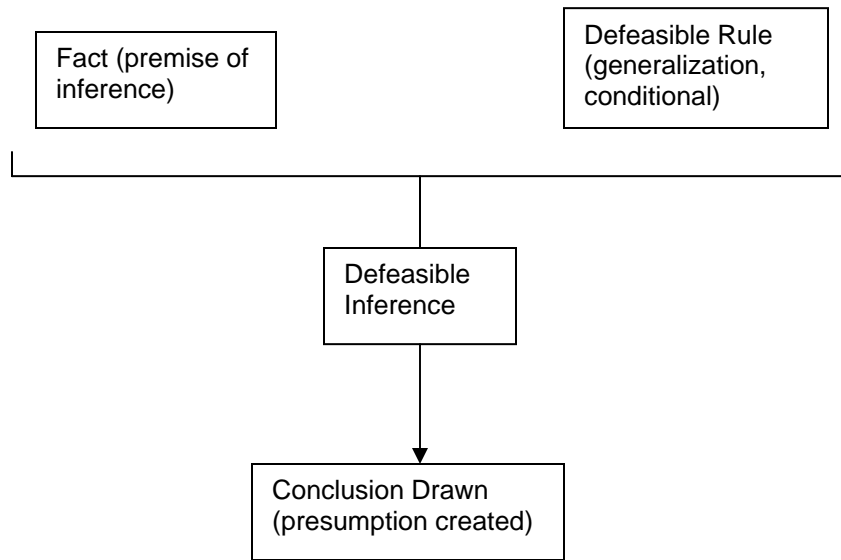


Figure 1: Inferential Structure of Presumptive Reasoning

It is important to recognize that the two premises at the top go together to support the conclusion, and so the argument structure is that of a linked argument. In contrast, in a convergent argument, each premise represents an independent support for the conclusion. In a linked argument, the premises function together.

According to Ashford and Risinger (1969) there is no agreement among legal writers on the questions of exactly what a presumption is and how presumptions operate. However they think that there is some general agreement on at least a minimal account of what a presumption is: “Most are agreed that a presumption is a legal mechanism which, unless sufficient evidence is introduced to render the presumption inoperative, deems one fact to be true when the truth of another fact has been established” (165). According to legal terminology, the fact to be proved is called “the fact presumed”, and the fact to be established before this other fact is to be deemed true is called “the fact proved” (Ashford and Risinger, 1969).

According to Prakken and Sartor (2006), presumption is to be identified with the defeasible rule operative in the inferential structure shown in figure 1. On the dialogical theory, in contrast, the presumption is to be identified with the conclusion of the inference. The decision between the two theories is a choice of which language to adopt. Perhaps one choice is better for using artificial intelligence to model legal reasoning while the other is better to build an argumentation theory for reasoning and everyday conversational argumentation. Either choice is better than leaving the notion of presumption in its current vague and slippery state. Whatever choice is made, the most important thing is to recognize that presumptive reasoning has this general structure.

A presumption is a very common device used to assist a dialog to move forward towards reaching its goal by argumentation used for that purpose. Usually the requirement of burden of proof demands that for every claim made or argument put forward reasons have to be given to back up that claim or argument in case it might be

questioned. Backing up every argument with convincing reasons to support it could be extremely costly in time and effort in many instances, even so burdensome that it might delay that dialog from moving forward or block it entirely from continuing any further. The function of a presumption, according to the dialogical theory, is to remove this potential blockage and enable the dialog to move forward from a given point during the argumentation stage. In practical terms, the function of presumption is to save time and money and effort in communication. Any kind of communication is only possible, according to Grice (1975), if both parties contribute in a collaborative manner to moving the dialog along towards its goal by making the right kinds of moves at the right point in the dialog with the kind of moves needed. This principle is the fundamental rule or chief conversational postulate in any Gricean style theory of collaborative conversation of the kind outlined in the next section.

### 1. The Five Components of Argumentation in a Trial

For this analysis of how burden of proof and presumption work in law, we need five components. The first component is the concept of a trial as a procedure with three main stages, called the opening stage, the argumentation stage and the closing stage. Trials can be divided into various types, but for our purposes it will suffice to distinguish between a criminal trial and a civil trial. In both types of trials, during the argumentation stage two opposed sides present arguments designed to persuade the trier of fact or jury, as we will call it. One side has the goal of proving a claim made at the opening stage, while the other side has the goal of casting doubt on the attempts of the first side to prove its claim. The second component is a set of facts that consists of the evidence judged to be admissible at the opening stage. This set can be added to or deleted from during the argumentation stage. A fact corresponds to what in logic is called a simple proposition, as contrasted with a rule, which takes a conditional form and therefore is classified in logic as a complex proposition. The third component is a set of rules. A rule is set by law previous to the trial and takes the form of a conditional proposition, a complex proposition with an antecedent and a consequent. The fourth component is that of an inference, a structure that has one proposition called the conclusion drawn from a set of other propositions called the premises. For example, from the factual premise ‘An expert testified to proposition  $A$ ’, and the rule that if an expert testifies to  $A$  then  $A$  is acceptable as evidence, the conclusion follows by inference that  $A$  is acceptable as evidence. This type of evidence is called defeasible, because the conclusion may have to be withdrawn after the inference has been subject to critical questioning during the argumentation stage.

Verheij (1999, 115) and Walton (2002, 43) have put forward the proposal that many common argumentation schemes fit under a defeasible form of the deductive form of *modus ponens* that we are familiar with in deductive logic. The normal *modus ponens* form of argument that we are familiar with in deductive logic is based on the material conditional binary constant  $\Rightarrow$  sometimes called strict implication. The variables  $A$ ,  $B$ ,  $C$ , ..., stand for propositions (statements).

Major Premise:  $A \Rightarrow B$

Minor Premise:  $A$

Conclusion:  $B$

This form of argument can be called strict *modus ponens* (SMP). In contrast, there is also a defeasible *modus ponens* having the following form, where the symbol  $\sim>$  is a binary constant representing the defeasible conditional.

Major Premise:  $A \sim> B$

Minor Premise:  $A$

Conclusion:  $B$

This form of argument is called defeasible *modus ponens* (DMP) in (Walton, 2002, 43).<sup>1</sup> To cite an example, the following argument arguably fits the form of DMP: if something is a bird generally, but subject to exceptions, it flies; Tweety is a bird; therefore Tweety flies. This argument is the canonical example of defeasible reasoning used in computer science. Suppose we find out that Tweety has a broken wing that prevents him from flying, or that Tweety is a penguin, a type of bird that does not fly. If we find out that in the given case one of these characteristics fits Tweety, the original DMP argument defaults. The argument is best seen as not one that is deductively valid, and that still holds even if new information comes in showing that the argument no longer applies to the particular case in the way anticipated. Instead, it is better seen as an argument that holds only tentatively during an investigation, but that can fail to hold any longer if new evidence comes in that cites an exception to the rule specified in the major premise.

*Modus ponens* arguments, whether of the strict or defeasible type, are typical linked arguments. Both premises go together to support the conclusion. If one is taken away, there is much less support for the conclusion in the absence of the other.

The fifth component is the process that takes place during the closing stage in which the jury critically examines and evaluates the arguments on both sides that were put forward during the argumentation stage, and decides which one had an argument strong enough to realize its goal of persuasion. The trial is designed so that the argumentation of the one side is opposed to the argumentation of the other side in such a way that if one side fulfills its goal of persuasion, that means that the other side does not.

This normative model of a fair trial is built around concepts drawn from semi-formal logic, where an argument has two levels, an inferential level and a dialectical level. At the inferential level, an argument is made up of the inferences from premises to conclusions forming a chain of reasoning. But such a chain of reasoning can be used for different purposes in different types of dialog. When reasoning is used as argumentation in a dialog, it needs to be studied at a dialectical level. There are different types of dialog, and each has its characteristic goals set at the opening stage. One type of dialog is a persuasion dialog, in which one party has the goal of persuading the other party to accept a particular proposition called its claim or thesis. The goal of the other party is to resist this attempt at persuasion by expressing critical doubts about the argumentation of the

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<sup>1</sup> Verheij (1999, 115) (2000, p. 5) called this second form of inference *modus non excipiens*, arguing that it needs to be applied in cases where a general rule admits exceptions.

first party. The trial represents a special type of dialog, because it not only has two opposed sides engaging in persuasion dialog, but it also has other parties that are involved. A judge oversees the trial to see that evidential rules and other rules governing procedure are followed. The decision on which side achieved its goal of persuasion, thereby defeating the other side, may be made by a fourth party, a jury.

On this analysis of the trial, the notions of burden of persuasion, evidential burden, tactical burden of proof, and presumption can be defined in such a way that we can get a clear account of their relationships to each other as devices useful for the success of a trial. Burden of persuasion is set at the opening stage. It determines which side has to prove what, and what standard of proof is required to prove it, depending on the type of trial. Burden of persuasion does not shift or change during the argumentation stage of the trial. Whether the burden of persuasion has been met by the one side or the other is determined by the jury during closing stage. In contrast, the notions of evidential burden, tactical burden and presumption are operative only during the argumentation stage. To say that there is an evidential burden on a party *P* concerning proposition *A* means that *A* is acceptable as evidence at a particular point during the trial, that *A* counts against *P*'s side, and that if *P* does not rebut *A* by presenting evidence to make *A* no longer acceptable, *A* will stay in place as acceptable. The difference between evidential burden and tactical burden of proof is a subtle matter that will be discussed below.

A remark of the Florida Supreme Court quoted in (Morman, 2005, 3) brings out the practical nature of presumption very well: "the presumption, shifting the burden of producing evidence, is given life only to equalize the parties' respective positions in regard to the evidence and to allow the plaintiff to proceed." This remark makes several features of the notion of presumption come out. One is that the effect of bringing forward a presumption in a trial is to shift the burden of producing evidence, the evidential burden. A second is that bringing forward a presumption has two purposes. One is to equalize the parties' positions by allowing them to compete on a fairer basis. The other is to allow one of the parties, in this case the plaintiff, to proceed by putting forward his argument without being obstructed by a gap in it that is obstructive. It is this gap that makes the respective positions of the two parties unequal.

## 2. Presumption in Law and Everyday Reasoning

First, let's consider an example from the everyday conversational argumentation. Suppose the chairman of the department sends an e-mail around to all department members describing a proposal that has been put forward saying that if she does not get a response from a department member she will assume that any person who does not voice an objection does not object to the proposal and is okay with it. What she has said in the e-mail invokes or puts forward a presumption. The presumption can be seen as a conditional proposition saying that any person who does not put forward an objection to the proposal will be taken not to object to it. This interpretation supports a logical approach. But we can also take a dialectical approach whereby presumption is seen as a kind of speech act that shifts roles and burdens in a dialog. The chairman is saying that she will presume 'no objection' on the ground that she does not hear an objection made in any subsequent message sent by the member this message was sent to. Normally, what would be required to conclude that acceptance of the proposal has been given by a

member is a replying e-mail message by the member saying that he or she accepts the proposal. But in this case, because the chairman invokes the notion of a presumption, she is saying that the absence of such a message will be enough to draw the conclusion that the member accepts the proposal (or at least has no objection to it). This effect can be viewed in dialectical terms as a kind of shift of the burden of proof, because it places the burden on the member to send a new message to indicate that he or she does not accept the proposal. If the member does not send such a message it will automatically be assumed that he does accept it. This interpretation supports a dialectical approach to presumption, linking it to the shifting back and forth of an existing burden of proof in a structured dialog setting.

