ARGUMENT FROM FAIRNESS IN JUDICIAL REASONING

Abstract. This paper applies two argumentation schemes, argument from fairness and argument from lack of knowledge, to model the reasoning given by Judge McCarthy supporting his decision to divide the proceeds of a homerun baseball in the case of Popov v. Hayashi. The Carneades Argumentation System is used to model the reasoning. Both schemes are presented, and then applied to the account given by Judge McCarthy as the basis of the reasoning in the case. A special feature needed to apply the scheme for argument from fairness to the case is extracted from Perelman's theory of justice (Perelman, 1980). The resulting analysis extends a previous analysis of the same case that also used Carneades (Gordon and Walton, 2012).

Keywords. argumentation schemes, Carneades Argumentation System, Popov v Hayashi, justice, argument from lack of evidence, standards of proof.

1 Introduction

Argumentation schemes are proving to be increasingly useful for modeling reasoning in legal cases (Bench-Capon and Prakken, 2010), but it is also becoming apparent that the existing list of schemes in (Walton and Macagno, 2008, chapter 9) needs to be supplemented with some new schemes that are particularly important for this purpose. This paper applies such a new scheme, deriving from the work of Perelman (1980) on justice, to the reasoning given by Judge McCarthy supporting his decision to divide the proceeds of a homerun baseball in a case where the factual evidence appeared to be deadlocked as a basis for arriving at a decision. The case of Popov v Hayashi (Popov v. Hayashi 2002 WL 31833731 (Cal. Superior, Dec. 18, 2002)) has become a benchmark for study in the field of artificial intelligence and law (Wyner, Bench-Capon and Atkinson, 2007). A special issue of the journal *Artificial Intelligence and Law* (volume 20, no, 1, 2012) has been exclusively devoted to it. The contributions of the papers in the special issue and the importance of the case are summarized and explained by Atkinson (2012).

The issue of the case concerned which fan should have ownership rights to a homerun baseball hit into the stands by Barry Bonds. There were many arguments put forward by both sides on the issue of which of two claimants should be awarded the right to possession of a ball that bounced from the mitt of one who was attacked by a crowd into the possession of the other. After examining all these arguments in much detail, Judge McCarthy decided that any award to one party would be unfair to the other. He concluded that since each party had an equal and undivided interest in the ball, its monetary value should be divided equally between them. The Carneades Argumentation System (Gordon, 2010) has already been comprehensively applied to the argumentation in Popov v. Hayashi (Gordon and Walton, 2012). In the present paper its application to the use of argument from fairness by Judge McCarthy in the case is modeled in greater depth using two versions of a scheme representing this type of argument. Using these schemes, along with some other schemes necessary to carry out the job, it is shown in finer detail how argument from fairness provides the basis of the reasoning that led to the decision to divide the proceeds between the two parties equally instead of awarding it to the one or the other based exclusively on the factual evidence in the case. A key factor is that the factual evidence was judged to be insufficient for argument of the one side or the other. The paper takes a different approach to modeling the scheme for argument from lack of evidence to reveal a link between this type of argument and argument from fairness.

Section 2 offers an introductory explanation of the argumentation schemes needed for the work of the paper. Section 3 briefly explains the essentials of the Carneades Argumentation System necessary for the analysis of the case. Section 4 presents and explains the argument from fairness along with another argumentation scheme needed for the work of paper called argument from lack of evidence. Section 5 presents a description of the line of argumentation in the case summarized from the statement of decision of the judge, Kevin M. McCarthy (McCarthy, 2002). Section 6 contains a reconstruction and analysis of the main argument in the case using the Carneades Argumentation System. Section 7 states the conclusions of the paper.

2 Argumentation Schemes

Argumentation schemes represent, at an abstract level, forms of reasoning used in everyday conversational argumentation, and in other contexts, like legal and scientific argumentation (Bench-Capon and Prakken, 2010). Many of the most common schemes, still recognized as centrally important in the literature, were identified in (Hastings, 1963), (Perelman and Olbrechts-Tyteca, 1969), and (Kienpointner, 1992). The schemes described and explained in chapter 9 of (Walton, Reed and Macagno, 2008) include the ones for argument from expert opinion, argument from sign, argument from commitment, argument from lack of knowledge, practical reasoning (argument from goal to action), argument from cause to effect, the sunk costs argument, argument from analogy, three kinds of *ad hominem* argument, and four kinds of slippery slope argument. Historically, schemes are the historical descendants of the topics, representing common types of arguments, originally catalogued by Aristotle.

