1

Introduction to Basic Concepts and Methods

A presumption is a device used in the law of evidence to enable a proposition to be taken into account as a piece of evidence in a case even though the argument supporting that proposition is not strong enough for it to meet a required burden of proof. From this definition of what presumption is, we can already see that presumption is linked to burden of proof in evidential reasoning in law. Burden of proof sets a standard for what is to be considered a proof in evidential reasoning in law. It is a device used to make it possible for a trial to arrive at a decision for one side or another in a contested case, even though all the facts of the case may not be known, and for various reasons may never be known. For example, in a criminal case, there may have been no witnesses to the crime, and the crime may have happened a long time ago. Most of the existing evidence may have been lost or destroyed. Therefore, evidential reasoning in law has to be able to move forward to a conclusion under conditions of uncertainty, lack of knowledge and even inconsistency. Typically, for example, in a trial there will be witnesses for one side, but there will also be conflicting testimony on the other side brought in by witnesses who say the opposite thing. What these conditions imply is that in a trial it is rarely if ever possible to prove or disprove the ultimate conclusion beyond all doubt. Hence, the device of having a burden of proof is necessary for the trial to reach a conclusion for one side or the other.

Presumption is not a new notion in legal reasoning. It was a device used in the ancient Jewish law code of the Talmud, and in ancient Roman law. A rough idea of how presumptions work is shown by citing some of the more common examples. According to the presumption of death, a person who has been unheard of for a fixed period of time, varying with the jurisdiction, five years typically in common law, may be presumed to be dead if there is no other explanation of his or her disappearance based on any evidence. Later in this book we will examine an example of another interesting kind of presumption called the presumption of mailing, which

1

presumes that a properly addressed and stamped letter sent by the Postal Service was received by the person to whom it was addressed.

There are two purposes to this book. One is to explain and apply the latest methods of argumentation and artificial intelligence to help us understand how burdens of proof and presumptions work as devices of legal reasoning. The other is to use these resources to analyze burden of proof and presumption in everyday conversational argumentation. The task of describing and explaining how these models of burden of proof and presumption have been implemented in working software systems for analyzing and constructing legal arguments comprises a substantial part of the book. As argumentation has proved to be useful for artificial intelligence, this book will show how there is also a bounce-back effect enabling the benefits of the recent research in computer science to be applied to the problem of analyzing burden of proof and presumption. These two key concepts are fundamental to argumentation studies generally, and are known to be important for studying fallacies and other foundational problems that arise from the shifting of a burden of proof back and forth in a dialogue.

It is argued in this book that we can learn a lot from how the courts have developed procedures over the years for allocating and reasoning with burden of proof, and from how artificial intelligence models have built clear and precise logical models to represent this kind of reasoning. Indeed, the conclusion of the book, based on analyses of many legal and nonlegal examples, is that there is a general overarching structure of argumentation that fits cases of everyday conversational argumentation as well as argumentation in legal cases and that is based on an underlying common structure of burden of proof.

1. Problems and Objections

The concepts of burden of proof and presumption are fundamentally important in argumentation studies and indeed one could argue that they are the most fundamental concept in this area. These two concepts are so closely connected that it is impossible to study one without the other (Rescher, 2006). But procedural methods for dealing with issues of burden of proof and presumption in argumentation have been worked out and applied in most detail in the field of law. However, law itself is far from free of difficulties in being able to define and analyze this pair of concepts. According to Wigmore (1981, 285) the difficulties of every attempt to explain the concepts of burden of proof and presumption in law "arise not so much from the intrinsic complication or uncertainty of the situation as from the lamentable ambiguity of phrase and confusion of terminology under which our law has so long suffered." Kiralfy (1987, 94) wrote in a book written exclusively on the concept of burden of proof in law: "the phrase 'burden

of proof' is notoriously difficult to define with any degree of precision, and
when defined equally difficult to apply in a consistent way." In the standard
work on evidence law *McCormick on Evidence*, Strong (1992, 449) wrote that
presumption is the "slipperiest member of the family of legal terms," except
for its first cousin, burden of proof.