Next let's cite some common examples in law. *McCormick on Evidence*, (Strong, 1992, 455) wrote that there are hundreds of presumptions recognized in law, and here we cite four from his list. (1) A classic instance is the presumption of ownership from possession (454). (2) Presumptions may be made dealing with the survivorship of persons who died in a common disaster, even though there may be no factual basis to believe that one party or the other died first (454). (3) If a first party proves delivery of property to a second party in good condition, and also proves that it was returned in a damaged state, a presumption arises that the damage was due to the second party (456-457). (4) The proof that a person has disappeared from home and been absent for at least seven years, and nobody has heard from this person during that period, raises a presumption that the person died during the seven years (457). Many more examples can be given, but these four are enough to give the reader some idea of how commonly presumptions are used in legal reasoning.

Many presumptions of the kind so often used in law can be classified as evidentiary or probative, but a presumption of consent by silence, of the kind illustrated by the case of the e-mail vote above, is based on a constitutive rule. To see this, we need to look at the conditions under which the inference from silence to consent can be defeated. If my side loses the vote, I cannot bring additional evidence that some of those who do not reply to the e-mail did not consent. Under the rules of the discussion, their silence counts as consent. To defeat the presumption, I would have to attack the right of the chair to make this procedural decision, or claim that not everybody received the e-mail. Whether this attack succeeds will depend on the institutional rules. In law, some presumptions are purely constitutive, as in the example of the e-mail case. An example would be the presumption against gift in the law of theft.<sup>2</sup>

To take a closer look at how presumptions work in legal reasoning, consider the following example of another common one (Park, Leonard and Goldberg, 1998, 103).

A presumption states that a letter properly addressed, stamped, and deposited in an appropriate receptacle is presumed to have been received in the ordinary course of the mail. Unless the presumption created by this rule is rebutted, the properly addressed, stamped, and deposited letter will be deemed to have been received in what is considered to be the ordinary amount of time needed in that delivery area.

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<sup>2</sup> I would like to thank an anonymous referee for making this point, and for pointing out as well that different jurisdictions can treat the same rule as constitutive or probative. As this referee pointed out, the rule that a posted letter ( see the next example) implies receipt of information is constitutive in German contract law, even though it may well be probative in American law.

Notice that the rule stated in the first sentence could be described in logical terms either as a universal generalization or as a conditional statement. On the first description, it says that any letter properly addressed, stamped, and deposited in an appropriate receptacle is presumed to have been received. On the second description, it can be expressed as the following conditional: if a letter was properly addressed, stamped, and deposited in an appropriate receptacle it will be presumed that it has been received. Notice also that the rule stated in the first sentence of the quotation is also described in that sentence itself as a presumption. This statement suggests the hypothesis that a presumption is the same thing as a general rule of this defeasible kind. But is the rule really the same thing as the presumption, or should a distinction be drawn between the two notions?

The difference between presumption in law and presumption in everyday reasoning outside legal context may be illustrated by some further examples. Take the example of a man who enters a dark room in an old cave and sees something on the floor of the cave that could be a coil of rope or a snake. He has to get past it. On the assumption that it might be a snake, he jumps over it, making sure to clear it as well as possible. In this case he has acted on the presumption that the object is a snake. The ground for making this presumption is safety. A coil of rope is harmless, but a snake could be dangerous or even deadly. It is a very individual decision whether to jump over the object or not. Jumping over the object could be somewhat dangerous as well, in a cave that is dark and has not been well explored. It is up to the individual to judge what the object looks like in the available light conditions, and to make a personal estimate to what extent it looks more like a snake or more like something harmless.

Contrast this example of a presumption made in everyday reasoning with a typical kind of presumption used in law. Consider once again the example of the legal presumption that if a person has disappeared for seven years, and there is no evidence that he is alive, after this number of years (which varies from jurisdiction to jurisdiction), he is presumed to be dead. As noted above, this presumption may be made in law for practical purposes, like that of dividing an estate.

What is the difference between these two kinds of cases? It would appear that the key difference is that the presumption in the snake case is an individualized matter made on the basis of an individual judgment of risk. In the legal case however, the presumption is a standardized rule of inference accepted by the courts.

Some legal writings appear to equate presumption with the rule used to infer a conclusion from a fact, while others define it as the conclusion so drawn. The Florida Evidence Code (F.S. 90.301(2)) defines a presumption as “an assumption of fact which the law makes from the existence of another fact or group of facts found or otherwise established.” (Morman, 2005, 3). This definition seems to make the presumption equivalent to the conclusion drawn from the premises of fact and rule. However another part of the Florida Evidence Code seems to present a different definition: “A presumption of law is a preliminary rule of law which may be made to disappear in the face of rebuttal evidence, but in the absence of such rebuttal evidence, compels a favorable ruling for the party of relying thereupon.” This definition appears to equate the presumption with the defeasible rule that is combined with a factual premise to draw a conclusion by inference that can affect the ruling in a trial.

*McCormick on Evidence* (Strong, 1992, 449) offers the following definition: “a presumption is a standardized practice, under which certain facts are held to call for

uniform treatment with respect to their effect as proof of other facts”. This definition, at first sight, seems to identify the presumption with a rule on which the inferences is based. However, on closer inspection, it identifies the presumption with the standardized practice codified by law in the rule. Presumably, it is the standardized practice that supports the rule, or is the basis of it.

According to this definition, what makes the difference between the kind of presumption found in ordinary reasoning, as in the case of the snake example, and legal presumption, is that legal presumption is a practice that is standardized under court rulings or statutes or both. Yet in both instances, a presumption is something that sanctions an inference from one proposition to another. In the snake case, the inference was drawn from the observation of something that appeared, to some extent, to resemble a snake. From this premise that conclusion was drawn, on grounds of safety, that it would be prudent to jump over the object. In the legal case, the premise was the factual proposition that the person in question had not been seen or heard from for a specified period of time. The conclusion drawn from this premise is that this person can be declared to be dead for legal purposes. The difference between the two is that the legal presumption is a standardized practice set in law as a kind of standard rule that fits all cases meeting the factual specification of the premise. In contrast, an everyday presumption appears to be more of an individual judgment varying with the particulars of the case.

Note that both kinds of presumptions involve inferences from premises to a conclusion, and that in both instances these inferences are defeasible. For example in the snake case, if the man prods the object with a stick and it does not move, he may reasonably cancel his decision to jump over it in light of this new evidence. The effect of the previous inference is canceled by this new evidence that has come in. Similarly in the legal case, if some new evidence comes in that the man is alive, the conclusion to move ahead on the assumption that he is dead is now revoked.

Ullman-Margalit (1983) recognized that there might be differences between presumptions in law and ordinary conversational reasoning outside a legal framework. She proposed a common underlying framework, however, in the form of a characteristic pattern of inference with three components (1983, 147). The first is the presence of the presumption-raising fact in a particular case at issue. The second is the presumption formula, as she calls it, that sanctions the passage from the presumed fact to a conclusion. The third is a conclusion that a proposition is presumed to be true on the basis of the first two components combined. She described the conclusion of this presumptive inference by saying (147) that the inference is not to a “presumed fact”, but to a conclusion that “a certain fact is presumed”.

Rescher offers the following defining principle for presumption (2006, 33), where  $P$  is the proposition representing the presumption: “Any appropriate cognitive presumption either is or instantiates a general rule of procedure of the form that to maintain  $P$  whenever the condition  $C$  obtains unless and until the standard default proviso  $D$  (to the effect that countervailing evidence is at hand) obtains”. It is clear that this principle has the form of a qualified conditional of a kind that would be called a defeasible rule in AI.

Based on the approaches of Ullman-Margalit (1983) and Rescher (2006), we propose that a presumptive inference in law or everyday conversational reasoning conforms to the inferential structure shown in figure 2.



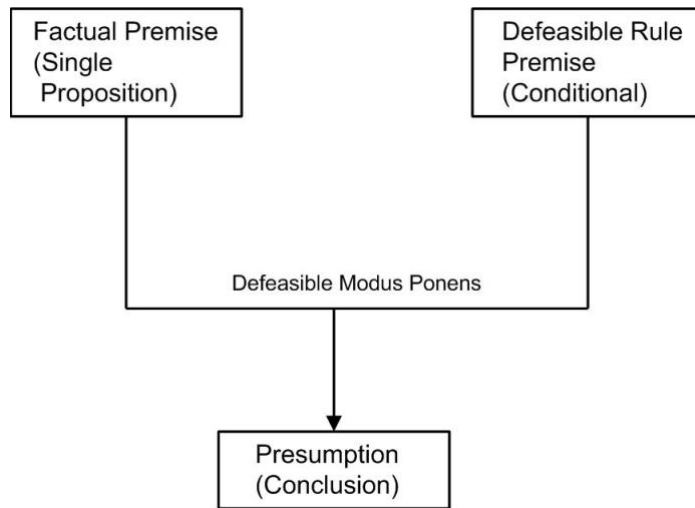


Figure 2: Presumptive Inference Format

In figure 2 we have annotated the linked argument by putting the label *Defeasible Modus Ponens* on it. As we will show in the last section, using the example of argument from expert opinion as an example, defeasible argumentation schemes of the type that are generally thought to be presumptive in nature can be expressed in the defeasible *modus ponens* form. Thus the presumptive inference format pictured in figure 2, is meant to be generalized to numerous defeasible argumentation schemes. However, it is beyond the scope of this paper to illustrate this contention in detail, or to apply it to many examples.

The notion of rule is defined according to these characteristics (Gordon, 2008, 4).

1. Rules have properties, such as their date of enactment, jurisdiction and authority.
2. When the antecedent of the rule is satisfied by the facts of a case, the conclusion [consequent] of the rule is only presumably true, not necessarily true.
3. Rules are subject to exceptions.
4. Rules can conflict.
5. Some rule conflicts can be resolved using rules about rule priorities, e.g. *lex superior*, which gives priority to the rule from the higher authority.
6. Exclusionary rules provide one way to undercut other rules.
7. Rules can be invalid or become invalid. Deleting invalid rules is not an option when it is necessary to reason retroactively with rules which were valid at various times over a course of events.

The word ‘presumably’ is used in characteristic 2, indicating the connection between rules and presumptions. As Gordon noted (4), it is a consequence of these characteristics that the notion of a rule cannot be modeled adequately by material implication of the kind we are familiar with in deductive logic. Instead, rules need to be modeled by identifying the parts of the rule, including its antecedent propositions, its consequent proposition, its exceptions, its assumptions, and its type.