Two schemes that we will have to use in this paper are the one for argument from expert opinion and the one for argument from lack of knowledge, widely known in the literature on fallacies as the argument from ignorance. To explain how schemes work, it is best to begin with a description of these two schemes

The simplest, and in many ways the most intuitive scheme for argument from expert opinion, can nicely be expressed in the form below.

Major Premise: E is an expert.

Minor Premise: E asserts that A is true (false).

Conclusion: A is true (false).

The reader might be interested comparing this form with a slightly more complex version of it given in (Walton, Reed and Macagno, 2008, 310).

This form of argument is defeasible, meaning that it only holds tentatively in a given case, subject to the possibility of new evidence might come in that can defeat it. It is important to recognize that argument from expert opinion is subject to critical questioning, and that therefore it needs to be treated as an open-ended type of argument rather than as a conclusive one of the kind that might be represented by deductive logic or any other monotonic system where the addition of new premises will not make the argument default. This set of critical questions matches this scheme for argument from expert opinion (Walton, Reed and Macagno, 2008, 310).

CQ_1: *Expertise Question*. How credible is E as an expert source?

CQ_2: *Field Question*. Is E an expert in the field that A is in?

CQ_3: *Opinion Question*. What did E assert that implies A?

CQ_4: *Trustworthiness Question*. Is E personally reliable as a source?

CQ_5: *Consistency Question*. Is A consistent with what other experts assert?

CQ_6: *Backup Evidence Question*. Is E's assertion based on evidence?

CQ_1 questions the expert's level of mastery of the field F. CQ_4 questions the expert's trustworthiness. For example, if the expert has something to lose or gain by saying A is true or false, this evidence would suggest that the expert may not be personally reliable. The asking of the critical question defeats the argument temporarily until the critical question has been answered successfully.

Argument from ignorance, also called inference from lack of knowledge, argument from lack of evidence, argument from negative evidence, or the *ex silentio* argument, is a subtle argument that is used very commonly but is not easy to identify because of its subtlety. It is associated with what is called the closed world assumption in computing (Reiter, 1980). Traditionally in logic, this form of argumentation is called the *argumentum ad ignorantiam,* argument from ignorance. The standard form of the argumentation scheme representing this type of argument is the following one, taken from (Walton, Reed and Macagno, 2008, 327).

Major Premise: If *A* were true, then *A* would be known to be true

Minor Premise: It is not the case that *A* is known to be true.

Conclusion: Therefore *A* is not true.

The argument from ignorance was traditionally for many years portrayed as a fallacious form of argument in leading logic textbooks, although it is some of them it is recognized that it can be reasonable in some instances. Recent research in argumentation studies however, has turned this around by finding many cases showing that it is a reasonable but defeasible form of argument in many instances.

In some of the examples of argument from fairness we will examine below, we will see that evaluating arguments from ignorance is closely related to burden of proof, and depends on standards of proof that are set in place in an argument (Gordon and Walton, 2009). For these reasons, below we provide a reformulated version for the scheme. Instead of calling it argument from ignorance (the negative term 'ignorance' suggesting a fallacy), we will call it the standard scheme for argument from lack of evidence.

If there is insufficient evidence to prove that *A* is acceptable [according to the standard of proof required] then *A* is not acceptable.

There is insufficient evidence to prove that A is acceptable [according to the standard of proof required].

Therefore *A* is not acceptable.

This scheme represents a better form of argument from lack of evidence, or argument from negative evidence as it might also be called.

3 The Carneades Argumentation System

Schemes are now being used in computational argument mapping systems, for example Araucaria[1] and Carneades[2]. A user can also select argumentation schemes from a menu and use them to analyze and evaluate arguments, as well as to search through the database for new arguments to prove a claim. The Carneades Argumentation System is a mathematical model of argumentation (Gordon and Walton, 2006) that has an Open Source argument mapping graphical user interface available at no cost to users. The version that presently exists can be used to analyze, construct and evaluate arguments using defeasible forms of argument like argument from testimony, argument from analogy, argument from precedent, practical reasoning, and many other kinds of arguments (Gordon, 2010).

Carneades models critical questions by drawing a distinction between two kinds of premises in an argumentation scheme, assumptions and exceptions. The premises of the scheme that are explicitly stated are modeled as assumptions, meaning that they are taken to hold unless they are challenged, but if they are challenged the arguer has to back up the premise with some evidence, or else the argument is treated as no longer acceptable. The kind of premise that represents an exception is taken to remain acceptable even when the question is posed. The premise is only shown to be not acceptable when evidence is given to back up the allegation made in the critical question. Consider the field question matching the scheme for argument from expert opinion. Let's say the questioner asks whether *E* is an expert in the field that *A* is in. When this question is posed by a challenger, the arguer who put forward the argument from expert

[1] Araucaria can be downloaded from http://araucaria.computing.dundee.ac.uk/doku.php.