There is considerable controversy concerning the extent to which legal
methods for defining and determining burdens of proof can be applied
to the study of problems of burden of proof arising in everyday conversa-
tional argumentation, and other context-like forensic debate. Hahn and
Oaksford (2007) argued that the notion of burden of proof has been inap-
propriately extended into argumentation studies from its proper domain of
application in law. They describe this extension as a "hasty transference" of
legal concepts to less structured contexts of everyday conversational argu-
mentation. Kauffeld (1998, 246) argued that the procedural formality of
courtroom argumentation has been responsible for the lack of progress in
investigating presumption and burden of proof in everyday conversational
argumentation. Gaskins (1992, 3) even claimed that burden of proof works
in law as a shadowy device used by skillful advocates in legal battles to direct
manipulative arguments from ignorance against each other. On his view,
public argumentation is deteriorating badly through the use of shadowy
devices of burden shifting and arguments from ignorance. These objec-
tions are stated more fully in Chapter 1, but it won't be until the last chapter
of the book that we can fully respond to them.

Hahn and Oaksford (2007) have argued that the notion of burden of
proof has been extended inappropriately into argumentation studies from
its proper domain of application in law. They call this extension a "hasty
transference" of legal concepts to other kinds of argumentation, citing
Gaskins (1992) and Kauffeld (1998) as supporting their view (2007, 40).
On the account given by Hahn and Oaksford, Whately was the culprit who
first affected the transference from law through the introduction of the
notion of burden of proof in his writings on rhetoric. They also cite confu-
sions and difficulties in the way the notion of burden of proof operates in
law, citing the historical analysis of Gaskins (1992) to show how the U.S.
Supreme Court of the Warren era used creative shifting of burden of proof
as a vehicle for progressive social change (42). The two fundamental prem-
ises of Hahn and Oaksford's analysis are the propositions that burden of
proof is only important where action is concerned, and that legal argumen-
tation is about action. On their view (48), legal argumentation is character-
ized by a need for termination that arises from its inherent link to action.
On their view, questions of evidence in law are subsidiary to decisions about
actions. As well, on their view, "termination does not seem essential to argu-
mentative dialogue in general"(48). On these considerations, they draw the
conclusion (49) that there is no need for burden of proof in a critical dis-
cussion because it is not a type of dialogue with an inherent link to action.

As an example to support their case (2007, 43), they cite the decision that many countries have had to face when deciding whether or not to sign up for the Kyoto agreement. The majority of papers in leading scientific journals have accepted the claim that global warming is real, even though debate on the topic continues. However, they write (43), "the possible consequences of global warming are so potentially devastating that one might not want to wait until one was entirely certain before taking action." Accordingly, the procedure governments use is to set a threshold for action so that they can arrive at a decision when they are convinced enough to act. This example provides a paradigm case of the use of burden of proof as a device for rational decision making, leading to a course of action even under conditions of uncertainty. The problem posed by this kind of case is how burden of proof works in cases of deliberation where there is a need to take action and a choice has to be made on the evidence available. Is this different from the kind of case where the aim of a discussion is to find the truth by evaluating the evidence on both sides of a contested issue? This problem will be taken up in Chapter 7.

In the late 1960s and early 1970s, a new style of theorizing about evidential reasoning, called the New Evidence Scholarship, emerged in American law schools (Tillers, 1989, 1226). Some leading characteristic features of the New Evidence Scholarship can be summarized as follows. It focused more on logic as well as on law, it focused on the notion of proof in a way tying it to logical reasoning and it emphasized logical rigor as opposed to rhetoric. This scholarship also struggled with fundamental problems of epistemology, taking the approach that knowledge should be based on evidence rather than on justified true belief. Another characteristic was that the new scholarship employed technical tools from mathematics and formal logic, tools that were later also developed by artificial intelligence in computer science.

How research technical tools were used to formulate the outlines of a new theory of evidential reasoning and provide an approach that led to these later developments in artificial intelligence can best be appreciated by reading David Shum's book *The Evidential Foundations of Probabilistic Reasoning* (1994). His work defined the agenda of an important part of the new evidence scholarship (Tillers, 1989, 1226). Schum's work supported the view already widely accepted in law that the traditional approach to probability based on Bayesian rules do not take into account important features of the kind of reasoning used in realistic legal argumentation about evidence. Schum advocated and applied argument diagramming methods, of the kind that trace back to the use of diagrams to represent the mass of evidence on both sides in a legal case at trial called Wigmore charts (Wigmore, 1931). Wigmore's thesis was that there is an independent science of reasoning about evidence he called the "Science of Proof" that underlies the legal reasoning based on legal rules and procedures that we are familiar

with. This thesis, when Wigmore first stated it, although it seemed generally like it should be true as an ideal, did not seem compelling as a program of research that could be realistically carried very far, because the science of reasoning was, at the time, confined to deductive logic and to the inductive kind of reasoning used in probability and statistics.

