

Levels of Reasoning With Legal Cases

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ABSTRACT

In this paper we discuss how different levels of reasoning can occur in legal cases. We build upon our recent work in which we have reconstructed the reasoning of the majority and dissenting opinions for a particular case through the use of Belief-Desire-Intention (BDI) agents to replicate the contrasting views involved in the actual decision. This reconstruction has shown how the reasoning involved can be separated into three distinct levels: factual and normative levels and a level connecting the two, with conclusions at one level forming premises at the next. We further discuss the properties and significance of each of these levels and illustrate them with short examples and also include a discussion of the role of precedents within these levels of reasoning.

1. INTRODUCTION

In this paper we take forward the work reported in [4]. In that paper we applied a general theory of practical reasoning to law. Our theory has its roots in the idea that practical reasoning is a species of presumptive reasoning, and builds on the work of Walton [20]. His account views presumptive reasoning as the instantiation of an argument scheme which is then subject to critique through a number of critical questions associated with that particular scheme. We have taken one such argument scheme, the *sufficient condition scheme* for practical reasoning, and refined it so as to analyse one of its components at a more detailed level, and to extend the range of critical questions that can be posed. Further we have given pre-conditions describing what is required for agents specified using the Belief-Desire-Intention (BDI) model to instantiate this scheme, and to pose critical questions to instantiations of it. In [4] we use this machinery to reconstruct the majority and dissenting decisions in a well known property law case (*Pierson vs Post*, 3 Cai R 175 2 Am Dec 264 (Supreme Court of New York, 1805)), by associating a set of agents with different beliefs, desires and values relevant to the case so as to represent different points of view on the case. These agents are then able to provide instantiations of the argument scheme and pose critical questions of these instantiations. The resulting arguments are then organised into a value based argument framework [8], so that the status of the arguments can be evaluated

from the various perspectives.

A number of layers of reasoning emerged and we wish to explore these further in this paper, together with consideration of how precedents are treated. We will use two running examples: the law relating to UK Sickness Benefit, as stated in the Social Security Act 1975 (and which was current until 1995 when the system was radically reformed), and US Trades Secrets law, as described in the Restatement of Torts. Both of these have been the subject of investigation in AI and Law. The first is an example of the kind of area in which rule based expert systems of the 1980s and 1990s operated, and is discussed in [5]¹. The second has been the subject of investigation in connection with case based approaches, e.g, [2]. These two examples provide some instructive differences.

The remainder of this paper is structured as follows: Section 2 gives a brief summary of the work presented in [4] which has motivated the discussions in this paper. Section 3 explores in more detail the different levels of reasoning that emerged from the reconstruction of the *Pierson vs Post* case. Section 4 offers a discussion of the different modes of agreement and disagreement that can occur at each of the different levels. Section 5 examines how precedents relate to these levels of reasoning through the use of two examples. Section 6 discusses the structuring of cases through the separation of the issues involved. Finally, Section 7 offers some concluding remarks.

2. SUMMARY OF APPROACH

In this section we briefly recapitulate our approach to practical reasoning with BDI agents which we have used to reconstruct the reasoning involved in the *Pierson vs Post* case, as presented in [4].

Our general approach to practical reasoning follows the account given by Walton [20] which views practical reasoning as presumptive justification. Justifications of actions can be presented in terms of argument schemes, and critical questions that can be posed against the presumptions present in the argument schemes to challenge these *prima facie* justifications. In [3] we proposed an extension to Walton's *sufficient condition scheme* for practical reasoning as follows:

AS1: In the current circumstances R

Action A should be performed

To bring about new circumstances S

Which will realise goal G

And promote value V

In this scheme we have unpacked Walton's notion of a goal into three elements: the state of affairs brought about by the action; the goal (the desired features in that state of affairs); and the value (the

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reason why those features are desirable).

The presumptions present in instantiations of this justification for action may be attacked through the application of sixteen different critical questions, as described in [3]. These attacks enable questioning of the validity of the various elements of the argument scheme and the connections between them, and additionally there may be alternative possible actions, and side effects of the proposed action.

In [4] we have gone on to show how this model of reasoning can be made computational for use in a multi agent system in which BDI agents, augmented to handle the notion of values, form intentions based on their beliefs and desires. We have done this by presenting the definitions by which such BDI agents can state and attack a position motivating an action, according to our model of practical reasoning. This has enabled us to reconstruct the reasoning involved in decision making about actions, as exemplified by the case of *Pierson vs Post* presented in [4]. We now restate some of the main points arising of our analysis of *Pierson*.