[2] Carneades can be downloaded from http://carneades.github.com/

opinion has to provide some evidence that the expert is an expert in the appropriate field. Otherwise the argument from expert opinion defaults. The burden of proof is the other way around with the consistency question, however. When a challenger asks whether is *A* consistent with what other experts assert, merely asking that question does not defeat the argument. To defeat the argument the questioner asked to present some evidence that is not consistent with what other experts assert. For example he could claim that another expert says the opposite.

Let's consider the example shown in figure 1. The original arguer puts forward an argument to prove this claim that Ed is insane, based on an argument from expert opinion. The two premises are his statements that Dr. Bob says that Ed is insane, and that Dr. Bob is a psychiatrist. Since it can be taken as an additional implicit assumption that psychiatry is the appropriate domain of knowledge into which claims about insanity fall, the argument is persuasive. In the Carneades argumentation system, the text boxes in which these two premises are contained are colored in green, indicating that both premises have been accepted. Assuming that the argument from expert opinion is applicable, the conclusion that Ed is insane is also automatically shown in a green box by Carneades. But now suppose that the critical question is asked whether what Dr. Bob says is consistent with what other experts assert. In the Carneades System, the proposition that what Dr. Bob says is not consistent with what other experts assert is shown as an exception. In the system, this premise is shown as posing a contra argument (indicated by the minus sign in the argument node), an argument that goes against the original argument from expert opinion. The mere stating of this exception does not defeat the original argument from expert opinion. However, if supported by appropriate evidence it can defeat the original argument.

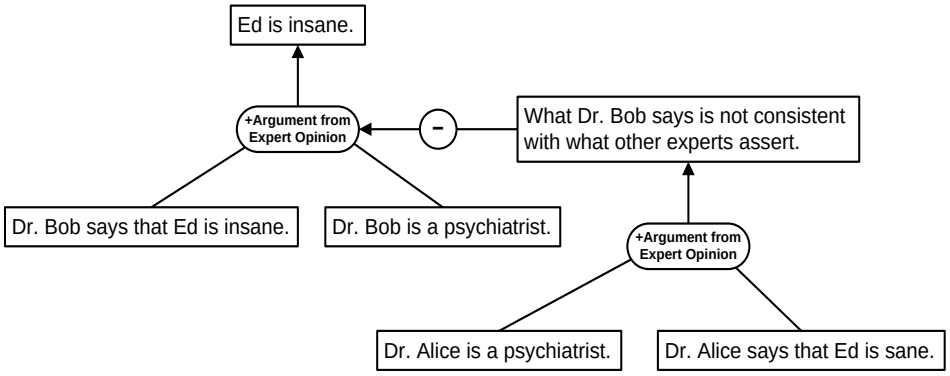

Figure 1: Example of argument from Expert Opinion

If we look at the right side of figure 1, we see that the conclusion 'What Dr. Bob says is not consistent with what other experts assert' is supported by two premises: Dr. Alice is a psychiatrist, and Dr. Alice says that Ed is sane. Once these two premises are accepted, assuming that the argument from expert opinion scheme is applicable, the conclusion that what Dr. Bob says is not consistent with what other experts assert has been supported by evidence. Therefore the second argument defeats the original argument from expert opinion. The structure represents the common situation often called the battle of the experts in the courts.

Now we have some grasp of how argumentation schemes work as devices for analyzing, evaluating and inventing arguments when incorporating into argument mapping technology, we can go ahead and examine the schemes for argument from fairness.

4 Schemes for Argument from Fairness

In a study that identified different kinds of arguments used by the party leaders in a Canadian provincial election (Walton and Hansen, 2012), several instances of a particular kind of argument called argument

from fairness were found. Four argumentation schemes representing versions of this type of argument were proposed. Several versions of the scheme for argument from fairness were considered and evaluated. Of these, only two need to be considered in this paper, a simpler version and a more complex version. We begin with the scheme that will be called here the simple version of argument from fairness. In this scheme, φ represents an action, or in some instances is taken to represent a policy for action. α and β (or others) are agents or groups of agents. ф is an alternative action (or policy) being considered.

Major Premise: If φ is fair (just) to α and β, φ should be carried out.

Minor Premise: φ is fair (just) to α and β.

Conclusion: φ should be carried out.

There are five critical questions matching this scheme.

CQ_1: Are agents α and β of the same kind?