So far, the analysis only represents the inferential structure of presumption, that as we stated in the introduction, the more adequate representation of the notion of presumption has dialogical features as well. To appreciate this, we have to show how the inferential structure shown in figure 2 fits into the five components of argumentation in a trial.

### 3. Burden of Proof in Law

According to Williams (2003, 166), considerable confusion has arisen from a failure to distinguish between two distinct kinds of burdens of proof, especially by appeal courts who discuss questions of burden of proof without making it clear whether they are talking about burden of persuasion or evidential burden. Also, from the point of view of argumentation theory, it often seems difficult or problematic to precisely distinguish between presumption and evidential burden in all cases, since both often seem to shift back and forth in a similar way. Strong (1992, 425) wrote that presumption is the “slipperiest member of the family of legal terms, except for its first cousin, burden of proof”.

Wigmore (1940, 270) drew a distinction between these two meanings of burden of proof. The first one he called the risk of non-persuasion. Wigmore offered the following example (271) from “practical affairs”. Suppose A has a property and he wants to persuade M to invest money in it, while B is opposed to M’s investing money in it. A will have the burden of persuasion, because unless he persuades M “up to the point of action”, he will fail and B will win. Wigmore went on to show how the burden of persuasion works in litigation, in a way similar to that of practical affairs, except that the prerequisites are determined by law (273), and the law divides the procedure into stages (274). The second meaning is called the burden of production. It refers to the quantity of evidence that the judge is satisfied with to be considered by the jury as a reasonable basis for making the verdict in favor of one side (279). If this is not fulfilled, the party in default loses the trial (279). According to Wigmore (284), the practical distinction between these two meanings of burden of proof is this: “The risk of non-persuasion operates when the case has come into the hands of the jury, while the duty of producing evidence implies a liability to a ruling by the judge disposing of the issue without leaving the question open to the jury’s deliberations.” Wigmore offered a number of good examples, and went on to discuss shifting of the burden of proof from one side to the other (285). He wrote that the risk of non-persuasion never shifts, but the duty of producing evidence to satisfy the judge does have this characteristic often referred to as a shifting (285-286).

The general principle underlying burden of proof in law is often called the normal default rule concerning burden of proof. This rule or principle is expressed in the Latin maxim *necessitas probandi incumbit ei qui agit*, meaning that the necessity of proving falls on the party who acted, i.e. who put forward the action of making the charge, allegation or complaint. This general rule seems simple enough in the abstract, and it may also seem to be similar to the way burden of proof works in everyday conversational argumentation. However, it may be necessary to distinguish three particular kinds of burden of proof that are recognized in law, the burden of persuasion, the evidentiary burden and the tactical burden of proof (Williams, 2003). Burden of proof as a legal concept needs to be seen as applying centrally to the kind of dialogue called the trial process, although it applies to other areas of law as well like police searches. To try to grasp in general outline how these three burdens work in law one needs to see that a trial, like any dialog process, goes through various stages. There is a pretrial stage where a decision is made to take an action to trial. There is the central trial stage where rules of

evidence apply, determining what evidence is admissible, and where other procedural rules apply. There is a concluding stage where the trier makes a ruling for one side or the other. Also, there may be post-trial stages that follow, like sentencing or an appeal.

The burden of persuasion, also often called the risk of non-persuasion, as noted above, remains on the same party for the whole duration of the trial. *McCormick on Evidence* explains how it works (Strong, 1992, p. 426) as follows.

The burden of persuasion becomes a crucial factor only if the parties have sustained their burdens of producing evidence and only when all of the evidence has been introduced. It does not shift from party to party during the course of the trial simply because it need not be allocated until it is time for a decision. When the time for a decision comes, the jury, if there is one, must be instructed how to decide the issue if their minds are left in doubt. The jury must be told that if the party having the burden of persuasion has failed to satisfy that burden, the issue is to be decided against that party. If there is no jury and the judge is in doubt, the issue must be decided against the party having the burden of persuasion.

The burden of persuasion, along with the substantive rules, states what each party has to prove in order to win the trial. It is often expressed in a negative way by calling it the risk of non-persuasion because it states that a party will lose the trial if she does not produce a strong enough argument to persuade the trier to decide for her side. How persuasive such a winning argument needs to be depends on the standard of proof for that type of trial. In a criminal trial, the prosecution has to prove all the elements of the offense beyond a reasonable doubt. For example, if murder is defined as intentional killing within the jurisdiction, the prosecution has to prove that there was a killing and that the act of killing was intentional. In such a case there are two elements, the act of killing and the intentional nature of the act. This burden of persuasion also requires disproving all the opposing arguments brought forward by the defense. What ‘proof’ or ‘disproof’ means are matters determined by the rules of evidence taken to be binding on the trial.

The two main characteristics of the burden of persuasion as defined above are (1) that it is fixed and does not change during the whole trial and (2) that once met, it determines who wins the trial. In the case of a jury trial in criminal law, for example, the judge has the task of explaining the burden of proof to the jury at the beginning of the trial, and the jury has the job of applying this burden to all the evidence that was brought forward during the trial, and to use it to decide the outcome. A third aspect of the burden of persuasion is the standard of proof. It determines how heavy the burden is.

In contrast, the evidential burden changes during the trial, and is often said to shift back and forth from one side to the other (Williams, 1977). The evidential burden, as noted above, is also often called the burden of producing evidence or the burden of production. Wigmore summarized the distinction between these two burdens by writing that the risk of non-persuasion operates when the case has come into the hands of the jury, while the evidentiary burden implies a liability to a ruling by the judge disposing of the issue without leaving the question open to the jury’s deliberations. What seems to be suggested here is that the evidential burden comes into play during the trial process at some particular point when a particular issue is being discussed and one party fails to produce enough evidence to support his or her side on the issue thereby running the risk of having the trial judge determine that issue in favor of the opponent.

According to Williams (2003, 166) however, the expression evidential burden as commonly used in law, can refer to two distinct notions. In one sense, ‘evidential burden’ means “the burden of the producing evidence on an issue on pain of having the trial judge

determine that issue in favor of the opponent.” In another sense, ‘evidential burden’ means that if the party “does not produce evidence or further evidence he or she runs the risk of ultimately losing on that issue.” Williams sees these two notions as distinct, because the first involves a question of law while the latter involves a tactical evaluation of who is winning or losing at a particular point during the sequence of argumentation in the trial. He adds that commentators do distinguish between these two concepts, using the expression ‘evidential burden’ to refer to the former notion and using the expression ‘tactical burden’ to refer to the latter notion.

According to *McCormick on Evidence* (Strong, 1992, 452), the expression presumption of innocence, so widely used to describe legal argumentation, is a misnomer.

Assignments of the burdens of proof prior to trial are not based on presumptions. Before trial no evidence has been introduced from which other facts are to be inferred the assignment is made on the basis of the rule of substantive law providing that one party or the other ought to have one or both of the burdens with regard to an issue. In some instances, however, these substantive rules are incorrectly referred to as presumptions. The most glaring example of this mislabeling is the “presumption of innocence” as the phrase is used in criminal cases.

Although courts often insist on the inclusion of this phrase in the charge to the jury, what it really refers to is the prosecution’s burden of persuasion.

#### 4. The Logical Component

There is now a considerable literature in the field of artificial intelligence and law on the notion of burden of proof (Prakken, Reed and Walton, 2005; Gordon, Prakken and Walton, 2007; Prakken and Sartor, 2007). The notion of burden of proof can be taken as something that has been now fairly well clarified and defined. More recently a theory of presumption has linked the two notions together. The Prakken-Sartor (2006) theory of presumption in law depends on some prior analysis of the notion of burden of proof, and in particular on drawing a three-way distinction among the notions of burden of persuasion, burden of production and tactical burden of proof. According to this theory, presumptions can be characterized as default rules, and disputes about whether a presumption holds do not turn on the question of whether the default rule corresponding to the presumption holds or not.

An example used to support the Prakken-Sartor theory is the case where the plaintiff demands compensation on the ground that defendant damaged his bicycle. The plaintiff has the burdens of production and persuasion that the bicycle was damaged and that he owned it. One way he can prove that he owns the bicycle is to prove that he possesses it. According to Dutch law in such a case, given possession, ownership of the bicycle can be presumed. The presumption in such a case can be expressed by the proposition that possession of an object can be taken as grounds for concluding that the person who possesses the object owns it. According to the Prakken-Sartor theory, this proposition has the form of the default rule, and generally speaking, any legal presumption can be cast in the form of such a default rule. The default rule is this proposition: normally if a person possesses something, it can be taken for granted that he owns it, subject to evidence to the contrary. It is held to be a default rule in the Prakken-Sartor theory in the same way the

following proposition is: if Tweety is a bird, then normally, but subject to exceptions, Tweety flies. Such a proposition is a default rule in that it holds generally, but can fail or default in the case of an exception, for example in the case that Tweety is a penguin.

The Prakken-Sartor system is built on a logic for defeasible argumentation called IS (inference system). Information is expressed in the system using a set of rules in the language of extended logic programming. Strict rules are represented with  $\rightarrow$  while defeasible rules are represented with  $\Rightarrow$ . Facts are represented as strict rules within empty antecedents. IS has both negation as failure and classical or strong negation. Arguments can be formed by chaining rules. Conflicts between arguments are decided according to a binary relation of defeat, partly induced by rule priorities, and may be reasoned about like any other issue. Arguments can attack and defeat each other in three ways, and on the basis of such attacks arguments can be assigned dialectical status as winning, losing or tying. Arguments can be “justified” or “defensible”.

Prakken and Sartor (2006, 5-6) offer an analysis of the bicycle example designed to show their formal system IS can be applied to the case where a presumption has effects on a burden of persuasion in a trial situation. They begin with two defeasible rules.

```
R1: owner & damaged => compensation
R2: possession => owner
```

Rule R2 expresses a presumption in conditional form, meant to represent the rule in the Dutch civil code that possession of a movable good creates a presumption of ownership. The plaintiff’s burden of persuasion amounts to being required to prove the two propositions that he is the owner of the bicycle and that the bicycle was damaged. If he meets these two requirements, the judge will rule that he is to be compensated. Suppose the defendant proves that he possesses the bicycle.

```
F1: possession
```

Now by defeasible *modus ponens* it follows from R2 and F1 that the plaintiff is the owner of the bicycle. Suppose it can be proved that the bicycle was damaged. It follows by R1 that the plaintiff deserves compensation, because the burden of persuasion has now been fulfilled by the plaintiff’s argument.