The case arose when Post was hunting a fox in the traditional manner with horse and hounds on open country. After Post had pursued the fox for some time, Pierson shot the fox and made off with it. Post claimed damages from Pierson. The majority view expressed by Tompkins was that remedy for Post was only possible if he could be ascribed ownership of the fox. There were no precedents for ascribing ownership of a wild animal on the basis of pursuit rather than capture. Thus Post did not own the fox and had no remedy. The dissenting opinion delivered by Livingston agreed that remedy was only possible if Post could be said to own the fox, and that there were no precedents to meet the case. Livingston, however, went on to argue that the court was entitled to set such a precedent, there being no precedents stating that ownership should not be ascribed on the basis of pursuit, and that fox hunting was so socially useful, given the harm to farmers caused by foxes, that such a precedent should be set. If ownership were ascribed to Post in this way, then Post would be entitled to remedy.

One of the main features to emerge from our reconstruction of these two opinions was that the reasoning naturally formed three connected layers. The uppermost layer (Level 3) was concerned with legal concepts and the rights they conferred. In the particular opinions, disagreement at this level was based solely on whether or not ownership was ascribed: once this point was decided the consequences were clear and there were no conflicting considerations. The second layer (Level 2) concerned the ascription of these legal concepts, given the particular facts of the case under consideration. Here arguments for and against ascription of the legal concepts can come either from precedents (although there were no applicable precedents in the particular case), or from purposes derived from reasoning in the bottom layer (Level 1).

At Level 1 people reason about the world in order to determine what the law *should* be, and conclusions from this level are used at Level 2. Note that Tompkins, who is content with the *status quo*, has no need to descend to Level 1, while Livingston, who wishes to extend the concept of ownership beyond what is covered by the current precedents, needs to motivate his arguments at this level. These three levels of reasoning are shown diagrammatically in Figure 1.

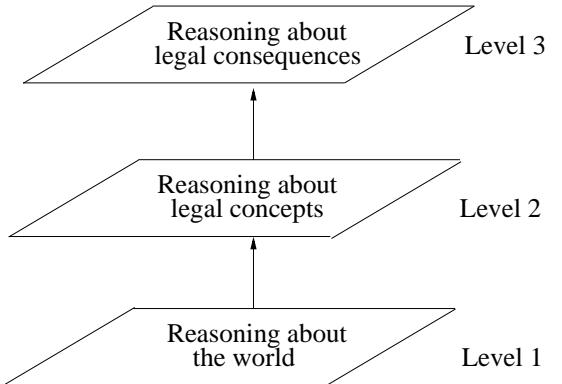


Figure 1. The three levels of legal reasoning emerging from the reconstruction of *Pierson vs Post*.

In the following sections we go on to discuss the features of these levels of reasoning in more detail.

3. LEVELS OF REASONING

Legal reasoning begins with facts and ends with legal conclusions. The law is typically stated in terms which cannot be directly equated with facts. Thus under the 1975 Social Security Act, a person is entitled to Sickness Benefit:

“in respect of any day of incapacity for work which forms part of a period of interruption of employment.”

In the Restatement on Torts: “One who discloses or uses another’s trade secret, without a privilege to do so, is liable to the other if:

- (a) he discovered the secret by improper means, or
- (b) his disclosure or use constitutes a breach of confidence reposed in him by the other in disclosing the secret to him, or
- (c) he learned the secret from a third person with notice of the facts that it was a secret and that the third person discovered it by improper means or that the third person’s disclosure of it was otherwise a breach of his duty to the other, or
- (d) he learned the secret with notice of the facts that it was a secret and that its disclosure was made to him by mistake.”

Terms such as “incapacity for work”, “period of interruption of employment” and “trade secret” are all terms of art, the application of which must be determined in the light of facts.

The need to make the transition from facts about the world to legal concepts was a major concern of expert systems designers in the 1990s. For example the work of Breuker and his group (e.g. [10]), explored the need to represent knowledge of the world, knowledge of legal concepts and the connections between them. Work on legal expert systems in the logic programming tradition (e.g. [7]), tended to begin with a definition of the terms of the legislation, and then unpack the definitions of these terms using sufficient conditions expressed in factual terms taken from case law and expert guidance. These strands of work arose from a response to practical problems of designing and building legal expert systems. A recent paper [16], gives a nice formal expression to these notions. Lindahl describes a legal inference as having the form:

$a \rightarrow b$
 $b \rightarrow c$
 Therefore $a \rightarrow c$.

and calls b the middle term, linking a to c . We shall use the “intermediate concept” to describe the middle terms. Lindahl argues that many legal inferences are of this form. Intermediate concepts such as “ownership” (or “trade secret” or “period of interruption of employment”) play the role of these middle terms. Then, following Ross [19], he says that several fact situations can typically fill the role of a for a given b , and that typically any given b will allow the deduction of several c s.