CQ_2: In what respects are α and β equal?

CQ_3: In what respects are α and β different?

CQ_4: Are there special circumstances such that α and β should be treated differently?

CQ_5: Are there reasons supporting ф?

Argument from fairness fits into the classification system of (Walton and Macagno, 2008) as a species of argument from values. In the model of value-based argumentation of (Bench-Capon (2003), the strength of an argument depends on the comparative strength of the values advanced by the parties.

When argument from fairness is used in everyday conversational reasoning, it is often used in a negative form. Children are very familiar with using this form of argument in the simple saying that they often used repeatedly, "That's not fair". Since this form of argument appears to be so common, it is useful to have a negative version of the simple scheme for argument from fairness.

Major Premise: If φ is unfair (unjust) to α and β, φ should not be carried out.

Minor Premise: φ is unfair (just) to α and β.

Conclusion: φ should not be carried out.

The problem with using the term 'equally' in these two simple versions of the scheme is that equality is such a highly contested concept in politics and law that there is a need to avoid building any particular political philosophy into the argumentation scheme from fairness. Perelman (1980, 11) provided a solution to this problem by formulating an underlying principle of "formal" or "abstract" justice. It is "a principle of action in accordance with which beings of one and the same essential category must be treated the same way". But how does the notion of an essential category work in this principle of justice? According to Perelman (1980, 11), everyone is agreed despite their political disagreements, that to be just is to give the same treatment to those who possess a particular characteristic that groups people together into a class or category defined by the fact that its members possess this characteristic. So for example, some contend that fairness requires that equal treatment be given to all persons who have the same needs. For the adherents of this political view, the essential characteristic will be that of having the same needs. Others might contend that equal treatment should be given to all persons who have the same merit. For the adherents of this political view, the essential characteristic will be that of having the same merit. Different groups or persons person advocate different political views to these questions, so that no system secures universal agreement. Underlying this diversity, however, all are agreed that to be just is to give the same treatment to those who are equal with regard to one particular characteristic defined as an essential category (Perelman, 1980, 10). Perelman's insight on how the abstract notion of fairness (justice) can be extended to accommodate particular cases by building it into a more complex version of argument from fairness will now be shown.

Perelman's views on the principle of justice suggest building a more refined version of the scheme based on the simple scheme for argument from justice presented above. The variant of the argumentation scheme for argument from fairness presented below is called the complex version of the argument from fairness.

Premise 1: Agents α and β are of the same kind.

Premise 2: φ treats α and β equally.

Premise 3: If φ treats α and β equally, then φ is fair.

Interim Conclusion: φ is fair.

Premise 4: If φ is fair, then φ should be carried out.

Ultimate Conclusion: φ should be carried out.

The complex version of the argument from fairness treats the argumentation scheme as a chaining together of two inferences. The first inference leads to the conclusion that the action or policy j is fair. The second inference uses this interim conclusion as a premise that is combined with and additional conditional premise, leading to the conclusion that j should be carried out.

The complex version eliminates the need for the first critical question, leaving only the other four critical questions matching the complex scheme. There also is a negative version of the complex scheme for argument from unfairness. Next we need to see how these two schemes can be applied to a relatively simple example of argument from fairness.

One of the examples from the election project (*Toronto Star* 14/09/2011, 'Hudak Still Intends to make Sex Offender Registry Public') can be used to apply the argument mapping tool of the Carneades Argumentation System to it. In the example, Tim Hudak, the Progressive Conservative leader, told reporters that he believes that correctional officers are in favor of a work program which would require criminals to perform manual labor for up to forty hours a week in exchange for some compensation. His opponents derided the plan, calling it "a chain gang initiative". Hudak presented the following counter-argument: we are just asking the criminals to do what every other hard-working Ontarian does, an honest day's work instead of spending the day working out to become better criminals. As shown in (Walton and Hansen, 2012), what Hudak says essentially contains three arguments. The first is that correctional officers are in favor of the work program. The second is that criminals should be treated in the same way as other citizens with respect to having to put in an honest day's work. The third is that it is better for criminals to spend the day working than for them to spend the day "working out to become better criminals". In addition to these three arguments, there is also a fourth argument put forward those who called the original argument "a chain gang initiative". This fourth argument is a contra argument against the work program proposal put forward by Hudak.

Figure 2 shows how argumentation schemes can be applied to the argumentation in the example, including a scheme for argument from fairness and a scheme for argument from expert opinion.