What kind of argument could the defendant mount against the plaintiff’s argument at this point? Suppose he could provide evidence that the plaintiff had stolen the bicycle in the form of witness testimony to that effect. This argument is represented by Prakken and Sartor in IS by representing it as a fact and two rules.

```
F2: witness W1 says "stolen"
R5: witness W1 says "stolen" => stolen
R6: stolen => ¬owner
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When taken together, F2, R5 and R6 defeat one conjunct of the antecedent of R1, and this sequence of argumentation now defeats the formerly justified argument that the plaintiff has fulfilled his burden of persuasion. What has happened now is that there has been a shift in the burden of proof. Formerly the plaintiff had fulfilled his burden of persuasion, but with the advent of the new argument above, the burden has shifted. Unless the

plaintiff can now offer another argument that defeats or brings into question the defendant's argument that he did not own the bicycle, because it was stolen, he stands to lose the case.

So described, the bicycle example can be analyzed in terms of the concepts of burden of persuasion and presumption as follows. The plaintiff's case partly depended on the presumption that he owned the bicycle, given the fact that he was in possession of it. This fact is not contested by either side. Since neither side contests the proposition that the defendant damaged the plaintiff's bicycle, it follows by R1 that the plaintiff is entitled to compensation. His burden of persuasion would be fulfilled if the trial were to end at this point. When the defendant offers his counterargument based on witness testimony however, it places an evidential burden on the plaintiff. Unless he can lift this evidential burden, for example by producing a counterargument to the counterargument, he will no longer have fulfilled his burden of persuasion. He could produce such a counterargument, for example, by arguing that the witness was biased because he was paid to testify for the defendant. But if he fails to make some such move of rebuttal of this sort, his burden of persuasion will no longer be lifted. So one could describe what happened in the case by saying that there has been a shift in the burden of proof. Originally the plaintiff's burden of persuasion was fulfilled, but then, because of the defendant's counter-argument, that fulfillment was cancelled.

This way of analyzing the argument in terms of a shift in the burden of proof is, however, not the way that Prakken and Sartor analyze it using their formal system IS. According to their way of analyzing it, the plaintiff has two burdens, both the burden of production and a burden of persuasion, that the bicycle was damaged and that he owned the bicycle (2006, 26). To fulfill this burden the defendant invokes the presumption that the plaintiff owned the bicycle. This presumption is then attacked by the defendant's argument that the plaintiff had stolen it. According to Prakken and Sartor's analysis, "Plaintiff's burden of persuasion for ownership now induces a tactical burden for the plaintiff to convince the judge that he has not stolen the bicycle". Note that they see this move as inducing a tactical burden rather than as a shift in the burden of persuasion or the burden of production. They explicitly point out that on their analysis, "this is not a burden of production since evidence on the issue of ownership has already been provided, namely *possession*. To sum up, what has happened in their terms took place in two phases. In the first phase there was a burden of persuasion on the plaintiff's side, one that was met by his initial argument, based on a presumption. In this first phase, the defendant had a tactical burden of producing counter evidence that would introduce reasonable doubt on whether the plaintiff really owned the bicycle. The defendant had fulfilled this tactical burden by producing an argument that the plaintiff had stolen the bicycle, based on witness testimony. The effect of this counterargument was to induce a tactical burden for the plaintiff to convince the judge that he had not stolen the bicycle.

The key to understanding Prakken and Sartor's formal analysis of burden of proof is to see that they stress the importance of the three-way distinction among three kinds of burden of proof in legal argumentation, burden of persuasion, burden of production and tactical burden of proof. As the bicycle example shows, on their analysis presumptions are a way to fulfill a burden of production or a burden of persuasion, and they have the effect of shifting a tactical burden to the other party in a dispute. As this example shows, on their analysis presumptions can be equated with default rules, and "disputes about

what can be presumed should concern whether such a default rule holds” (25). They conclude, “debates about what can be presumed can be modeled in argumentation logic as debates about the backings of default rules” (27). Thus for Prakken and Sartor, a presumption is always a rule, or what is called a conditional proposition in logic. However, unconditional presumptions, “such as the well-known ones of innocence and good faith”, are treated as “boundary cases with tautological antecedents” (23).

## 5. The Dialogical Component

The three main tasks of argumentation theory are the identification, analysis and evaluation of arguments. Considerable progress has been made in developing methods to assist in the first two tasks through the application of tools like argumentation schemes, profiles of dialogue and argument diagrams. The third task seems more formidable because judging what is a successful or good argument, as opposed to an unsuccessful or bad one, seems to vary so much with different contexts of argument use. For example, a good argument used in the legal context of a trial might not be a good one to be used in a scientific investigation, or vice versa. It might be pretty much the same argument, but the criteria for its acceptance as a good or successful argument might be quite different in the one context than the other. This apparent contextual variability of the task of evaluating arguments is a serious problem, perhaps the main obstacle to moving ahead with a work of developing methods for the evaluation of arguments.

This paper moves towards a solution to the problem by building on the dialectical approach to argumentation that evaluates an argument not only as a sequence of reasoning formed by chaining of inferences, but also as an entity that occurs in a context of dialog. Six basic types of dialog have been recognized: persuasion dialogue, negotiation, deliberation, inquiry, information-seeking dialogue and eristic dialog. The thesis of this paper is that an argument always needs to be evaluated in relation to the standard of proof appropriate for the type of dialog in which the argument was put forward. In the paper, several different standards of proof recognized in law are distinguished, and how such standards can be applied to the evaluation of everyday conversational argumentation is studied through the use of some examples. The examples show that solving the problem is only possible if three related but problematic notions, burden of proof, presumptions, and argument from ignorance, are also taken into account. Luckily there has been some recent work on the first two notions in argumentation theory that can help us to gain a better understanding of how the first two notions can be analyzed using dialectical models.

Van Eemeren and Houtlosser (2002, 17) argue that burden of proof is necessary in argumentation because it is a procedural concept that is necessary in a critical discussion aimed at resolving a conflict of opinions. On their account, such a conflict can be resolved only if the burden of proof requirement is made clear at the opening stage, and if both parties comply with it throughout the discussion (p. 17). In this way, the concept of burden of proof can be useful as a way of setting the division of labor in a rational discussion. Once the burden of proof is agreed on and set at the opening stage, its effects travel through the whole sequence of argumentation as the participants take turns in the dialogue. For example, the type of speech act called the assertive (where an assertion is made) creates a specific commitment that constitutes a burden of proof because the

proponent of an argument is advocating a point of view. The creation of such a burden of proof also creates an obligation to defend an assertion when challenged to do so.

The difference between presumption and burden of proof is that burden of proof is set at the opening stage of the dialog. On the approach of van Eemeren and Houtlosser, there are four stages of a dialog in a critical discussion, the confrontation stage, the opening stage, the argumentation stage and closing stage. However, in the past there has been much confusion about the first two stages (Krabbe, 2007). They often get mixed up, and the functions of each of these two stages do not seem to be entirely clear or separate. For this reason in (Walton, 2007) a general theory of the dialog framework of argumentation was given in which there are always three stages in any type of dialogue - an opening stage, an argumentation stage and closing stage. In this model the first two stages of the Amsterdam model are collapsed into one stage. One reason for adopting this new approach is adapting computer models to argumentation; in any computer model there needs to be three stages, the start point, the endpoint, and the sequence of steps joining the start point to the endpoint. Another reason for adopting this approach is that it is more generalizable to types of dialog other than just the persuasion dialog or critical discussion type of dialog. The initial state for several of these others types of dialog is not a conflict of opinions posing a confrontation. Instead, there may be a problem to be solved, a proposition to be investigated, or reliable information to be collected, tested and verified. In these types of dialogue there is no confrontation stage.

The three part distinction (the opening stage, the argumentation stage and closing stage) is vitally important for helping us to understand the difference between burden of proof and presumption. The overarching principle of burden of proof, that he who asserts must prove, is set at the opening stage of the dialog. Burden of proof is made up at the opening stage by determining three factors: (1) what strength of argument is needed to win the dialog for a participant at the closing stage (standard of proof), (2) which side bears the so-called burden for producing such an argument, and (3) what kind of argument is required for this purpose. 'Winning' means producing an argument that is stronger than the opponent's argument to a degree that means that whoever has produced such an argument has succeeded in carrying out the burden of proof set at the opening stage.

When applying this dialog model from argumentation theory to legal argumentation, another principle is also vitally important: whichever side is in the best position to prove must do so. An example would be jurisdictions that have a reversal of burden of proof in favor of citizens suing the state. Normally the citizen who is suing would have the burden of proof to support his claim, but if he lacks information because that information is possessed only by the government, the burden of proof may shift to the government to provide the required information. This principle is also important as applied to the kind of case in which it is impossible for the defendant to prove absence of a factor. Cases of this sort have been studied in the argumentation literature under the heading of lack of evidence arguments of the type of thing called argument from ignorance (*argumentum ad ignorantiam*) in logic (Walton, 1996).

The key distinction between presumption and burden of proof (of the type called burden of persuasion in law) is that presumption functions only at the argumentation stage, whereas burden of proof is set at the opening stage, has effects at the argumentation stage, and is vitally important in determining when the closing stage has



been reached in a given case. In a trial, the burden of persuasion is set at the opening stage, and remains fixed until the closing stage. At the closing stage, which side won or lost is determined by which side met its burden of persuasion.