Lindahl then discusses how such intermediate concepts can be defined and mentions direct enumeration, whereby a set of concrete examples of “being a b ” are listed, and definition by regulation, whereby the terms are defined in greater detail by secondary legal sources. We might also see case law (at least as used in the Sickness Benefits case) as offering definitions of these sorts, where a particular case provides a particular example which can be seen as part of an enumeration, and the *ratio decendi* of a case is akin to definition by regulation.² If such decisions are to act as precedents, however, the latter is probably the better way to see them.

Examples of definition by regulation through secondary legislation and through case law abound in Sickness Benefit. For an example of secondary legislation, Regulation 3(1) of the Social Security (Unemployment, Sickness and Incapacity Benefit) Regulations 1983 provided that a person undertaking therapeutic work as part of supervised programme of treatment while a patient in or of a hospital should be considered incapable of work. As an example of case law it was held in R(S)3/52³ that a patient attending hospital as an outpatient every two months should be considered a patient of a hospital in the intervening period.

It was this style of definition that underlay the thinking of expert systems constructed in the manner of [7]. As Lindahl has subsequently pointed out [17], there is another important type of “definition” whereby a set of factors to be considered, explicitly stated to be individually neither necessary nor sufficient, are given. The Restatement of Torts comment (b) gives an excellent example of this:

“Some factors to be considered in determining whether given information is one’s trade secret are:

1. the extent to which the information is known outside of his business;
2. the extent to which it is known by employees and others involved in his business;
3. the extent of measures taken by him to guard the secrecy of the information;
4. the value of the information to him and to his competitors;
5. the amount of effort or money expended by him in developing the information;
6. the ease or difficulty with which the information could be properly acquired or duplicated by others.” (italics ours)

These factors and their combination are not straightforwardly represented in the rule based approach, and it is intermediate concepts of this type that have featured prominently in case based approaches, such as [1] and [2].

Relating this work to the levels of [4], we can see that Level 3 is concerned with Lindahl’s $b \rightarrow c$, the calculation of consequences from legal terms, and Level 2 is concerned with Lindahl’s $a \rightarrow b$, the determination of which intermediate legal concepts apply given the case facts. So where does Level 1 fit in? This kind of reasoning does not occur in legal expert systems, because they work with a body of existing law (or an interpretation of it) and are not at all concerned with what the law should be or whether the conclusions are desirable. Such systems take the law as given and allow no deviation from it [6]. In [5], these two levels were encased in two others: the level of political debate which determines that a law should be made (e.g. it is desirable to maintain the income of the sick), or at which law is criticised (e.g. R(S) 4/56 in which a young woman who had been in receipt of sickness benefit for two years in respect of agoraphobia was held not to be incapable of work on the ground that she could work as an outworker in her own home, would seem rather harsh today). These are important debates, but are often held to fall outside the scope of legal knowledge based systems.

On the other hand, it is a fact that judges can, and often do, use discretion, and there is the phenomenon of “judge made law”. The extent to which judges are permitted, or even encouraged, to exercise such discretion varies from jurisdiction to jurisdiction, according to legal culture, and will also vary within a jurisdiction from time to time. Moreover, different judges will be more or less reluctant to exercise such discretion. None the less, it is clearly this notion of changing the law to meet some notion of what is right that underlies Livingston’s argument in *Pierson*: he explicitly says “if men themselves change with the times, why should not laws also undergo an alteration?” and is in no doubt of the power of the court to effect this alteration.