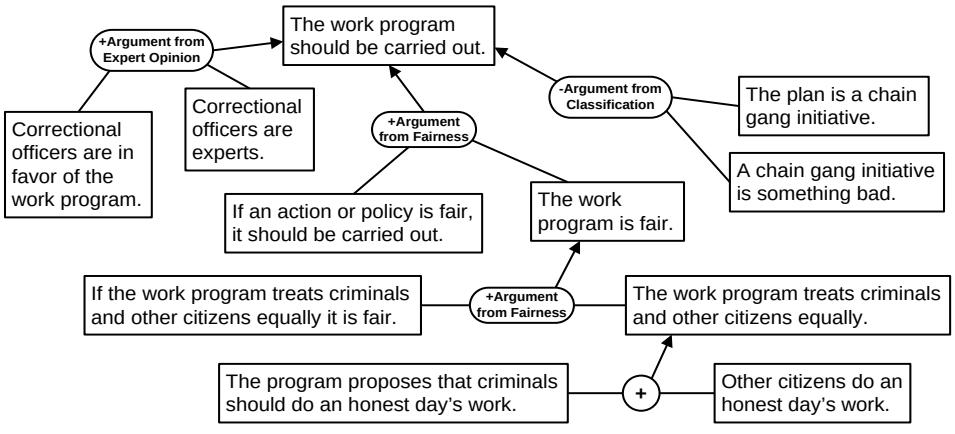

Figure 2: Argument Diagram of the Work Program Example

The third scheme is that of argument from classification. According to this argumentation scheme, if something fits a certain classification, and all things fitting that classification have a certain property, then this thing will have that property. For example, if something fits the classification of being a whale, and all

things fitting the classification of being a whale have the property of being a mammal, then this particular thing is the property of being a mammal. In this instance Hudak's plan is classified as what is called "a chain gang initiative", which is taken to be something negative. In general, if a plan or policy can be described as something negative, it should not be carried out. So in this instance the plan should not be carried out. Because of the negative nature of the argument in this instance, in the argument map in figure 2, it is represented as a contra argument. It offers a reason for not carrying out the work program. The ultimate conclusion is the statement that the work program should be carried out, shown in the text box at the top. On the left at the top, the statement that correctional officers are in favor of the work program is taken as one premise in an argument from expert opinion supporting the ultimate conclusion.

Notice in figure 2 how argument from fairness is represented in two different argument nodes, reflecting its representation in the format of the complex scheme for argument from fairness. At the top stage of the argument, the simple scheme for argument from fairness is applied. The argument tells us that if an action or policy is fair, it should be carried out. That is one premise. The other premise is that the work program is fair. According to the requirements for the application of the simple argumentation scheme for argument from fairness, the scheme can now be applied and provides a transition by a defeasible inference to the conclusion that the work program should be carried out. This application of the simple scheme is only part of the application of the complex scheme, which requires that another argument be chained to the simple argument from fairness. According to this way of structuring the argument as shown in figure 2, considerations of equal treatment are brought to bear to support the conclusion that the work program is fair. This conclusion is then reused as a premise in the simple argument. By combining the two arguments, a complex argument from fairness is produced.

Figure 2 also illustrates the support of one of the premises of the secondary argument from fairness by evidence. The one premise of the argument from fairness stating that the work program treats criminals and other citizens equally is supported by the argument containing the two premises shown at the bottom of figure 2. The argument is that the program proposes that criminals should do an honest day's work, and that other citizens do an honest day's work, so the work program treats criminals and other citizens equally.

5 The Case of Popov v. Hayashi

Barry Bonds, playing for the San Francisco Giants, hit his 73rd home run in 2001 at PacBell Park in San Francisco, breaking his previous record. The ball, worth millions of dollars (Mark McGwire's 70th homerun ball hit in 1998 sold for $3 million), went into the stands in the arcade section. It landed briefly in the upper portion of a glove worn by a fan, Alex Popov, who was at that moment thrown to the ground by a mob of fans trying to obtain it. At some point, the ball left Popov's glove and ended up on the ground. Another fan standing nearby, Patrick Hayashi, who was not part of the mob that had knocked Popov down, picked up the loose ball and put it in his pocket. Somebody in the crowd videotaped the incident. When the man making the videotape pointed the camera at Hayashi, he held the ball in the air for the others to see.