Instead of taking the standard Bayesian approach to probabilistic reasoning based on the study of games of chance in the Enlightenment period by scientists and academicians, notably Pascal, Schum took a different approach now called Baconian probability (Cohen, 1977). Baconian probability ties in closely with the new epistemological view of the New Evidence Scholarship approach. This epistemology defines knowledge as a defeasible concept that leads toward or away from the truth of the hypothesis being inquired into depending on the evidence supporting hypothesis and the evidence against hypothesis. On this approach, epistemology is closely tied to a cognitive model that evaluates a claim by considering both the arguments for it and the arguments against it, and by considering how the arguments for it interact with the arguments against it (in an orderly procedure). In the case of legal evidential reasoning, such a procedure might be, for example, that of a criminal or civil trial in the common law system.

The distinction between Pascalian and Baconian probability (Cohen, 1977; 1979; 1980) has become a matter of some importance for the study of legal argumentation in evidential reasoning. Each of these approaches to probability has a different kind of logic. For example, because evaluating argumentation in the approach of the New Evidence Scholarship requires examining and weighing both the proarguments and counterarguments, we are working in a system that needs to work with a knowledge base representing the mass of evidence in a legal case, allowing for inconsistency and incompleteness. This assumption has highly significant implications concerning how we should treat negation as well as negative evidence. In a Pascalian system, the probability value of a negated proposition is always calculated as unity minus the probability value of the original proposition. This probability rule will no longer work in any system of evidential reasoning based on Baconian probability. Similarly, when we put two pieces of evidence together as a pair of propositions joined by the conjunction operator, in Pascalian probability we basically multiply the probability values of the two simple propositions. This too will no longer work in evidential reasoning in law, for example where DNA evidence is used to corroborate or attack witness testimony evidence in a trial setting (Stein, 2005).

The Pascalian model is applicable to some instances of evidential legal reasoning, for example it is used in analyzing forensic DNA evidence. In recent times, however, there is a growing body of research in artificial intelligence and law that has gone beyond deductive and inductive logic (of the Pascalian sort) to use argumentation methods from informal logic that can

be applied to defeasible reasoning under conditions of uncertainty, lack
of evidence and conflicts of opinion where there are rules that apply but
admit of exceptions. The methods are based on forms of argument that are
subject to critical questioning and that only lead to conclusions that are ten-
tatively acceptable subject to new evidence that may enter a case, and that
sometimes fail. Such argumentation needs to be evaluated on a balance of
considerations taking the pro- and contra reasons into account. We will see
many examples of this throughout the book.

As these new methods were used in artificial intelligence tools and sys-
tems for evidential legal reasoning, Wigmore's thesis came to seem much
more plausible and attractive. Legal reasoning was turning out to be a very
good fit with argumentation methods because progress was being made in
seeing how there is a common structure of reasoning or science of proof
underlying both legal reasoning and everyday conversational argumenta-
tion. Hence, now is the time to see if we can go the other way and apply
some of the lessons learned in artificial intelligence and legal reasoning
to move research forward on some of the main concepts and problems of
argumentation theory, both as it applies to law and other contexts of argu-
mentation as well. One of the most significant concepts in this category
is the notion of burden of proof, and with it the closely related notion of
presumption. The central focus of this book in on the concept of burden
of proof, but because the notion of presumption is so closely related to it
(and indeed often confused with it), this concept has to come into detailed
consideration as well.

2. Arguments from Ignorance

Gaskins (1992), in a broad social commentary that covers styles of legal
reasoning as well as argumentation in everyday conversational contexts,
has marshaled evidence that is supposed to show that the argument from
ignorance has become "an inescapable feature of contemporary discourse"
(3). He sees the argument from ignorance as forming the tacit structure
of an increasingly common style of public argument: "I am right, because
you cannot prove that I am wrong" (2). He has observed that this form of
argument is found "in great abundance in public argument, in philosoph-
ical speculation, and throughout academic discussion" (2). According to
his diagnosis, we live in a pluralistic age where we are increasingly insecure
about resting arguments on fundamental principles, disciplinary founda-
tions or a political notion of the common good (3). The consequence of
our situation, according to Gaskins (3), is that there has been a polariz-
ing tendency in public debate where each side deploys the argumentation
strategy of attempting to impose the burden of ignorance on its opponent.
According to his social commentary on the current state of affairs, the
use of this strategy of arguing from ignorance hardens and exaggerates

the difference between advocates on opposed sides of an issue. Each side declares, "I win, because you have not produced sufficient evidence to prove your point." On this view, the argument from ignorance, in these postmodern pluralistic times, has become a bad boy among argumentation styles that is running amok and distorting all our practices of public discussion, as well as scientific and legal argumentation. This claim appears to be that we are using argument from ignorance in these contexts much more than we used to, and this practice has had highly negative effects on these areas where argumentation is used.