This means that Level 1 will not come into play in all cases, but only where one of the judges wishes to challenge the apparent *status quo*. Since it is at this level that social values, as opposed to legal principles, are at their most important this may help to explain the observation made in [9] that values are little spoken of in the majority of judicial decisions. None the less, such explicit appeal to values, which we have identified as Level 1 reasoning, does occur. An excellent example is provided by the decisions in the US Supreme Court case of *Furman v Georgia* 408 U.S. 238 (1972). The case was considering the question of whether the death penalty is a cruel and unusual punishment prohibited by the Eighth Amendment to the United States Constitution. Mr Justice Marshall’s concurring decision is very long and takes one on a historical tour of many aspects pertinent to the case including capital punishment and the use of the word “cruel”, but his key question is “whether capital punishment is “a punishment *no longer* consistent with our own self-respect”” (italics ours). He concludes one section of his discussion with “It is immediately obvious, then, that since capital punishment is not a recent phenomenon, if it violates the Constitution, it does so because it is excessive or unnecessary, or because it is abhorrent to *currently existing moral values*” (italics ours). Another section concludes “To answer this question, we must first examine whether or not the death penalty is *today* tantamount to excessive punishment.” (italics ours). Again he says “it nonetheless violates the Eighth Amendment because it is morally unacceptable to the people of the United States *at this time* in their history.” (italics ours). He concludes that by striking down capital punishment “We achieve “a major milestone in the long road up from barbarism””. The whole thrust of his decision, which he himself describes as “a long and tedious journey”, is to show that the law develops and progresses as times change, and it is the role of judges such as himself to mark those changes.

The concurring judgement of Mr Justice Brennan, similarly emphasises the need to look at the matter with contemporary eyes:

"When this country was founded, memories of the Stuart horrors were fresh and severe corporal punishments were common. Death was not then a unique punishment. The practice of punishing criminals by death, moreover, was widespread and by and large acceptable to society. Indeed, without developed prison systems, there was frequently no workable alternative. Since that time, successive restrictions, imposed against the background of a continuing moral controversy, have drastically curtailed the use of this punishment. Today death is a uniquely and unusually severe punishment. When examined by the principles applicable under the Cruel and Unusual Punishments Clause, death stands condemned as fatally offensive to human dignity." (italics ours)

In contrast the dissent from Mr Justice Burger begins

"If we were possessed of legislative power, I would either join with MR. JUSTICE BRENNAN and MR. JUSTICE MARSHALL or, at the very least, restrict the use of capital punishment to a small category of the most heinous crimes. Our constitutional inquiry, however, must be divorced from personal feelings as to the morality and efficacy of the death penalty, and be confined to the meaning and applicability of the uncertain language of the Eighth Amendment." (italics ours)

For Burger the judges do not have the scope of discretion that Brennan and Marshall take upon themselves, and "the highest judicial duty is to recognize the limits on judicial power and to permit the democratic processes to deal with matters falling outside of those limits."

This pattern, whereby disagreement resides in whether or not Level 1 reasoning is appropriate, leads to the narrowly legalistic approach exemplified by Tompkins in *Pierson* being set against an appeal to social values as a motive to make or change the law, exemplified by Livingston in *Pierson*, and is not uncommon.

4. MODES OF DISAGREEMENT

At Level 3 there is often little scope for disagreement: typically once the applicability of the intermediate terms has been discovered, the consequences follow in an agreed manner. Any disagreement that does occur will turn on a conflict of norms: two legal concepts are considered to be applicable and they have conflicting consequences. Such conflicts may be resolved through the use of precedent, or legal principles such as *lex superiori*. This is shown diagrammatically in Figure 2 below:

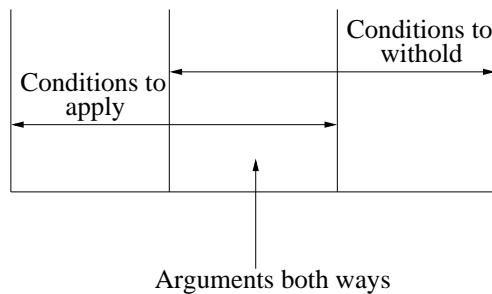


Figure 2. A conflict in arguments.

At Level 2 there is again scope for conflict, if definition by regulation has provided sufficient conditions for ascribing the concept

and sufficient conditions for withholding it, both of which are satisfied in a particular case. Here the conflict is typically resolved either through the use of legal principles, or by choosing between the precedents. At this level there is also the possibility of a gap, where no definition covers the case at hand, as shown in Figure 3. Here one either takes a default, withholding the concept if no conditions for its attribution are satisfied, or one can extend the scope of the concept: it is at this point that descent to Level 1 is required, to motivate the extension. Conflicts and gaps form the "hard cases" of Gardner's pioneering work [13].