There is a distinction always drawn in argumentation theory between two types of persuasion dialogue. In the one type, there is a conflict of opinions, meaning that the one side has a certain thesis, a proposition to be proved, while the other side has the obligation of proving the opposite thesis. This type of conflict of opinions is sometimes called a dispute. In another type, one side has a certain thesis to be proved, but all the other side (the respondent) has to do in order to win the dialog is to cast enough doubt on the proponent's attempts to prove her thesis such that the proponent is unable to carry out her job of proving it. This type of dialogue is sometimes called a dissent.

The difference between these two types of dialog is a matter of burden of proof. In the dissent, one side has the burden of proof. The proponent must prove her thesis, by presenting an argument that meets the standard of proof for the dialog. Otherwise the respondent wins. In the dispute, each side must present its arguments, and the one who has the stronger argument wins. In the dispute, we say that the burden of proof is distributed equally on the two parties. Each side bears a positive burden to prove. Thus the notion of burden of proof is the fundamental concept that is needed to set up a dialog by determining at the opening stage what is required on the part of each participant to bring the dialogue to a successful conclusion at the closing stage.

The notion of presumption, in contrast, functions only at the argumentation stage. It functions at individual moves during the argumentation stage. Because of this contrast, it has been said (Walton, 2007) that burden of proof is set at the global level in a dialog whereas presumption acts at the local level during a sequence of dialogue exchanges. In general, the argumentation stage may be seen as a connected sequence of arguments on each side. You can see it as two lengthy argument diagrams, one representing the chain of argumentation on the proponent's side and the other representing the chain of argumentation on the respondent's side (as indicated in the bicycle example in the previous section). Each party has the job of building up the probative effect of this chain of argument on its own side, as well as the job of criticizing the arguments of the other side and finding the weak points in them. At the closing stage, the two chains of argument are compared, on the basis of the allocation of the burden of proof at the opening stage a decision is arrived at on which side has the winning argument. During any particular point during the sequence of moves on one side or the other, the notion of presumption can come into play. It comes into play when one party or the other makes a claim. The claim is made when the party makes an assertion or otherwise puts forward a particular proposition as something that she claims to be true, or that the other side should accept. The problem is whether the opponent of the claim needs to back it up by an argument, or whether the claim can stand without argument. If a claim made always had to be backed up by an argument, there is the danger of wasting time and energy on claims that nobody would dispute, or perhaps that nobody in the dialogue should have any reason to dispute or right to dispute. For example if the claim is already accepted by all parties to the dispute and nobody has any reason not to accept it, there should be no need to put forward an argument to back it up, even though it might be possible to do so. This is where the notion of presumption is useful. A participant can put forward a claim and ask to have it accepted as a presumption, rather than putting it forward as a flat out

assertion. The presumption functions as a reasonable request for the other party to accept the proposition made in the claim without the participant who made the claim having to prove it by offering an argument to support it.

It is during the argumentation stage where arguments are put forward, critically questioned by the other side, and where presumptions come into play. When proposition *A* is put forward by a proponent as a presumption, the productive burden to produce evidence to support that proposition if its acceptance is challenged by the respondent shifts the burden of proof to the respondent's side, but in a negative way. In order not to have to accept *A*, the respondent must produce evidence against *A*. In other words, you could say that now the respondent has a burden to rebut the proposition *A*. This negative logic of presumptions is often called a shift in the burden of proof. However, it is not a shift in the burden of proof that was set at the opening stage of the dialog. This burden of proof remains constant during the whole dialog, until the point where it is either fulfilled or not at the closing stage. The shift is one that might be called the productive burden of proof or the tactical burden of proof (Prakken and Sartor, 2007). Such shifts are influenced by argumentation schemes and critical questions.

## 6. The Letter and the Dark Stairway

Now let's go back to the letter example, cited in section 2 as a typical case of a legal presumption. The discussion of this example in section 2 suggested the hypothesis that a presumption is the same thing as a general rule of this defeasible kind, and we can see how this hypothesis is expressed formally by the Prakken-Sartor theory of presumption. However, we also remarked that it can be questioned whether the rule is really the same thing as the presumption, or whether a distinction should be drawn between the two notions. The second sentence of the quotation of the letter example in section 1 is especially interesting in this regard, because it says that the presumption is created by the rule. This wording suggests that the presumption may be something different from the rule. What is perhaps suggested is the following structure. There is a generally accepted rule in law that if a letter was properly addressed, stamped, and deposited in an appropriate receptacle, it can be taken to have been received in the ordinary course of the mail. As noted above, this rule from a logical point of view has a conditional form, a form of a qualified universal generalization, of the kind that makes it easily fit with other statements in familiar sequences of logical reasoning. For example, when joined with a particular statement of fact, it can create a logically valid inference. Suppose that in a particular case it has been factually established by evidence that this particular letter was properly addressed, stamped, and deposited in an appropriate receptacle. Using this statement as the antecedent of the *modus ponens* inference along with the conditional statement in the general rule above, the conclusion can be drawn on a defeasible basis that this particular letter was received. The form of inference here is that of defeasible *modus ponens*. In this analysis, the presumption can be seen as something different from the rule. The rule is the conditional statement in the defeasible *modus ponens* inference. The presumption is the statement that this particular letter has been received. That is the presumption created in this case by the application of the rule to the facts of the case.

According to this account of the reasoning, the presumption is not the general rule that is applied to the particular case, that a letter properly addressed, stamped, and deposited

in an appropriate receptacle can be taken to have been received in the ordinary course of the mail. The presumption is the statement that a particular letter in a particular case has been received. Or perhaps it is even more accurate to say that it can be presumed that a conclusion can be drawn because it can be presumed that the person in a particular case received it. As *McCormick on Evidence* (Strong, 1992) warned, the notion of presumption is slippery and vague. Which meaning should we choose? What should we say? Is the conditional rule the presumption? Is the particular statement inferred from the rule in this particular case the presumption? Or is the whole network of reasoning whereby the particular statement is derived inferentially from the rule and the fact the presumption? If the last option is the best one, it makes sense to define presumption in terms of the sequence of presumptive reasoning whereby an inference is used to draw a presumptive conclusion from a defeasible conditional and its antecedent. These questions can be answered by extending the letter example into a case from civil law.

In the following example of a legal case, which we will call the dark stairway example, summarized from (Park, Leonard and Goldberg, 1998, 103), the argumentation turns on the presumption stating that a letter properly addressed, stamped, and deposited in an appropriate receptacle is presumed to have been received in the ordinary course of the mail.

#### The Dark Stairway Example (summarized from Park, Leonard and Goldberg, 1998, 107)

The plaintiff suffered a fall on a dark stairway in an apartment building. She sued the defendant, the building's owner, claiming that he did not keep the stairway in a safe condition, because the lighting did not work properly. To prove notice, the defendant claimed he mailed a letter to the plaintiff, informing her that several of the lights in the stairway no longer worked.

To see how the letter delivery presumption figures in the chain of reasoning in the case, let us represent the rules and facts in the arguments on both sides using the IS model of Prakken and Sartor.

#### Rules and Facts in Plaintiff's Argument

R1:  $\neg$ lighting works properly  $\Rightarrow$   $\neg$ stairway in a safe condition  
 F1:  $\neg$ lighting works properly  
 R2:  $\neg$ stairway in a safe condition  $\Rightarrow$  owner liable

#### Rules and Facts in Defendant's Argument

F2: defendant mailed letter to plaintiff, saying lights in the stairway don't work  
 R3: defendant mailed letter to plaintiff, saying lights in the stairway don't work  $\Rightarrow$  plaintiff was informed  $\neg$ stairway in a safe condition  
 R4: plaintiff was informed  $\neg$ stairway in a safe condition  $\Rightarrow$   $\neg$ owner liable

The chain of reasoning in the plaintiff's argument works as follows. By R1 and F1, based on DMP (defeasible *modus ponens*), the conclusion  $\neg$ stairway in a safe

condition follows. By this conclusion and R2, the conclusion that the owner is liable follows by DMP. The chain of reasoning in the defendant's argument works as follows. By R3 and F2 and DMP, the conclusion `plaintiff was informed ¬stairway in a safe condition` follows. By this conclusion and R4, the conclusion that the owner is not liable follows.

The ultimate conclusion of the plaintiff's argument is the opposite (strong negation) of the ultimate conclusion of the defendant's argument. Each side has a valid chain of reasoning leading to its conclusion based on DMP and on a factual proposition thought to be provable by the that side. So far the logic of the reasoning seems to be that of the standard legal case in civil law. The problem is to make a determination of which parts of the reasoning on each side can be designated as presumptions.

It might appear that on the Prakken and Sartor theory, R3 is the presumption. That would not seem to be correct, because R3 is about this particular instance in which the defendant allegedly mailed a certain letter to the plaintiff. On the Prakken and Sartor theory, the presumption is the general rule to the effect that if a letter was properly addressed, stamped, and deposited in an appropriate receptacle it will be presumed that it has been received. This is a general rule of law, as opposed to a particular statement in a given case that is an instance of the application of this rule. Thus it would seem correct to say that the presumption in the case, as modeled by the Prakken and Sartor theory, does not appear specifically in the set of facts and rules stated above. Rather it is a general legal rule that backs or supports R3.

However, it seems more natural to say that the presumption in the case is the statement that the plaintiff was informed that the stairway was not in a safe condition. In the chain of reasoning on the defendant's side, this statement has the role of an interim conclusion generated by R3 and F2 using DMP. This view of the argumentation accords with the view that the presumption is to be identified with the statement that is derived by inference from a given fact of a case along with a general defeasible rule that applies to the fact. The given fact is the premise of the presumptive inference. We can describe the situation by saying that a general defeasible rule applies to this fact, thereby creating a presumption. The presumption is created by the rule of inference and the given fact by applying the rule to the fact, generating the presumption as a conclusion of the inference.