Popov later sued Hayashi contesting ownership of the ball, and arguments were presented on both sides. The case was tried in the Superior Court of California and the arguments on both sides along with the basis of the decision have summarized by the presiding judge, the Honorable Kevin M. McCarthy (McCarthy, 2002). Hayashi argued that possession does not occur unless the fan has complete control of the ball. This claim was supported by an expert, Professor Brian Gray, who said that a ball is caught (possessed) only if the fan has complete control of it. However, a number of other legal experts also participated in a forum during the trial to discuss the legal definition of possession and the group could not reach agreement on how 'possession' should be legally defined. If Popov had obtained control of the ball, he would have been entitled to possession of it, but the partial catch did not give certainty of obtaining control of the ball, since Popov had to reach for it and may have lost his balance while doing

this. Thus the evidence was insufficient to show that Popov caught the ball, possessed it, and therefore had a legal right to the ownership of it.

Popov argued that Hayashi had illegally interfered with his possession of the ball, on the basis that Popov had taken steps to achieve possession but was interrupted by the unlawful action of others. According to Judge McCarthy's legal analysis (2002, 4), Popov pled four causes of action, but we will only mention two of them here, called conversion and trespass to chattel. Conversion is defined as a wrongful exercise of dominion over the personal property of another party. Essentially it is wrongful withholding of the property of another party, and requires interference of the accused party, which could be constituted by an unjustified refusal to give the property back to the other party. But there was no evidence of conversion of the part of Hayashi. Trespass to chattel takes place where personal property has been damaged or with one party has interfered with the other party's use of the property. But there was no evidence sufficient to support trespass to chattel on the part of Hayashi.

There were other interesting arguments in this case as well, including comparisons to some precedent cases involving the catching of wild animals. But what is of particular interest to us here is the ultimate ruling of Judge McCarthy and the way he supported it. Although there were strong arguments on both sides, Judge McCarthy ruled that neither argument was strong enough to meet its burden of proof. This being a civil case, the standard of proof is that of preponderance of the evidence. Judge McCarthy concluded, as quoted below (2002, 10), that since ownership of the ball requires full possession and that since neither party could claim full possession of the ball, based on the evidence, it would be unfair to award the ball to either side.

An award of the ball to Mr. Popov would be unfair to Mr. Hayashi. It would be premised on the assumption that Mr. Popov would have caught the ball. That assumption is not supported by the facts. An award of the ball to Mr. Hayashi would unfairly penalize Mr. Popov. It would be based on the assumption that Mr. Popov would have dropped the ball. That conclusion is also unsupported by the facts.

Judge McCarthy (2002, 10) described the case as posing a dilemma, but then he added that that there is a middle ground. Since it would be unfair to award the ball to either one side or the other, he concluded that the best solution would be to sell the ball and divide the proceeds equally between the two parties. He had shown, in his remarks above, the previous conclusion that the evidence was insufficient to show that Popov had caught the ball, and therefore that it could not be proved, by the standard of proof required, that Popov had ownership. Similarly Judge McCarthy had shown in his remarks above that there was insufficient evidence to prove Hayashi's claim to ownership of the ball could be proved by the evidence Hayashi presented. This posed a dilemma, because the contention of neither side could be proved on the basis of the evidence presented in the trial. To resolve the dilemma, Judge McCarthy proposed that the ball should be sold and the proceeds divided equally between the two parties.

6 An Analysis of the Main Argument from Justice

The Carneades Argumentation System has already been applied to the case of Popov v. Hayashi in the full analysis of the argumentation in the case provided by Gordon Walton (2012). This paper shows in detail that since Popov, the plaintiff, failed to prove either of his claims of conversion or trespass, and since Popov had the burden of proof, Judge McCarthy should have decided the case in favor of Hayashi. Hayashi did not need to prove that he had the right to possession of the ball. He only needed to produce arguments sufficient to prevent Popov from proving his case (Gordon Walton, 2012, 13). Nevertheless, Judge McCarthy went on to propose a third solution based on argument from fairness.

Gordon and Walton presented an argument map (figure 8, p. 13) of Judge McCarthy's reasoning. On his representation of the case, there are three possibilities represented for arriving at an equitable solution. One is to give the ball to Popov. Another is to give the ball to Hayashi. The third

solution is to sell the ball and divide the proceeds equally between the two parties. Using the argument diagramming tool of the Carneades Argumentation System, it is possible to construct an argument map that is comparable to the one presented by Gordon Walton, but uses argument from fairness, as well as argument from ignorance, to build an alternative reconstruction of the argument that exploits the explicit use of argumentation schemes. The analysis of Walton and Gordon presented their modeling of this part of Judge McCarthy's reasoning as a deliberation problem. In the analysis below, which represents argumentation schemes on the argument map as key components of the structure of the reasoning in the case, the approach of presenting the case as a deliberation problem is preserved.

Judge McCarthy's ultimate conclusion that the ball should be sold and the proceeds divided equally is shown in the top text box in figure 3. It represents an action, or a recommendation for action, that should be carried out based on the reasoning shown supporting it in figure 3.