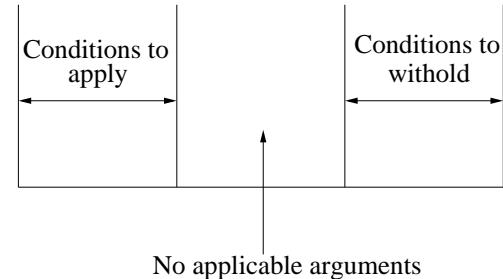


Figure 3. A normative gap.

Where the definition is not in terms of sufficient conditions, but in terms of a set of factors to consider, as in the case of "trade secret", analogous situations arise. One way to see such cases is a kind of scatter plot where precedents are positioned according to the extent to which the various factors apply. Figure 4 shows such a plot for two factors, with "Y" representing cases where the concept was applied and "N" cases where it was withheld. We would expect there to be a region occupied only by "Y" and a region occupied only by "N", but between them "Y"s and "N"s would be entangled. This is the region where hard cases are found. In this case of these intermediate concepts, however, we can have no expectation of drawing a sharp line to separate the two regions, rather we have, to use Hart's famous analogy [15], two cores of certainty and a penumbra of doubt between them. This is the situation - particularly as we move into higher dimensional spaces with the need to consider more factors - which makes the notion of matching to closest precedents particularly attractive.

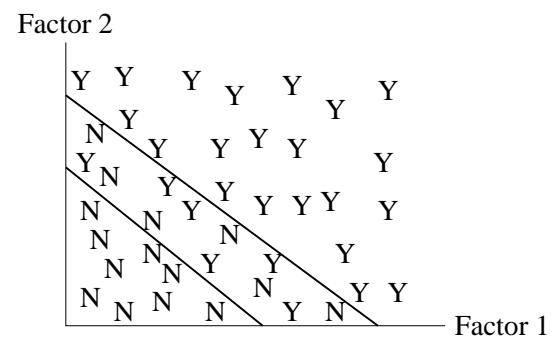


Figure 4. Hard Cases in Factor Based Domains.

Finally there may be disagreement at Level 1, but here the debate will concern what should be encouraged, and has the character of a political argument, turning on values, rather than a purely legal argument.

5. THE ROLE OF PRECEDENTS

In this section we turn to the question of how precedents fit in with our account, and how they relate to the levels of reasoning discussed above. Since we proceed by generating instantiations of argument schemes from the beliefs and current facts of the agents, it is at first sight hard to see how precedents can play a role. This is, however, to overlook the fact that part of the knowledge of the agents has to derive from previous cases.

5.1 Intermediate Concepts Defined by Regulation

Consider first Sickness Benefit, and decision R(S) 13/54:

"A disabled man with an artificial leg was unable to get to his place of work for some days because of a heavy fall of snow. It was held that he was not incapable of work by reason of his bodily disablement and that sickness benefit was not payable to him." [18, 2.2.7]

This decision can be converted into a rule, whereby we can say that the fact that the illness renders the claimant incapable of travel to work rather than the work itself is a sufficient condition to state that the claimant is not incapable of work.

In terms of our argument scheme⁴:

A1: where capable of work and incapable of travel and R(S) 13/54
find no incapacity for work
as capable of work and incapable of travel and no incapacity
for work
promotes consistency.

We will therefore represent our agents as having a desire to follow precedents, so as to promote consistency, and the conditions for the desire to be satisfied will be the fact situation of the precedent, the precedent and the legal qualification made by the precedent. Representing precedents in this way is rather similar to the way in which case law is represented in traditional expert systems such as [7].

An argument such as A1 can of course be attacked using critical questions as described in [4]. Such critical questions can be used to attack precedents in ways corresponding to the standard argument moves in case based systems such as HYPO. Chief among these are distinguishing and providing a counter example. We begin with distinguishing. In [14] we identified four of the critical questions as making distinguishing moves of various sorts (differentiated as to whether the distinction resulted from a strength in the precedent absent from the current case or a weakness in the current case, and as to whether the distinction could be emphasised or downplayed).

Suppose the man concerned in R(S) 13/54 was unable to travel because of a defect in the artificial leg rather than the weather conditions, although he could do his work once at the office. This might be held to be good enough (defects in prosthesis can be treated as bodily disablement in certain cases).

Now we can attack A1 with the argument:

A2: where incapable of travel and ineffective prosthesis
find incapacity for work
as ineffective prosthesis and incapacity for work
promotes income maintenance.