The most natural way of representing how the presumption is generated in this case is through an examination of its basic inferential structure, as shown in figure 3.

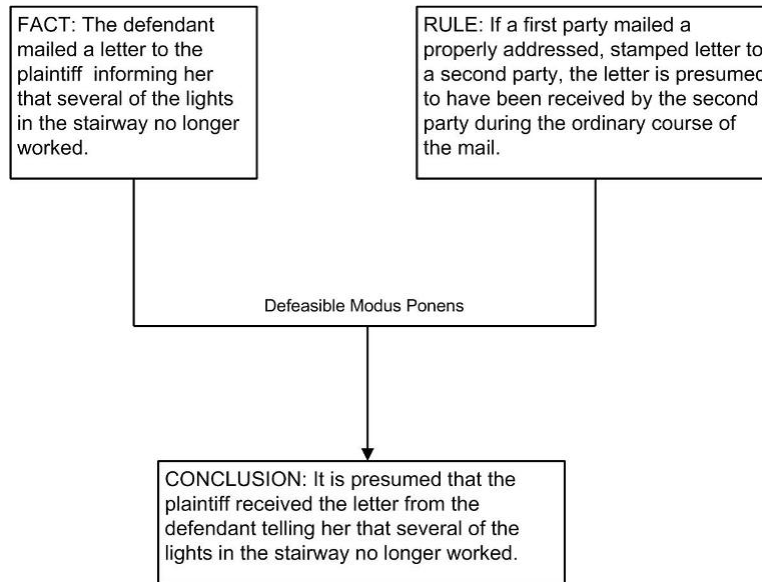


Figure 3: The Mailed Letter Rule in an Inference in the Stairway Case

That this is the more natural way to describe the reasoning in the dark stairway case, and probably many other cases of presumptive reasoning as well, does not really detract, at least very much from the Prakken and Sartor theory, however. The reason is that this theory is supposed to be a formal model of presumption that is based on nonmonotonic logic and meant to be used for purposes of artificial intelligence as applied to legal reasoning. Because it is a formal model that is meant to be implemented in computing systems, it need not represent the most natural way of speaking about presumptions in everyday conversational argumentation, or even for that matter in legal argumentation of the kind found in a trial in civil or criminal law.

Finally, we need to comment on how the presumption in the case is related to the burden of proof. It is a civil case, so the burden of proof is distributed equally between the two parties. The standard of proof is “preponderance of the evidence”, meaning that whichever side has the stronger argument wins. Once the plaintiff has put forward her argument, provided her rules and facts are supported by sufficiently strong evidence, she will win the trial, unless the defendant can put forward a stronger argument. At the point where her argument above is offered, we are still in the argumentation stage. The outcome is not decided yet, but unless the defendant puts forward a stronger counterargument, he loses. What this means is that the plaintiff’s argument has placed an evidential burden on the defendant’s side, as soon as she puts her argument forward. His counterargument, assuming it is strong enough, meets this evidential burden. The conclusion of the plaintiff’s argument is *owner liable*. The support of this argument by the plaintiff by admissible evidence creates an evidential burden on the side of the defendant in a way that is typical of evidential legal argumentation in a trial.

To meet this evidential burden, the defendant uses the device of presumption. The defendant’s problem is that he lacks evidence to prove the proposition *plaintiff was informed -stairway in a safe condition*. All he can prove is the proposition *defendant mailed letter to plaintiff, saying lights in the stairway don’t work*. What use is this? It would be of no use as evidence, except for

the existence of the defeasible legal rule R3, defendant mailed letter to plaintiff, saying lights in the stairway don't work => plaintiff was informed  $\neg$ stairway in a safe condition. This rule can be applied to the fact that such a letter was mailed, giving rise by defeasible inference to the presumption that the plaintiff was informed that the stairway was not in a safe condition. This evidence supports the conclusion  $\neg$ owner liable. Even though the reasoning is merely presumptive, it may represent strong enough evidence to meet the evidential burden set into place by the plaintiff's argument, shifting the evidential burden of proof back to her side. This shifting back and forth of such an evidential burden could take place many more times during the trial.

## 7. Combining the Inferential and Dialogical Components

There have been differing views in philosophy on how the term 'inference' should be defined. In logic textbooks, this term is commonly used to represent a structure made up of a set of propositions one of which is designated as the conclusion. The other propositions are called the premises of the inference. The conclusion is said to be drawn from the premises, and the premises constitute a set of assumptions. Abstractly, the inference may be defined as a relation on the set of propositions making up the premises and conclusion. A typical inference is a sequence of the following sort: all men are mortal; Socrates is a man; therefore Socrates is mortal. This inference is classified as a deductive one, as contrasted with inductive inferences. Inductive inferences are non-conclusive and nonmonotonic, meaning that if new premises are added, the inference may fail to hold. The third category of inference that is sometimes recognized is also non monotonic. A typical inference of this sort is a sequence of this kind: birds fly; Tweety is a bird; therefore Tweety flies. This type of inference is sometimes called defeasible, meaning that it is subject to failure in a case of an exception that could not be predicted in advance. For example, if Tweety has a broken wing, the two premises may be true, but inferring the conclusion from them no longer holds. This meaning of the term inference could be called the logical interpretation.

According to a contrasting interpretation (Brown, 1955, 360), an inference can never strictly speaking be deductive. On this interpretation, inferences do not have premises (358). Instead, inferences should be described as arising from facts or supposed facts (358). An example of an inference is the following: "Riding into town, he saw most of the flags at half-mast and inferred that some well-known person had died" (Brown, 1955, 355). This inference is different from a deductive argument, or for that matter from an inductive argument, and can be identified with what is now called defeasible inference in the literature on artificial intelligence, like the Tweety example. If it is known that it is a general practice in the area to only put the flags at half-mast when some well-known person has died, the inference is a reasonable one. However, it could default in some circumstances. For example, suppose that a recent practice is sometimes in place of putting the flags at half-mast when any soldier has died in a foreign engagement on that day. The soldier would not normally be a well-known person; in such an instance the inference would default.

Whinery (2001, 2) noted that the courts on occasion have used the terms 'inference' and 'presumption' synonymously. He drew the distinction in terms of the notion of

probative value. The probative value of an inference, or a proposition that is a premise in an inference, may be defined as its capability to increase probative weight as evidence of a proposition that is the conclusion of an inference. A presumption created by a rule of law can have probative value, but the way that this probative value arises in the case of a presumption is always different, according to Whinery, from the way it arises in the case of an inference not based on a presumption. In the case of an inference not based on a presumption the probative value of the conclusion drawn arises only from the probative force of the evidence. However, in the case of a presumption it arises from a rule of law. On this analysis, a presumption is a kind of inference, or at least is based on a kind of inference, but it is a special kind of inference in which one premise is a rule of law. A rule of law may carry probative weight, but it does so in a way different from a factual generalization. A factual generalization carries probative weight because it is supported by evidence that can be brought forward by one side and questioned by the other side.

According to Ashford and Risinger (1969, 165), there are some judicial limits that have been set on the use of presumptive inferences in law following due process requirements of the fifth and fourteenth amendments that “void the operation of presumptive language which works in an unreasonable or capricious manner”. They cite two cases showing that presumptive language may not be used to circumvent constitutional rights: *Mobile J. & K.C.R.R. v. Turnipseed* (219 U.S. 35 (1910)), and *Bailey v. Alabama* (219 U.S. 219 (1911)). In another case, *Leary v. United States* (395 U.S. 6, 36 (1969)), a court proposed a constitutional test called the “rational connection test” that is supposed to supply a more stringent standard to presumptive reasoning. A widely known statement of this test comes from yet another case, that of *Tot v United States* (3 U.S. 463, 467 (1943)):

Under our decisions, a statutory presumption cannot be sustained if there be no rational connection between the fact proved and the ultimate fact presumed, if the inference of the one from the proof of the other is arbitrary because of lack of connection.

According to the requirements of the dialogical theory, the rational connection between the fact proved in the ultimate fact presumed must have five inferential components. The first is a form of argument or argumentation scheme. For example *modus ponens* is a form of argument. In the examples treated here, the form of argument is that of defeasible *modus ponens*. The second component is a general rule that is meant to fit a particular case. One premise is a generalization (general rule) that takes the form of a general statement in the form of a conditional. The rule is often of a practical sort, that stems from efficient means needed to move a discussion or inquiry forward. In the examples treated here, it is a defeasible generalization. Some argue that it is always a defeasible generalization, because there are no conclusive or irrebuttable presumptions. However, this issue is controversial. The third component is a set of factual premises describing the particulars of a given case at issue. The fourth component is the proposition derived from the first three components by defeasible reasoning. It is often called the presumption that arises in the particular case. The fifth component is that of the probative function of an inference. Each proposition in an inference, the premises and the conclusion, may be said to have probative weight, of the kind that can be ranked in an ordering. In other words, some propositions have equal probative weight, and some propositions have more probative weight than others, and some have less probative weight than others. The

probative function of an inference refers to the use of an inference with premises that carry probative weight to increase the probative weight of the conclusion (Walton, 2002, 214-216). A presumption must have all five components to be a rational connection.

As indicated above, presumption also has dialogical components. The first is that there is some sort of ongoing discussion or investigation underway, and there are various participants taking part in it. In the simplest kind of case we study here there are only two participants, called the proponent and the respondent, and the issue to be resolved by the discussion is a conflict of opinions between them. The second component is the burden of persuasion. Each side has a thesis, a particular proposition that this side is required to prove to some standard proof in order to win the discussion. The third component is that the dialog is composed of three stages. Matters of which side has to prove what in order to win are set at the opening stage of the dialog. The fourth component is the burden of persuasion. At the opening stage, it is made clear that each side has a burden of persuasion. The burden of persuasion is composed of three elements stating (i) a thesis, (ii) which side has to prove that thesis, and (iii) what standard of proof has to be met. When a side puts forward arguments of the kind that successfully fulfill its burden of persuasion, that side is the winner in the dialog. The question of which side won or lost, by fulfilling its burden of persuasion or not, is cited at the closing stage of the dialog. The middle stage, between the opening and closing stages, is called the argumentation stage.