To take one of his more dramatic examples, Gaskins (1992, 147) cites the case of the disastrous Challenger space mission in 1986, citing the view of a commentator who argued that the use of the argument from ignorance by NASA administrators was a main factor in the decision to go ahead with the launch. According to this description of the case, the basic philosophy of the manned space program had been associated with the principle, "Prove to me we're ready to fly." But in this instance, Gaskins argues, the logic of the situation was switched around by an argument from ignorance to the principle: "Prove to me we are not able to fly" (1992, 147). In effect, Gaskins is attributing the Challenger disaster to a tacit shift in the burden of proof effected through the use of the argument from ignorance.

Gaskins' claims that the argument from ignorance is powerful, dangerous and used commonly in both scientific and legal argumentation, as well as argumentation in everyday conversational discourse, have been abundantly confirmed by the study of many examples in (Walton, 1996). However, what has also been shown by this study of many examples of both reasonable and fallacious arguments from ignorance is that it is so extremely common in everyday conversational argumentation that most of us are unaware that we are using it so often. For a long time it seemed to be an exotic form of argument to those few people who studied logical fallacies, and it was assumed traditionally that it represented a fallacious form of argument. However, once its logical structure was revealed as having a characteristic argumentation scheme, it became possible to see that we are using it all the time to draw conclusions in cases where we have to reason from incomplete databases. But what these findings also reveal is that the claim that this form of argument is somehow especially characteristic of our argumentation in a pluralistic age where we are increasingly insecure about resting arguments on fundamental principles, disciplinary foundations or a political notion of the common good, is not very plausible, and would be impossible to prove. After all, if the argumentation scheme for argument from ignorance has been embedded in so many of the common arguments that we have always used since the earliest times when such arguments have been recorded, how can we prove, comparatively speaking, that its usage has spiked in these postmodern times? Once we begin to realize how common this form of argument is in all our reasoning, the hypothesis that it

was not used as much before, but has now greatly increased in contemporary discourse, is open to question. It is an interesting idea for social commentary and speculation that the wide use of this form of argument, and the damage that strategically tricky uses of it can cause, has peaked in our pluralistic age. But how can we prove this idea as a hypothesis about changing styles of argumentation? Perhaps there is some clever way we could design an experiment to attempt to prove or disprove this hypothesis, but the hypothesis itself does seem highly dubious if argument from ignorance is as commonly used as the basis of our everyday reasoning, as well as scientific and legal reasoning, as the evidence so far suggests.

Gaskins links the argument from ignorance to the way burden of proof is used as a device in law. He characterizes burden of proof as "the law's response to ignorance, a decision rule for drawing inferences from lack of knowledge"(1992, 4). He describes the notion of burden of proof as vague and shadowy, operating in the background of legal procedure. He writes that in this respect, it is comparable to the default settings in computer programs. He describes it in negative terms as being often viewed by lawyers as a device for giving stage directions by determining procedural moves in legal argumentation, such as which party to a legal dispute has the obligation to speak first, and when such a party can step forward with evidence. This description of burden of proof makes it sound like a shadowy tool of legal argumentation that operates in the background and is wielded by lawyers and judges as a way of manipulating argumentation. He even writes that the wider influence of the notion of burden of proof on litigation "has been curiously ignored by legal commentators." This claim seems somewhat dubious, because there is a very large literature in evidence law on burden of proof, as well as a large literature on the related notion of presumption, and it is very well understood by legal scholars that the notion of burden of proof is fundamentally important, not only in evidence law, but in all legal argumentation generally. According to Gaskins (4) however, many legal standards are "notoriously vague" when applied to complex cases, and legal standards in such cases do not tell us where the burden of proof rests. He even goes so far to suggest that legal presumptions have been manipulated in order to orient the process of legal argumentation to favor judicial activism. As evidence of this claim he cites a number of Supreme Court cases.

Despite what Gaskins says, when burden of proof and presumption are linked together, they function as evidential devices that are useful and even necessary when dealing with defeasible arguments that need to be used under conditions of uncertainty and lack of knowledge. Generally speaking, the burden of proof tells you how strong an argument needs to be in order to be successful. It represents a description of a task such that if you fail to carry out this task, your argument will fail. Burden of proof rests on the prior notion that there can be different standards of proof appropriate

for different contexts of argumentation. This means that burden of proof might be discharged, making argument successful as a proof of its conclusion, even though the proof is not conclusive according to the requirements of some higher standard. To be realistic, we often have to make decisions based on evidence that cannot remove all doubt.