Note that this argument proposes a value promoted by satisfying the goal. This reflects the fact that, as discussed at length in [1],

not any difference between two cases will serve to distinguish a precedent. If the value is acceptable, then A2 will defeat A1: when evaluating arguments we give consistency a weak ranking to reflect that precedents need not be followed if they can be distinguished. But the debate is not yet finished. In the original decision R(S) 13/54 there will have been a motive for deciding the case in the manner chosen. Therefore, in the previous decision there must have been a Level 1 argument for finding that no incapacity should be attributed in the circumstances of that case, and so that decision will have been based on a value, perhaps the need to safeguard the contributors to the National Insurance Fund. This argument will still apply in the new case, and so we will have a conflict at Level 1, and we will need to choose between the values of A2, and of the original argument underlying R(S) 13/54. If we choose to prefer the value of that argument over the value of A2, we will reject the distinction. If the distinction is accepted, it has the effect of moving the case into the gap not already covered by previous decisions, and so Level 1 reasoning is needed to motivate how the gap should be narrowed, if indeed it should be narrowed at all. If the distinction is rejected, we effectively say that the case does not fall in the gap, is already covered by past decisions, and hence the reasoning can remain at Level 2.

Suppose we choose in favour of the argument based on the distinction and decide for the claimant on the basis of A2, and report the decision as, say R(H)1/05. Now that decision will become a precedent itself. In any subsequent case in which the facts of R(H)1/05 are satisfied, there will be two conflicting and applicable precedents, R(H)1/05 and R(S) 13/54. Here we will probably not wish to revisit the Level 1 reasoning: we are likely to follow R(H)1/05 on the grounds that it is favoured both as the more specific law and as the more recent law. Normally therefore conflicting precedents will be decided at Level 2 using such principles, although the opportunity to descend to Level 1 remains. Where we have two conflicting precedents, we are making a counter example move. In the example, citing R(S) 13/54 is likely to be ineffective, because R(H)1/05 trumps R(S) 13/54, but if the conflict could show features present in the counter example that are not present in the original precedent, there would be a need to resolve the matter using the value preferences shown in the Level 1 reasoning.

The need to descend to Level 1 is required not only to address non-trumping counter examples, but also for the law to be able to change to meet changing social circumstances, as advocated by the majority decisions in *Furman* cited above. In fact, however, the freedom to revisit the Level 1 reasoning depends on the Court and the rules under which it operates. In the UK, the House of Lords (since its Practice Statement 1. W.L.R. 1234 of 1966) is not bound by its previous decisions, and may depart from precedents if it is believed that there is good reason so to do. In other words, the House of Lords is always free to descend to Level 1 if it chooses to do so, although this freedom is exercised sparingly in practice. In contrast the Court of Appeal is usually, following the opinion of Greene M.R. in *Young v Bristol Aeroplane Co Ltd* (2 All E.R. 293) in 1944, considered bound by previous decisions of the Court, except where certain exceptions apply. In the case of Social Security, all lower courts are bound by decisions of superior courts, but decisions at a given level are not binding. Thus there is a possibility of different Commissioners giving conflicting decisions, based on different choices of Level 1 values: in such cases it is normal to convene a Tribunal of three Commissioners, the decision of that Tribunal then binding the Commissioners, or the legislation may need to be changed to clarify the situation.

So far we have considered moves concerning the application of intermediate legal concepts. Here a conflict is introduced

at Level 2 and resolved potentially by considering purposes at level 1. There is also the possibility of conflict at Level 3, when two intermediate terms conferring conflicting rights are both applicable at Level 2. For example a person may satisfy the conditions to receive Sickness Benefit, while also being in a situation where the Fund is entitled to withhold it, for example if the illness arises from what is judged to be "misconduct". Here the resolution is typically controlled by some statutory provision. Where this is not so, resolution can either be through applying legal principles, or through consideration of the competing precedents at Level 2. There we can apply principles such as the more specific or more recent law, or trace the values underlying these precedents back to Level 1, so that a choice can be made between them on the basis of these values.

The above discussion of Sickness Benefit concerns an area of law which is intended to be governed by rules, and the decisions act as clarifications of the rules. The style of definition of these concepts shows that it is intended that the intermediate concepts found at Level 2 be capable, in principle, of being given necessary and sufficient conditions. Case law in this domain can be seen as elaborating those conditions to meet circumstances not foreseen in the original drafting, or to decide them in ways concomitant with the prevailing social mood.

5.2 Intermediate Concepts Defined by Sets of Factors

The use of precedents in an area with no sufficient and necessary conditions, such as the notion of trade secret is somewhat different. Here we are supposed to consider a set of aspects, none of which can be considered decisive. None of the six factors which need to be considered according to comment (b) from the Restatement of Torts, is capable of being given a yes/no answer. They relate to "the extent to which" or the "ease with which". It is thus apparent that we are not dealing with sharp concepts, but concepts which are satisfied to greater or lesser degrees.