The relationship between the inferential and the dialectical components of presumption can only be properly appreciated once one fits the inferential component into the setting of the dialectical component. You might think that the notion of a presumption is completely defined by the five inferential components, but actually this is not so, because there are plenty of defeasible inferences from a fact and rule to a conclusion about a particular case derived from the fact and rule as premises. This distinction has been observed in law (Allen and Callen, 2003). The difference between a presumptive inference and an ordinary defeasible inference that is not presumptive in nature relates to the notions of burden of proof and standard of proof, factors that vary in different contexts of dialog. In a trial, for example, there are two sides. The claim of the one side is opposed to the claim made by the other. When one side puts forward an argument that has probative value, that argument supports its claim, and thereby rebuts the claim made by the opposed side. When this happens during the argumentation in a trial, it is often said that the burden of proof has shifted to the opposing side. Bringing forward a presumption can have the same effect. Thus the effect of bringing forward an inference based on a presumption, if the conclusion of the inference carries evidential weight, is that it places what might be called an evidential onus or burden on the opposing side. This phenomenon is the link between presumption and burden of proof.

A presumption may be defined as a plausible inference based on a fact and a rule as premises, where the premises are insufficient to support the conclusion in accord with the link or warrant presenting the argumentation scheme joining the premises to the conclusion, and where a further boost is needed to gain a proper acceptance of the conclusion. But what is meant by the term 'insufficient' in this definition? What is meant is that the argument fails to meet the burden and standard of proof that should be required to make it sufficient to prove the conclusion. But what does this mean? When is an argument sufficient to prove its conclusion? The answer to this question can only be sought in the notions of burden of proof and standard of proof. These notions vary with



the type of dialog in which the argument occurs and the stage of the dialog at which the argument was put forward (Krabbe, 2003). Hence dialectical notions are required to fully define the concept of a presumption.

The need for making a presumption arises during the argumentation stage when a particular argument is put forward by one side. Typically what happens is that a problem arises because there is some particular proposition that needs to be accepted at least tentatively before the argumentation can move ahead. But at that point in the dialog, this proposition cannot be proved by the evidence that is available so far. That evidence is insufficient, and the circumstances are such that collecting it would mean a disruption of the dialog, for example because it might be very costly or take too much time to conduct an investigation to prove or disprove this proposition by the standards required for properly accepting or rejecting it. It's precisely in this kind of case where the notion of presumption comes in. The proposition can be tentatively accepted as having the status of presumption even though the evidence supporting it at that present point in the dialogue is insufficient for accepting it. The reason for accepting it, typically a practical one, is to be found in the rule premise and the factual premise that support it as a conclusion.

Hence it is very important to recognize that the notion of sufficiency for acceptance is an essential component in the definition of presumption. The presumption is not just a general rule that can be applied to a particular case. Nor is it just the application of such a rule to a factual proposition to draw an inference leading to a factual assumption. It is the use of this kind of inferential setup for a particular purpose in a dialog, in a case where the factual assumption cannot be proved, and therefore accepted, by this standard of proof appropriate for the argument at the stage at which it occurs in the dialog. It is important to recognize that a presumption is not a conclusion that has been proved. In contrast, it is an assumption that cannot be proved, as the evidence has been collected at this point in an investigation, but that warrants acceptance anyway.

## 8. Summary of the Dialogical Theory

The key problem for the new theory was to define presumption in such a way that enables a distinction to be drawn between presumption and any other kind of defeasible *modus ponens* inference. Defeasible *modus ponens* inferences are extremely common in legal reasoning and in conversational argumentation generally, whereas presumptions are comparatively rare. On the Ullman-Margalit model, a presumption is defined as an inference based on two premises, one of which is a fact and the other of which is a generalization. The new theory finds this model acceptable as far as it goes, but the problem is that a deeper theory is needed in order to distinguish between the most common kinds of inferences based on facts and rules and those that can be distinguished as distinctively presumptive inferences. The new series solves this problem by setting out eight requirements for an inference to be a presumption.

1. It must be a linked argument of the defeasible *modus ponens* form.
2. One premise, called the fact premise, states some fact concerning a particular case at issue.
3. The other premise, called the rule premise, states a general rule that has a conditional form.

4. The context is that of a persuasion dialog in which a burden of persuasion has been set at the opening stage.
5. The conclusion drawn from the fact and the rule is put forward to gain the respondent's acceptance of it.
6. The argument is not sufficiently strong, based only on the evidence supporting the two premises to shift a burden of production to the respondent's side.
7. The presumptive rule has a practical justification in line with the goal of the persuasion dialogue.
8. The argument is sufficiently strong, with the practical justification counted in, to shift a burden of production to the respondent's side.

The first five requirements are not enough by themselves to distinguish between presumptions and many of the most common kinds of inferences found both in legal reasoning and everyday conversational argumentation. It is the last three requirements that mark off presumptions as distinctive kind of reasoning that can be brought to bear when the evidence is not strong enough in a given case as a basis for resolving a disputed point needed to move the argumentation ahead so that the ultimate conflict in the dialog can be resolved.

The first three requirements are inferential in nature. They describe the characteristics of the inference, that it must be a linked argument, that it must have certain kinds of premises, and that the conclusion is drawn from the premises by a defeasible inference of a certain sort. The remaining five requirements are contextual in nature. They pertain to the context of dialog in which the inference is used to move a chain of argumentation forward towards its goal in a dialog. The dialog structure provides a conversational setting in which the inference is used as a species of argumentation.

Now let's apply this theory to the case in which a person is declared dead by law in order to distribute his estate, based on the fact that he has disappeared for five years and the legal rule that if a person has disappeared for a period of five years or greater, he or she can be declared dead for legal purposes. The claim made in such a case, let's say, is that the proceeds of the estate should be divided up and handed out according to what the person stated in his will. One of the elements of this claim is that the person has to be dead. This is a civil case in which the claim has to be proved by the proof standard called preponderance of the evidence. To fulfill his burden of persuasion in the case, the claimant has to produce a strong enough argument to meet the standard of proof. If his argument meets this requirement, he has filled his burden of production, and the burden of production shifts to the other side. A burden of production now shifts to the other side to produce some evidence that person is not dead. The presumer<sup>3</sup> side has fulfilled its burden of production, and if the presumee side does not fulfill its burden of production, and the presumer proves all the other elements to the required standard, the presumer fulfills its burden of persuasion. The bottom line is that the party who claims that the proceeds of the state should be divided up and handed out according to what that person stated in his will has won the case.

Now let's apply the theory to the stairway case. The plaintiff sued the building owner, claiming he did not keep the stairway in a safe condition. In civil law, this claim needs to

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<sup>3</sup> Using the terms plaintiff and defendant can sometimes cause the reader to lose track when the burden of production is shifting back and forth from one side to another repeatedly over several moves in a dialog. For this reason we have invented the artificial terms 'presumer' and 'presumee' to name each side.

be proved using the preponderance of the evidence standard. Her ultimate *probandum* was the proposition that he did not keep the stairway in a safe condition. Hence the burden of persuasion was on her to prove that the stairway was unsafe. Now we need to look at the arguments on both sides. The argument the plaintiff gave to prove her claim that the stairway was unsafe was that the lighting did not work properly. This argument would be defeated, however, if the defendant had informed her beforehand that some of the lights in the stairway no longer worked. To defeat it, the defendant argued that he had sent the plaintiff a letter informing her that several of the lights in the stairway no longer worked. The inferential structure of the plaintiff's argument is shown in figure 4.

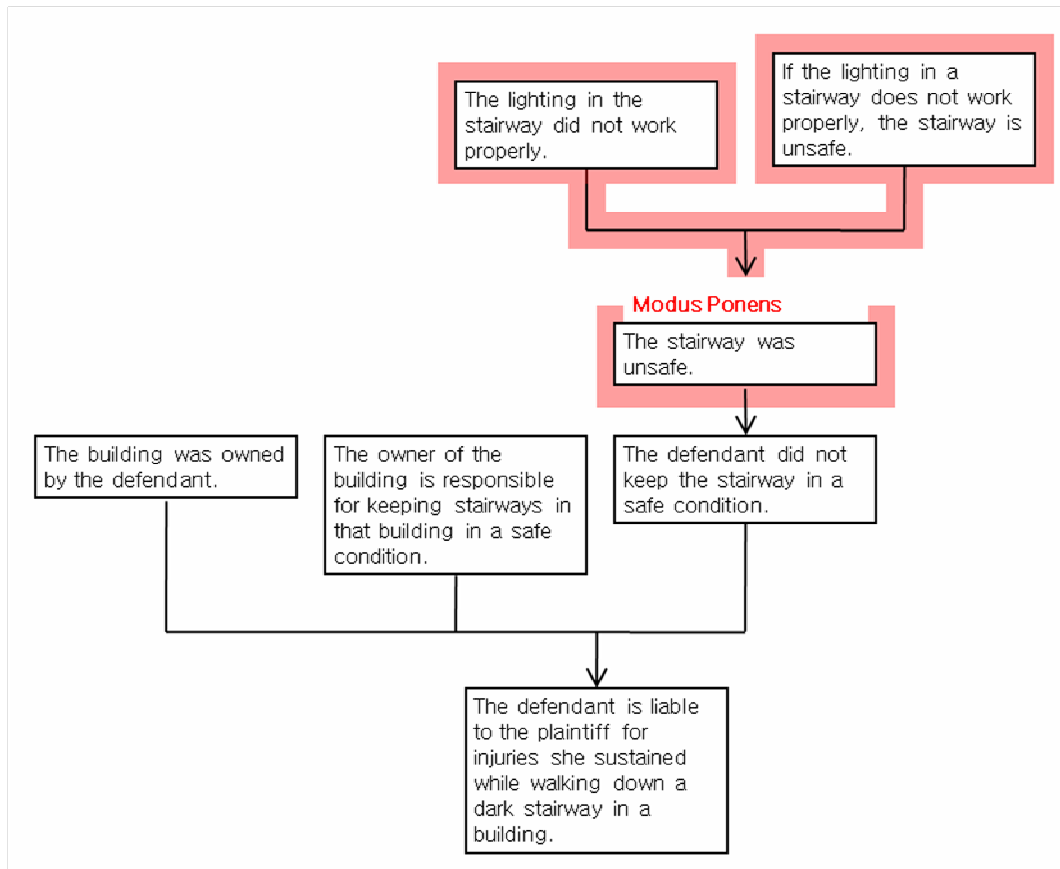


Figure 4: Inferential Structure of the Plaintiff's Argument

The evidential reasoning in the plaintiff's argument is straightforward. The two premises in the top on the right are used to derive the conclusion that the stairway was unsafe by a *modus ponens* inference. At the next level in the chain of reasoning, three additional premises are used to support the plaintiff's argument that the defendant is liable to the plaintiff for injuries sustained while walking down the dark stairway. The reasoning is based on evidence and no presumptions are required. This could be called a case of normal evidential reasoning, meaning that no presumptions are needed to boost up weak points in the chain of reasoning needed to establish the conclusion.

In contrast, in the defendant's argument, a presumptive inference is needed to establish the conclusion. The inferential structure of the defendant's argument is shown

in figure 5, displaying that the presumptive inference fits in with the other inferences in the chain of reasoning.

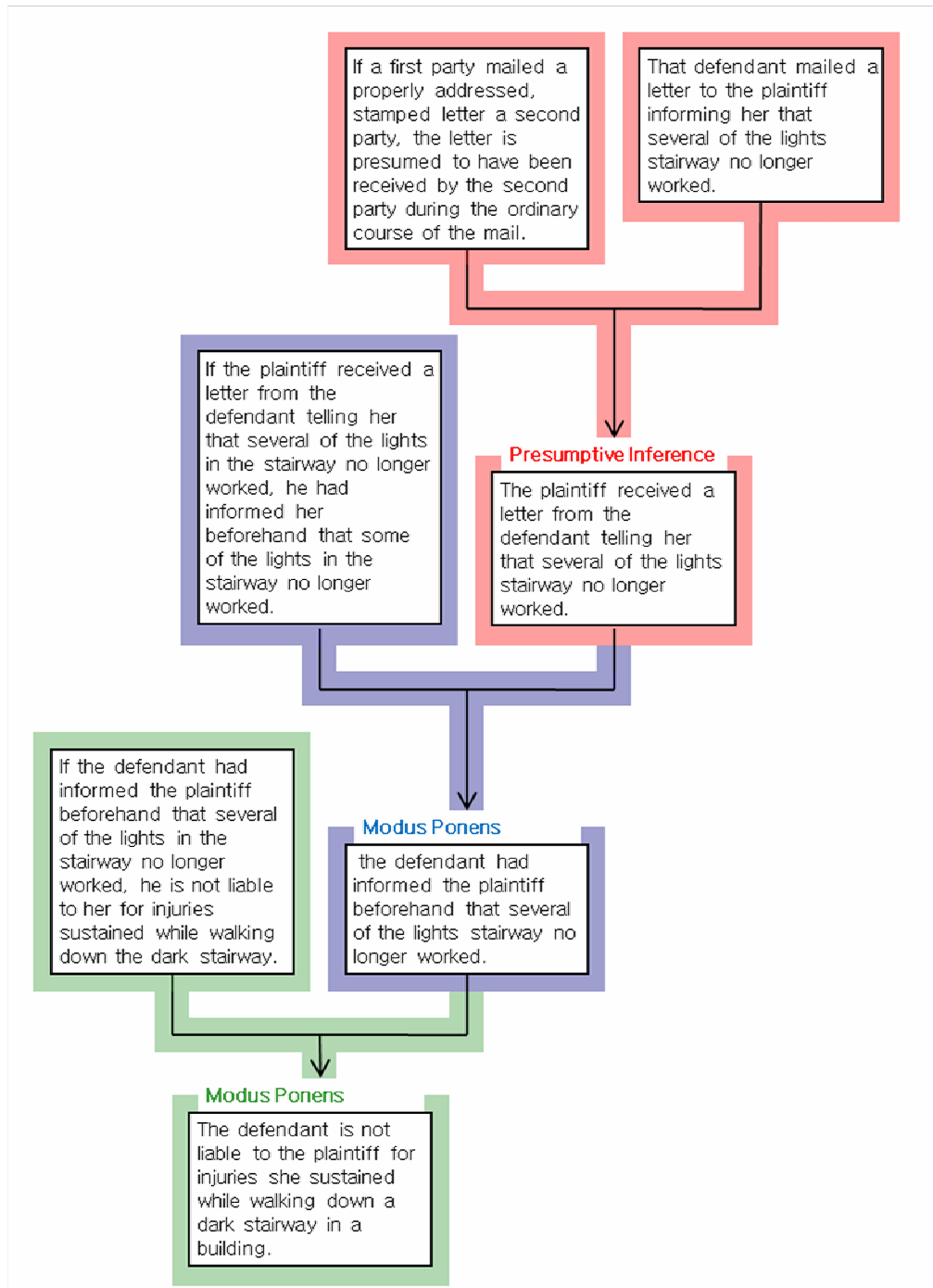


Figure 5: Inferential Structure of the Defendant's Argument

In the defendant's argument, as shown in figure 5, there are three steps of inference. The inference from the first two premises shown at the top right to a conclusion that the plaintiff received a letter from the defendant telling her that several of the lights in the

stairway no longer worked is a presumptive inference. But this presumptive inference is combined with the two normal *modus ponens* inferences shown below it. Normal evidential reasoning is not enough here. To fill the gap, a presumptive inference has to be used along with the two other inferences.

The conjecture can be put forward here that the Prakken-Sartor theory, an account of legal presumption meant to be suitable for artificial intelligence, can be combined with the dialogical theory, incorporating the Prakken Sartor theory as its logical component to display the connections between burden of persuasion, evidential burden and presumption.