Burden of proof did not seem to be an important concept in mainstream philosophy in the past because it was generally assumed that in order for an argument to be successful it has to be a conclusive argument, in some sense meaning that it proves its conclusion beyond doubt. Perelman and Olbrecht-Tyteca (1971) and Toulmin (1964) showed that there was strong tradition tracing back to Descartes especially that favored certain knowledge based on conclusive proof that leaves no room for doubt. This was generally taken to mean that the argument had to be deductively valid and have premises that are known beyond doubt to be true. Reasoning based on probability, broadly of the statistical kind, was reluctantly allowed, but defeasible reasoning of the kind that only offered plausibility of a conclusion was seen as too subjective to be admitted as justification for rational acceptance. The impracticality of this view of the matter has long been implicitly recognized in law, where burden of proof is one of the most important factors in aiding courts to use reasoned argumentation to arrive at a conclusion. In typical cases of reasoning based on legal evidence, there is inconsistency and uncertainty in the evidence on both sides of a disputed issue, making a conclusive proof for one side an unrealistic requirement. For those of us seeking to grasp the structure of rational argumentation in a more realistic and practical way than the traditional methods of logic in philosophy made possible, there are many important clues to be found through the practical experiences of the courts, on how to develop and work with the notions of burden of proof and presumption. Unfortunately however, law itself has not found these notions entirely unproblematic to work with, and so there is much work to do to build some clear, consistent and coherent model of how burden of proof and presumption should be defined and should work in argumentation.

3. Three Examples of Burden of Proof Problems

In this section, three examples are presented that could be called classic cases of a problematic shifting of burden of proof from one side of a dialogue to the other. The first one took place in a parliamentary debate. The other two are both legal examples that went to trial, where the issue turned on burden of proof. In the political case, there was no resolution of the issue of which side should have the burden of proof, and the argument about the original issue of the debate simply carried on. In both legal cases, the court made a ruling on the issue of which side had the burden of proof. All three cases are instructive, but in different ways. Each brings out different aspects

of how problems about burden of proof arise, and how they are resolved (or not) in different contexts of argument use.

The first example is part of a debate from the Canadian House of Commons that took place on September 30, 1985, described in Walton (1996, 118–120). The debate arose from concerns that an embargo on the export of Canadian uranium for nonpeaceful purposes was not being respected. It had recently been reported in the media that Canadian uranium was being used in American nuclear weapons. The question directed to the government representative was: "Can the minister give us the reasons why he is absolutely certain that depleted uranium is not being used for peaceful purposes?" The government representative responded as follows: "I have informed myself on the principle of fungibility and other arcane matters that are involved in this question. I have learned that there is, in the treaty, a requirement for administrative arrangements to be put into place that deal with the residue as well as with the original uranium. I have learned that those administrative arrangements are in fact in place. I am satisfied, on the basis of the information I know I have available, that the treaty is being respected." An opposition member then asked the question: "What is your proof?" The government representative replied: "I am asked for proof. The proof is that I have looked for any weaknesses in the treaty and I have found none. If honorable members have any information that the treaty is not being respected, I ask them for the fourth time not to be so secretive. Come forward with your allegations so that we can find out whether they are true or false." At that point, another opposition member said, "Do a proper investigation."

The sequence of argumentation in this case was classified in (Walton, 1996, 119) as fitting the argumentation scheme for the argument from ignorance, or *argumentum ad ignorantiam*, as it is traditionally called in logic. This form of argument, traditionally thought to be a fallacy, is often associated with shifts in a burden of proof (Walton, 1996, 58). The manual of rules for Canadian parliamentary debate (*Hansard*) does not define burden of proof. Procedural disputes, like those about burden of proof, are presumed to be resolved by the speaker of the House. In this case, the government representative began by replying that he investigated the matter, and was satisfied, based on his investigation, that the treaty was being respected. However, the opposition questioner, not satisfied with this standard of proof, asked him to give reasons why he is "absolutely certain" that the uranium is not being used for military purposes. This remark suggests an extremely high standard of proof, one which the government representative would be in no position to satisfy. The best the government representative could be expected to do would be to monitor violations, and be able to cite any that had been drawn to his attention, given the investigative resources at his disposal. At this point, the dialogue degenerates into an attempt by both sides to shift the burden of proof to the other side in a quarrelsome manner.