This notion was at the heart of the HYPO system [2], which introduced the notion of dimensions to represent differing degrees of satisfaction. Each of the six factors could have formed a dimension in HYPO, although in practice while factors 1, 3 and 6 correspond closely to dimensions, and 4 and 5 represent two aspects of another, the second factor does not form an explicit dimension. (The other nine dimensions in HYPO correspond to considerations that make a person liable for disclosure if the information is considered a trade secret. This notion of degree of satisfaction was not explicitly represented in CATO (although several of the "factors" used in that program can be seen as points on a HYPO dimension), but it has been revived in more recent work. The system IBP [11] distinguishes between three kinds of factor (weak, normal and knock-out) which might be seen as representing differing degrees of satisfaction, and the empirical investigations of Chorley and Bench-Capon [12] indicate that assigning weights to factors in a manner corresponding to their location on dimensions improves the quality of explanatory theories in this domain.

Although the approach in [4] allows for different degrees of belief and promotion of values, we have not as yet performed any experiments on this sort of legal argumentation, and so we will discuss this style of definition no further here.

6. SEPARATION OF ISSUES

In HYPO no attempt to divide cases into issues was made. In CATO, issues emerged through the structuring of factors into a factor hierarchy, in which abstract factors correspond to elements taken from the Restatement on Torts. In IBP the recognition of the need to consider issues separately is taken a step further and the

Restatement of Torts is used to provide an explicit top level model in terms of issues.

Similar structuring is apparent in our approach. The top level, Level 3, resolves issues, on the basis of the attribution of intermediate concepts at Level 2. Although in *Pierson* there is a single issue (whether or not Post owned the fox), in dealing with Sickness Benefit the issues of incapacity for work and period of interruption of employment could both potentially appear. It is important to separate out issues in this way, since no amount of support for incapacity for work would suffice to give title to Sickness Benefit if the latter condition were unsatisfied. The case is different for determining the application of intermediate concepts defined in the manner of "trade secret": it might, for example, be acceptable to compensate for minimal security measures with a clear satisfaction of some of the other factors. This reasoning, however, will take place at Level 2, each cluster of factors separately determining which intermediate concepts can be used at level 3. Therefore, another advantage of using levels to structure the reasoning is that it allows us to keep considerations which can be used to compensate for one another together, and away from those which they should not affect.

7. CONCLUDING REMARKS

In this paper we have discussed how the levels of reasoning which emerged from the reconstruction of *Pierson* [4] can be used to give insight to reasoning with legal cases more generally.

We have taken as an initial starting point the distinction made by Lindahl between fact situations, intermediate legal concepts, and the consequences that flow from them, and related this distinction to the three Levels of our reconstruction. We have also followed Lindahl in distinguishing between different intermediate concepts according to how they are defined, whether by conditions intended to be sufficient to ascribe or withhold the concept, or by conditions which must be considered, although never individually necessary or sufficient. We have further illustrated this by a detailed consideration of Sickness Benefit as an example of the former and a brief consideration of Trade Secrets as an example of the latter.

We believe that this discussion establishes a model which can be used to reconstruct legal reasoning about cases, and can explain different conclusions in the light of different beliefs and goals. The underlying argumentation can be generated by agents representing the different viewpoints, as described in [4].

One important issue not resolved by this model is when (and why) agents choose to descend to Level 1, to argue for a change in the law. Dissent often results from one judge taking a legalistic view being opposed by another who takes an instrumental view. In other words, one reasons only at Level 2 while the other reasons at Level 1. It would be very helpful to have a better understanding of when this latter style of reasoning is appropriate.

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Notes

¹We use the law as it was until 1995 since this is what was used in previous AI and Law work.

²Adjudications on Social Security claims were initially given by a lay Adjudication Officer. Appeal was first to a lay tribunal of three persons, and then to a legally qualified Commissioner. Commissioners were able to select their decisions for report, and these decisions would then be binding on tribunals and Adjudication Officers. In the case of conflict among Commissioners, a Tribunal of three Commissioners would be convened to decide the issue, the decision of a Tribunal of Commissioners being binding on Commissioners. Reported decisions were communicated to Adjudication Officers through guidance setting out the consequences of the decision issued by the Office of the Chief Adjudication Officer. Thus at the Adjudicating Officer stage, decisions were made by applying the rules found in this guidance rather than independent interpretation of the decisions themselves.