There is an additional component that needs to be added to the dialogical theory of presumption. What needs to be added is the requirement that the inference is sufficiently strong to satisfy the evidential burden of the party who put it forward as a presumption (the proponent). In other words, to be a presumption, it must shift an evidential burden from the proponent's side of the dialogue to the opponent's. The effect in the dialog must be that the party doubting or denying the presumption that has been inferred (the opponent) must give some argument against it, or else he will risk losing the exchange, leaving it so that the proponent's argument appears more plausible than his. To sum up then, on this theory, the notion of a presumption may be defined as follows. A presumption is (a) a proposition put forward by a proponent in a dialog indirectly by drawing it (or allowing the respondent to draw it) as a conclusion from a factual proposition and a general rule, (b) on the basis of a defeasible inference<sup>4</sup>, (c) to gain the respondent's acceptance of it, (d) of sufficient strength so that it meets an evidential burden that shifts the burden of proof in the dialog from the proponent to the respondent.

There is much discussion in the legal literature as well as the literature on argumentation theory concerning the distinction between rebuttable and non-rebuttable presumptions, sometimes also drawn as a distinction between permissible inferences and conclusive presumptions (Allen and Callen, 2003, 936). For reasons of space, we do not include a discussion of this distinction, and are compelled to leave it as a subject for further research. Because of the importance of the subject, and the abundant literature on it, we cannot deal with it in the scope of this paper, even though the theory put forward in the paper has significant implications for rethinking this distinction

This theory is meant to model presumptive reasoning in everyday conversational argumentation, but derives its inspiration from how burden of proof and presumption work as legal concepts in the context of the trial. Ordinary conversational argumentation is normally taken to be based on a dialectical framework in which two parties each criticize the arguments of the other. In contrast, legal argumentation in a trial is clearly a three party dialog structure in which there are two opposed sides along with a third party trier who decides the outcome of the dialog. How presumption works in a trial needs to be analyzed in relation to the interplay among these parties. How presumption operates in this kind of structure can be illustrated by McCormick's account (Strong, 1992, 460) of the effects of presumption in a civil jury trial. It can happen either where one party or the other moves for a directed verdict, or when the time comes to instruct the jury. The

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<sup>4</sup> Although presumptions of the most common sort are generally defeasible, exceptions need to be made for conclusive presumptions in law. Courts have presumed that if a child is under seven years of age, she could not have committed a felony (Strong, 1992, 451). We leave open the issue of whether so-called conclusive presumptions of this sort require an extension or modification of the theory.

defendant's motion for a directed verdict will be denied by the judge even though the plaintiff has failed to offer any evidence to support its claim, if the plaintiff can show that the basic facts give rise to a presumption of that claim: "the jury will be instructed that if they find the existence of the basic facts, they must also find the presumed fact" (461). We can see how presumptive reasoning is used in the context of the trial as a way of finding a substitute for meeting an evidential burden in some cases, as shown in the inferential structure of the defendant's argument in figure 5.

## 9. Directions for Future Research

The dialogical theory of presumption presented in this paper has raised a number of problems that cannot be solved within the scope of a single paper. Placed in a context of the recent literature on presumption and burden of proof in artificial intelligence, alongside the other theories of presumption that have been put forward in the field of argumentation studies, the dialogical theory offers resources for approaching these problems in a different way.

One problem we have not addressed in this paper is how to rebut a presumption. This is an important problem to be addressed in future work. It has not been addressed in this paper because there are theoretical problems about how to define the notion of a rebuttal that are significant enough to merit a separate investigation. Two theories already exist in the legal literature (Park, Leonard and Goldberg, 1998, 109-111). According to the bursting bubble (Thayer-Wigmore) theory of presumption, presumptions are "like bats flitting in the twilight, but disappearing in the sunshine of actual facts" (p. 109). It says that a presumption should have no effect once "rebutted" with evidence challenging the presumed fact. In the letter example, suppose that the plaintiff did not challenge the defendant's proper addressing, stamping and mailing of the letter, but testified that during the whole period, she picked up and diligently read her mail each day, and she never saw the letter. On the bursting bubble theory, the presumption that the plaintiff received the letter is cancelled. The jury would now be left "to apply its sense of logic and experience" to determine whether the plaintiff received the letter or not (110). According to the Morgan-McCormick theory, once a presumption is raised by its proponent, the burden of proof shifts to the opponent (111-112), or otherwise the presumption stands. This theory holds that the bursting bubble theory gives too "slight and evanescent" an effect to presumptions (111). On this theory, if the jury finds that the defendant properly addressed, stamped, and mailed the letter sufficiently in advance of the accident, the plaintiff must prove it more likely that she did not receive the letter or she must suffer a finding that she did (112). Which theory is right depends on how the notion of rebuttal (also often called refutation, attack, argument defeat, and so forth) is to be defined. It also depends on general issues in argumentation theory on how arguments are to be evaluated.

Another general problem that has been posed in this paper is how the notion of presumption relates to argumentation schemes. The Prakken-Sartor theory can be combined with the dialogical theory to solve the problem of the relationship between presumptions and argumentation schemes. To give an example, consider the following reformulation of the argumentation scheme for argument from expert opinion (Reed and

Walton, 2003).<sup>5</sup> In this version, a conditional premise that links the major to the minor premise has been added.

*Argument from Expert Opinion*

Major Premise: Source *E* is an expert in field *F* containing proposition *A*.

Minor Premise: *E* asserts that proposition *A* (in field *F*) is true (false).

Conditional Premise: If source *E* is an expert in a field *F* containing proposition *A*, and *E* asserts that proposition *A* is true (false), then *A* may plausibly be taken to be true (false).

Conclusion: *A* may plausibly be taken to be true (false).

In this version, the additional premise was called a conditional premise in (Reed and Walton, 2003), because it takes the form of what is called a conditional proposition in logic.

Let's apply this version of the scheme to an example. Let's say that Jason is a forensic expert in the field of ballistics evidence and that he has testified that the bullet found in the victim's body matches the defendant's gun. Let's say that these two propositions are accepted as factual in a particular case. Given these two facts, it may be taken as a presumption that the bullet found in the victim's body matches the defendant's gun. The presumption, as commonly said, arises from these two facts. But what is the logical structure whereby the two facts give rise to the presumption by some sort of identifiable logical inference? According to the dialogical theory, the structure is the argumentation scheme for appeal to expert opinion. If we look at the scheme, we can see that the conditional premise of the scheme acts as the rule in the Prakken-Sartor theory. The defeasible rule, shown to have the conditional form in version 2 of the scheme for appeal to expert opinion, enables the conclusion of the scheme to be drawn by a defeasible *modus ponens*. Thus the presumption is raised that the bullet found in the victim's body matches the defendant's gun. This presumption would then shift an evidential burden in the context of a murder trial in which the expert ballistics testimony is evidence.

The structure of the inference in the example can be modeled in the Prakken-Sartor theory as the following sequence of reasoning.

F1: Jason expert

F2: Jason testified bullet matches weapon

R1: Jason expert & Jason testified bullet matches gun => bullet matches gun

Applying defeasible *modus ponens* to F1, F2 and R1 yields the conclusion bullet matches gun. Through this simple example we can see how the presumption arises in the case through the application of the Prakken-Sartor theory and the dialogical theory combined. We can now see how presumptive argumentation schemes, like the one for appeal to expert opinion described in section 6, can justifiably be classified under the

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<sup>5</sup> The version in (Reed and Walton, 2003) uses a variable *S* for the subject domain of the proposition.

category of presumptive reasoning. Such schemes can generally be so classified because the conditional premise, the generalization implicit in the scheme, functions as a defeasible rule of the kind specified in the Prakken-Sartor theory.

One of the most important features of the dialogical theory is that it brings out the relationship between presumption and evidence. The burden of persuasion set at the opening stage of a dialog implies that the general default rule applies through the argumentation stage of the dialog – the party who asserts, or makes a claim, must back it up with evidence. Putting forward a presumption, as opposed to making a claim in the form of an assertion, is an exception to this general rule. According to the dialogical theory, a presumption can be set in place as the conclusion of an implicit argument based on a factual premise and another premise that is a default rule. Thus the speech act of putting forward a presumption during the argumentation stage has a structure that is very similar to the speech act of putting forward an argument. This structure is brought out very well by the new dialogical theory. Thus the theory displays the structure whereby presumption has a function of presenting evidence comparable to the way evidence is presented in law, namely by providing an argument that gives reasons to back up a disputed claim. Presumption can be seen as a kind of argumentation device that provides a reason for tentatively accepting a claim in the absence of evidence to the contrary.

Prakken and Sartor, following Williams, call the burden of proof set at the opening stage of a legal dialog, like that of a trial, the burden of persuasion. The question arises whether burden of persuasion only applies in persuasion dialogue, or whether it applies in other types of dialogue as well, like deliberation, negotiation, inquiry, information-seeking, and eristic dialogue. It would seem to be a likely hypothesis that it does not apply in these other types of dialogue. For example, in negotiation, each party is trying to get most of what it wants, and so there would seem to be no place for matters of burden of proof to arise, except where the dialogue shifts to a persuasion interval. If this general hypothesis is right, it follows that burden of persuasion is a unique characteristic of persuasion dialogue, as contrasted with these other types of dialogue. If this is so, it may help us distinguish between persuasion dialogue and, say, deliberation dialogue.

On the Prakken-Sartor approach, burden of production and tactical burden of proof only arise where there is a burden of persuasion in a dialogue. If this hypothesis is right, then it seems likely also be true that these two concepts have no place in types of dialogue other than persuasion dialogue. However, it would appear that burden of proof has a recognized place in the least one type of dialog, namely the inquiry (Walton, 1996). So it may well be that something like burden of proof, which should not be called burden of persuasion, plays a role in the other types of dialogue as well. How notions comparable to burden of persuasion work in these other types of dialog is a question now open for study in future research.

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