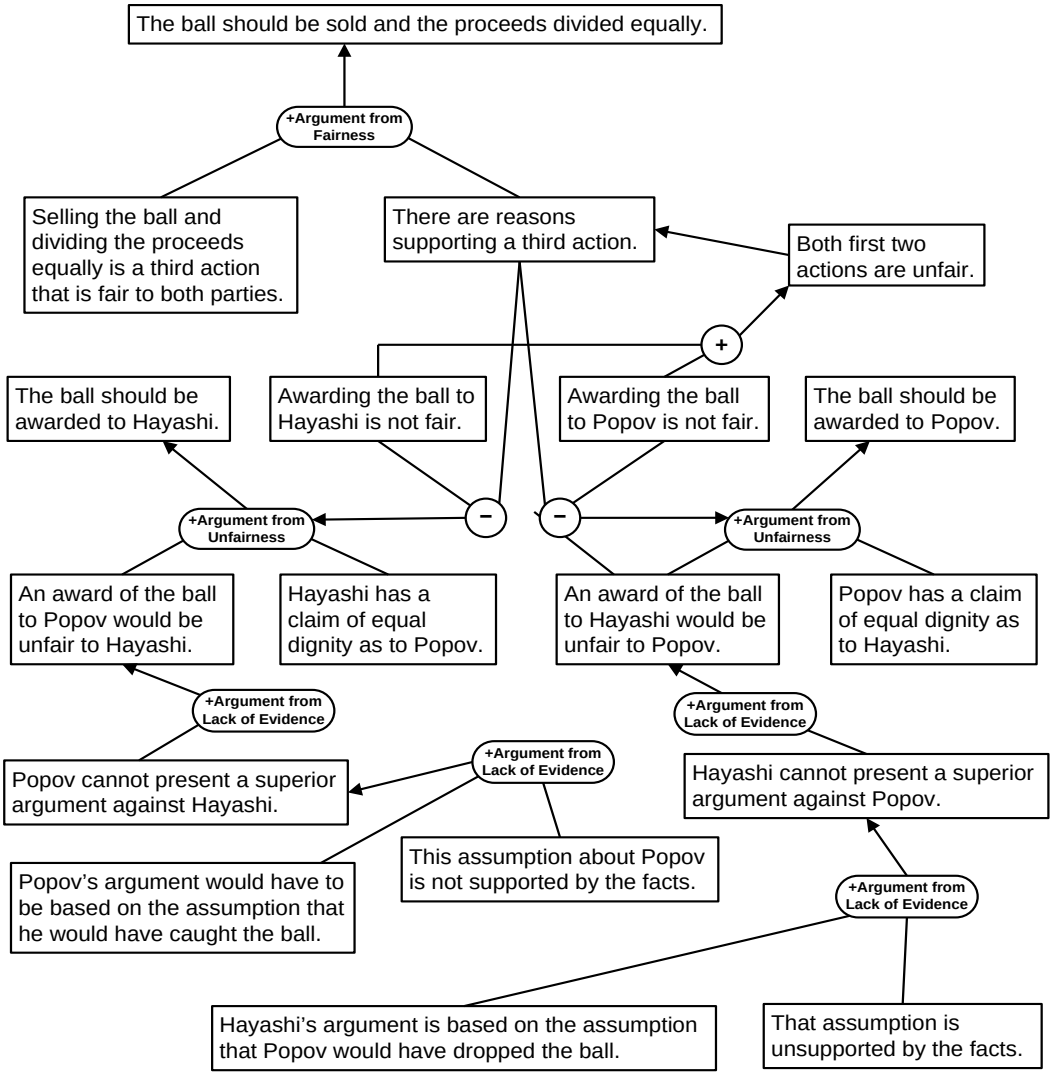

Figure 3: Argument Map of McCarthy's Argument for his Decision in Popov v. Hayashi

What is shown by this version of the argumentation in the case is that Judge McCarthy's main argument combines three instances of use of argument from fairness with four instances of argument from lack of evidence. The best way to appreciate how this argument map is supposed to represent the reasoning of Judge McCarthy in the case is to start with the bottom and work upwards. The two arguments from lack of evidence at the bottom of the diagram show that Popov cannot present a superior argument against