³Decisions are numbered according to the following convention. “R” stands for “reported” and the letter in brackets indicates the benefit concerned: “S” for “sickness”, “U” for “unemployment” and so on. The first number indicates that the decision was the *n*th reported in the year, which follows the slash. Thus this decision is a reported decision concerning Sickness Benefit, and was the third decision of 1952.

⁴We omit S, the circumstances resulting from the performance of the action since G represents the relevant subset of these circumstances. S is of importance only if we need to distinguish what results from an action, from the desires that it satisfies.

8. REFERENCES

- [1] V. Aleven. *Teaching Case Based Argumentation Through an Example and Models*. Phd thesis, University of Pittsburgh, Pittsburgh, PA, USA, 1997.
- [2] K. D. Ashley. *Modeling Legal Argument*. MIT Press, Cambridge, MA, USA, 1990.
- [3] K. M. Atkinson, T. J. M. Bench-Capon, and P. McBurney. Justifying practical reasoning. In F. Grasso, C. Reed, and G. Carenini, editors, *Proceedings of the Fourth International Workshop on Computational Models of Natural Argument (CMNA 2004)*, pages 87–90, Valencia, Spain, 2004.
- [4] K. M. Atkinson, T. J. M. Bench-Capon, and P. McBurney. Arguing about cases as practical reasoning. In *Proceedings of the Tenth International Conference on Artificial Intelligence and Law (ICAIL 2005)*, 2005. *In press*.
- [5] T. J. M. Bench-Capon. Knowledge based systems applied to law: A framework for discussion. *Knowledge Based Systems and Legal Applications*.
- [6] T. J. M. Bench-Capon. Deep models, normative reasoning and legal expert systems. In *Proceedings of the Second International Conference on AI and Law (ICAIL 1989)*, pages 37–45. ACM Press: New York, USA, 1989.
- [7] T. J. M. Bench-Capon. *Practical Legal Expert Systems: the Relation Between a Formalisation of Law and Expert Knowledge*. 1991.
- [8] T. J. M. Bench-Capon. Persuasion in practical argument using value based argumentation frameworks. *Journal of Logic and Computation*, 13 3:429–48, 2003.
- [9] K. L. Branting. An agenda for empirical research in ai and law. In *Working Papers of the ICAIL'03 Workshop on Evaluation of Legal Reasoning and Problem-Solving Systems*, pages 28–35, Edinburgh, UK, 2003.
- [10] J. Breuker and N. den Haan. Separating world and regulation knowledge, where is the logic? In *Proceedings of the Tenth International Conference on Artificial Intelligence and Law (ICAIL 1991)*, pages 92–97. ACM Press: New York, USA, 1991.
- [11] S. Brüninghaus and K. D. Ashley. Predicting outcomes of case-based legal arguments. In *Proceedings of the Ninth International Conference on AI and Law (ICAIL-2003)*, pages 233–42. ACM Press: New York, USA, 2003.
- [12] A. H. Chorley and T. J. M. Bench-Capon. An empirical investigation of reasoning with legal cases through theory construction and application. *Artificial Intelligence and Law*, 2005. *In submission*.
- [13] A. Gardner. *An Artificial Intelligence Approach to Legal Reasoning*. 1987.
- [14] K. M. Greenwood, T. J.M. Bench-Capon, and P. McBurney. Towards a computational account of persuasion in law. In *Proceedings of the Ninth International Conference on AI and Law (ICAIL-2003)*, pages 22–31. ACM Press: New York, USA, 2003.
- [15] H. L. A. Hart. *The Concept of Law*. Oxford University Press, Oxford, UK, 1961.
- [16] L. Lindahl. Deduction and justification in the law. the role of legal terms and concepts. *Ratio Juris*, 17 2:182–202, 2004.
- [17] L. Lindahl and J. Odelstad. Normative positions within an algebraic approach to normative systems. *Journal of Applied Logic*, 17 2, 2005. *To appear*.
- [18] D. Neligan. Social security case law: Digest of commissioner’s decisions. HMSO, London, 1979.
- [19] A. Ross. Tu-tu. In O. Borum and K. Illum, editors, *Festskrift til Henry Ussing*. Kobenhavn Juristforbundet, 1951.
- [20] D. N. Walton. *Argument Schemes for Presumptive Reasoning*. Lawrence Erlbaum Associates, Mahwah, NJ, USA, 1996.