Hayashi, and also that Hayashi cannot present a superior argument against Popov. The conclusions of these two arguments show, again using argument from lack of evidence as the scheme, both that an award of the ball to Popov would be unfair to Hayashi and that an award of the ball to Hayashi would be unfair to Popov. These two conclusions can now be used as premises in a pair of arguments that fit the scheme for argument from unfairness. Both these instances of argument from unfairness fit the complex form of the scheme, since each has a premise that makes a claim of the quality in a certain respect, specifically, a claim of equal dignity. But once we get to these two arguments, we appreciate the dilemma pointed out by Judge McCarthy. We have a pair of equally persuasive arguments. The conclusion of one is that the ball should be awarded to Hayashi. The conclusion of the other is that the ball should be awarded to Popov. The reason given that an award of the ball to Popov of would be unfair to Hayashi is that there is insufficient evidence to prove Popov's argument against Hayashi. Hence this argument, as shown in figure 3, is labeled as an instance of argument from lack of evidence.

Also, if we look at the next level, the two text boxes shown at the next level from the bottom of figure 2, there is another argument from lack of evidence supporting the conclusion that Popov cannot present a superior argument against Hayashi. One of the premises is the proposition that Popov's argument would have to be based on the assumption that he would have caught the ball. The other is the proposition that this assumption about Popov is not supported by the facts. In other words, since the evidence that would be required to support a superior argument by Popov against Hayashi is lacking, the conclusion drawn is that Popov cannot present a superior argument against Hayashi. This argument too is an instance of argument from lack of evidence. Similarly, if we look down the right side of the chain of argumentation shown in figure 3, we see that there are two comparable instances of argument from lack of evidence supporting the premise of the argument from fairness above that an award of the ball to Hayashi would be unfair to Popov.

To appreciate the next step in the argument we have to look at the statement in the text box in the middle of the second level saying that there are reasons for supporting a third action. It needs to be recalled that this is critical question CQ_5 matching the scheme for argument from fairness. Using the approach of the Carneades Argumentation System in this instance, we represent this statement as an exception. It functions as an undercutter attacking the two arguments from unfairness just below it. If supported by evidence, it will defeat both of these arguments. And as shown on figure 3 at the right, it is supported by a statement saying that both of the first two actions being considered are unfair. This statement is in turn supported by the two other statements that awarding the ball to Popov is not fair and awarding the ball to Hayashi is not fair. Hence both arguments from unfairness are defeated. At the top of the diagram we see the argument from fairness supporting the ultimate conclusion of Judge McCarthy in the case that the ball should be sold and the proceeds divided equally. It proposes this third alternative as an action that is fair to both parties and that is supported by the body of evidence indicated below the premise that there are reasons supporting a third action.

The application of the argumentation schemes for argument from negative evidence and argument from fairness in the Carneades Argumentation System have therefore proved helpful to bring out the deeper logical structure of the evidential reasoning in Judge McCarthy's summary of how he arrived at the conclusion that the ball should be sold and the proceeds divided equally. The comprehensive treatment of Judge McCarthy's reasoning in the case of Popov v. Hayashi (Gordon and Walton, 2012) included thirty-three arguments and used other argumentation schemes including argument from witness testimony argument from circumstantial evidence, arguments from legal rules, argument from precedent, practical reasoning, and argument from tradition. In the Gordon and Walton analysis, the type of argument that we have called argument from fairness, based on the principle of equitable division, was modeled as argument from legal principle.

7 Conclusions

By using a special argumentation scheme for argument from fairness, and by representing other schemes to apply to the arguments of Judge McCarthy in the case chosen for study, this paper goes deeper in certain respects than the analysis of the case by Gordon and Walton (2012). The new analysis has adopted Perelman's philosophical point of view on argument from fairness, as a way of seeing this type of argument as a complex structure based on a premise asserting that an abstract principle of equality is a necessary part of the complex version of the scheme. The conclusion of the paper is that there should be two variants of the scheme for argument from fairness, a simple version that can be quickly applied to initially identify an instance of the use of this type of argument in a given discourse, and a more complex version that can be used for analytical purposes of reconstructing an instance of argumentation based on fairness in a given case. The main finding of the paper is the presentation and justification of these two schemes, and the application of them to a legal case that is of special importance in its own right in artificial intelligence and law.

Another important lesson demonstrated by the paper is the revealing of the link between argument from lack of evidence and argument from fairness. A different approach to argument from lack of evidence has been taken in this paper, based on the analysis of burdens and standards of proof provided by the Carneades Argumentation System. In traditional logic, the argument from ignorance has been taken to be a fallacy, whereas in this paper, in sharp contrast, it has been shown to be a fundamentally important species of legal argumentation on which argument from fairness is based. It would seem that in certain cases, including the case of Popov v. Hayashi, argument from fairness always has to be based on the applicability of argument from lack of evidence is a necessary component.

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